F–3045

Sub. Code
7MCE1C1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science

APPLIED MATHEMATICS FOR COMPUTER SCIENCE

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Define tautology. Give example.

2. What is the condition for a statement A to tautologically imply a statement B?

3. What is existential Quantifier? Give example.

4. Define disjunctive normal form.

5. Define Rooted tree. Give example.

6. Define level and height of a rooted tree. Give example.

7. Define the canonical form of linear programming problem.

8. What is meant by optimum solution of an LPP?

9. State the mathematical formulation of an assignment problem.

10. What is meant by prohibited assignments?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Prove that following implications

(i) $(P \wedge Q) \Rightarrow (P \rightarrow Q)$

(ii) $P \Rightarrow (Q \rightarrow P)$.

Or

(b) Show the following equivalence

$\neg (P \rightleftarrows Q) \Leftrightarrow (P \vee Q) \wedge \neg (P \wedge Q)$.

12. (a) Obtain the disjunctive normal form of $P \vee (Q \wedge R)$.

Or

(b) Obtain the disjunctive normal form of $\neg (P \vee Q) \rightleftarrows (P \wedge Q)$.

13. (a) Explain spanning tree with example.

Or

(b) Explain binary tree with example.

14. (a) Use graphical method to solve the following problem

Maximize $z = 2x + 3y$

Subject to $x + y \leq 30$

$x - y \geq 0$

$y \geq 3$, $0 \leq x \leq 20$, $0 \leq y \leq 12$

Or

(b) An animal feed company must produce 200lbs of a mixture containing the ingredients X_1 and X_2. X_1 costs Rs. 3 per lb and X_2 cost Rs. 8 per lb. Note that more than 80 lbs of X_1 can be used and minimum quantity to be used for X_2 is 60 lbs. Find how much of each ingredient should be used if the company wants to minimize the cost. Formulate the above problem.

15. (a) Obtain an initial basic feasible solution to the following transportain problem using Vogel's approximation method.

	To			Available
	7	3	4	2
From	2	1	3	3
	3	4	6	5
Demand	4	1	5	

Or

(b) The Head of the department has five jobs A, B, C, D, E and five sub-ordinates V, W, X, Y, Z. The number of hours each man would take to perform each job is as follows.

$$\begin{array}{c c} & \begin{array}{ccccc} V & W & X & Y & Z \end{array} \\ \begin{array}{c} A \\ B \\ C \\ D \\ E \end{array} & \begin{pmatrix} 3 & 5 & 10 & 15 & 8 \\ 4 & 7 & 15 & 18 & 8 \\ 8 & 12 & 20 & 20 & 12 \\ 5 & 5 & 8 & 10 & 6 \\ 10 & 10 & 15 & 25 & 10 \end{pmatrix} \end{array}$$

How should the jobs be allocated to minimize the total time?

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Obtain an equivalent formula for the following which contains neither the biconditional or conditional

    (a) $P \wedge (Q \rightleftarrows R) \vee (R \rightleftarrows P)$

    (b) $((P \vee Q) \wedge R) \rightarrow (P \vee R)$.

17. Obtain the principal disjunctive normal forms of the following and also identify whether they are tautologies or not

    (a) $Q \wedge (P \vee \neg Q)$

    (b) $(Q \rightarrow P) \wedge (\neg P \wedge Q)$.

18. Discuss in detail about matrix representation of Graphs.

19. Use two-phage simplex method to solve the following LPP.

    Maximize $Z = 5x_1 + 8x_2$

    Subject to $3x_1 + 2x_2 \geq 3$

    $x_1 + 4x_2 \geq 4$

    $x_1 + x_2 \leq 5$, $x_1, x_2 \geq 0$.

20. Find the optimum solution to the following transportation problem using MODI method.

	T_1	T_2	T_3	T_4	Availability
B_1	5	3	6	2	19
B_2	4	7	9	1	37
B_3	3	4	7	5	34
Requirement	16	18	31	25	

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F–3046

Sub. Code
7MCE1C2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science

DESIGN AND ANALYSIS OF ALGORITHMS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Define space and time complexity.

2. Differentiate stack and queue.

3. Write the recurrence relation of divide and conquer algorithm.

4. Write the recurrence relation for computing time of quick sort.

5. What is feasible solution?

6. Write the purpose of Huffman codes.

7. Define multistage graph.

8. Give example for biconnected graph.

9. What is backtracking?

10. Give example for hamiltonian cycles.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Give a brief note on recursive function with example.

Or

(b) Write an algorithm for stack operations.

12. (a) Explain how to use recursion for finding maximum and minimum of set of elements.

Or

(b) Prove that the average computing time $T_A(n)$ of selection sort is O(n).

13. (a) Find the feasible solution to the job sequencing instance $n = 4$, $\{p_1, p_2, p_3, p_4\} = \{100, 10, 15, 27\}$ and $\{d_1, d_2, d_3, d_4\} = \{2, 1, 2, 1\}$.

Or

(b) Write greedy algorithm to generate shortest path.

14. (a) Explain Bellman Ford algorithm to compute shortest path.

Or

(b) Write an algorithm for tree traversals.

15. (a) Explain how to estimate the efficiency of backtracking.

Or

(b) Describe the function for Knapsack problem.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain different representation of Graph.

17. Discuss about binary search with example.

18. Describe the stages of Kruskal's algorithm.

19. Explain breadth first search tree.

20. Give a brief note on Graph Coloring.

F–3047

Sub. Code
7MCE1C3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science

ADVANCED JAVA PROGRAMMING

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Section A ($10 \times 2 = 20$)

Answer **all** questions.

1. What is JDBC – ODBC Bridge?

2. What is the purpose of SQL Exception class?

3. What are the two kinds of TCP sockets in Java?

4. How is datagram implemented in Java?

5. What is the purpose of Bound property?

6. What is meant by persistance? How is it achieved in Java Bean?

7. What is servlet? What are the advantages of servlets over CGI?

8. What is a cookie?

9. Tabbed panes are encapsulated by ———— class, which extends ————.

10. What methods are used for drawing Ellipses and circles?

Section B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) What is JDBC? How does it work?

Or

(b) Explain JDBC metadata classes.

12. (a) Explain URL and URL connection classes with example code.

Or

(b) With a sample code, explain how the contents of a document is cached on a server.

13. (a) Explain JAR files.

Or

(b) What is Java Bean? Explain its advantages and disadvantages?

14. (a) What is meant by session Tracking? How is it achieved in HTTP servlet.

Or

(b) Draw a state diagram and explain the life cycle of servlet.

15. (a) Discuss the constructors and methods of color class.

Or

(b) How is a table created using swing class?

Section C (3 × 10 = 30)

Answer any **three** questions.

16. Explain the Anatomy of a JDBC application and the classes and statements involved.

17. Write a simple client/server application using RMI and explain the concepts.

18. Discuss the Design patterns for properties and Events.

19. Discuss any four important classes and interfaces in Javax.servlet package.

20. How is a Tree created in an Applet? Explain the various classes and methods used?

Ws9

F–3048

Sub. Code
7MCE1C4

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science

PRINCIPLES OF COMPILER DESIGN

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** the questions.

1. Define a compiler.

2. Define a string with an example.

3. Construct a parse tree for id + id*id.

4. List down the four actions performed by a shift-reduce parser.

5. Draw the syntax tree for a*(b + c)/d.

6. Write about unconditional jumps.

7. Write down the format of symbol table.

8. Specify any two block structured languages.

9. Define a basic block.

10. What do you mean by an optimal ordering?

Ws9

Part B (5 × 5 = 25)

Answer **all questions**, choosing either (a) or (b).

11. (a) Why do we need translators? Explain.

Or

(b) Explain the method of constructing a deterministic finite automation from a non-deterministic one.

12. (a) Write about ambiguous grammar with an example.

Or

(b) Write an algorithm for the construction of an SLR parsing table.

13. (a) Explain the method of evaluating the postfix expressions by an example.

Or

(b) Discuss about the statements that alter the flow of control.

14. (a) Discuss about Hash tables.

Or

(b) Explain about the storage allocation in Block-structured languages.

15. (a) How can you construct a DAG? Explain.

Or

(b) Discuss in brief the problems in code generation.

Ws9

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Describe the structure of a compiler with a neat diagram.

17. Explain the stack implementation of Shift-Reduce Parsing with an example.

18. Discuss about any two kinds of intermediate codes used in compilers with examples.

19. Discuss the storage allocation in brief.

20. Explain a simple code generator in detail.

F–3049

Sub. Code
7MCE1E1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science

Elective — OBJECT ORIENTED ANALYSIS AND DESIGN

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What are the characteristics of an object oriented systems?

2. What is meant by overriding?

3. Define scenarios and event trace.

4. What is a constraint? What are the different types of constraints?

5. What are the steps required in constructing an object model?

6. What is an operation in OOAD parlance? What are the different sources of operations?

7. What are the two forms of layered architecture? When is one preferred over the other?

8. Write down any four kinds of a system.

9. Draw the implementations of stack using Inheritance and delegation? Which one is better than the other?

10. What are the trade-offs between information hiding and optimization?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) How do you establish relationships among objects and classes?

Or

(b) Draw an object model of windowing system discuss the underlying O.O. concepts.

12. (a) Discuss state Generalization with example.

Or

(b) Explain the relation of object and dynamic models.

13. (a) Discuss scenario, event and event trace with an example.

Or

(b) How are object attributes identified and right attributes selected?

14. (a) How are sub systems allocated to processors and tasks?

Or

(b) Discuss the two kinds of control flows in a software system.

15. (a) Discuss any three issues in designing algorithms.

Or

(b) What are the three different models in O.O. Design? How are they combined?

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Discuss aggregation and multiple inheritance.

17. Discuss the components of DFD and explain how a functional model is designed using DFD.

18. Discuss the steps performed in constructing a dynamic model.

19. Discuss any four common architectural frameworks.

20. Explain design optimization. Why is it required?

F–3050

Sub. Code
7MCE1E2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science

Elective : SYSTEM SOFTWARE

(CBCS – 2017 onwards)

Time : 3 Hours　　　Maximum : 75 Marks

Part A　　　$(10 \times 2 = 20)$

Answer **all** the questions.

1. List down the language processing activities.
2. Define a production with its format.
3. Give an example for a DFA.
4. Write down the format of an assembly language statement.
5. Write any two expansion time statements with their syntax.
6. Write the post fix form of $a + b * c + d * e \uparrow f$.
7. What are the components of a interpreter?
8. Define linking.
9. Specify the two object program forms supported by MSDOS.
10. What is a programming environment?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Write briefly about intermediate representation with its properties.

Or

(b) Write short notes on Entry formats.

12. (a) How DFA's can be built? Explain with an example.

Or

(b) Discuss about any two advanced assembler directives.

13. (a) Write about positional and keyword parameters with examples.

Or

(b) Discuss about the various parameter passing mechanisms.

14. (a) Describe pure and impure interpreters.

Or

(b) Write down the format of an object modula.

15. (a) Discuss about program testing and debugging.

Or

(b) Write about program environment with its components.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Describe any two types of table organization in brief.

17. Describe top down parsing with its implementation with an example.

18. Explain the design of a macro preprocessor.

19. Discuss about some of the optimizing transformations used in compilers.

20. Describe the structure of user Interface and UIMS.

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F–3051		Sub. Code
		7MCE1E3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer science

Elective – SOFTWARE ENGINEERING

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** the questions.

1. What is meant by system software and application software?

2. State the distinguishing feature of the spiral model.

3. What is QFD?

4. Define use-case and actor.

5. State the software equation for the cost estimation model.

6. Mention the ways in which LOC and FP are used during software project estimation.

7. What is the purpose of black– box and while–box testing?

8. State the benefit of smoke testing.

9. What are the three factors that have profound influence on software quality and organizational performance?

10. Define CBSE.

Part B (5 × 5 = 25)

Answer **all** the questions, choosing either (a) or (b).

11. (a) State the characteristics of software? Discuss.

Or

(b) Write short notes on Legacy software.

12. (a) Describe the steps required to initiate requirements engineering.

Or

(b) Explain how to write effective use-cases in detail.

13. (a) Explain process-based estimation with examples.

Or

(b) Enlighten about empirical estimation models.

14. (a) Explain basis path testing in detail.

Or

(b) Describe validation testing in detail.

15. (a) Write short notes on economics of CBSE.

Or

(b) Describe in detail about Reusable components and Reuse environment.

Part C (3 × 10 = 30)

Answer any **THREE** questions.

16. Elaborate on prescriptive models and incremental models in detail.

17. Describe in detail about the function accomplished during the requirement engineering tasks.

18. Discuss briefly about problem- based estimation and Use-Case based estimation with examples.

19. Explain various black-box testing methods.

20. Describe in detail about software measurement and also the metrics used for software quality.

F–3052

Sub. Code
7MCE2C1

M.Sc DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer Science

COMPUTER SYSTEM ARCHITECTURE

(CBCS – 2017 onwards)

Time :3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What is CPU? What are its major components?
2. Define Stack.
3. How do you define the internal hardware organization of a digital computer?
4. Define Selective complement operation.
5. What is the advantage of Microprogrammed Control unit?
6. What is the purpose of Control Address Register?
7. What is meant by Asynchronous data transfer?
8. Define Hit ratio.
9. What is meant by delayed branch?
10. Write any two characteristics of RISC architecture.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain Instruction formats.

Or

(b) Discuss the purpose of Status Register in Program Control.

12. (a) A digital computer has a common bus system for 16 registers of 32 bits each. The bus is constructed with multiplexers.

(i) How many selection input are there in each multiplexer?

(ii) What size of multiplexers are needed?

(iii) How many multiplexers are there in the bus?

Or

(b) Discuss Input-Output configuration.

13. (a) Define the following

(i) Micro operation

(ii) Microinstruction

(iii) Micro program

(iv) Microcode

Or

(b) Explain Address Sequencing in Microprogram control unit.

14. (a) Explain Associative memory.

Or

(b) Explain I/O Interface and connection of I/O bus to Input and Output devices.

15. (a) Discuss the characteristics of Multiprocessors.

Or

(b) Explain Array Processing.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain any six Addressing modes with examples.

17. Explain Instruction Cycle with necessary flowchart.

18. Explain Microprogram sequencer.

19. Explain Parallel Priority interrupt hardware.

20. Explain Instruction Pipeline and the difficulties associated with it.

F–3053

Sub. Code
7MCE2C2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer Science

.NET TECHNOLOGY

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A ($10 \times 2 = 20$)

Answer **all** questions.

1. What is .NET Framework?

2. What is object oriented programming?

3. Define scope.

4. What is mean by docking a control?

5. What is the difference between Tree and list views?

6. What is Typography?

7. Define name space.

8. Why do we need validator control?

9. What is the difference between ADO and ADO .Net?

10. What is a Repeater?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Write a short note on .Net Assemblies.

Or

(b) How will you create a structure? Explain with an example.

12. (a) Describe the facilities for handling sub procedures in VB Net.

Or

(b) How will you create dialog boxes? Explain with an example?

13. (a) Describe the funcbonality of splitters and notify Icons

Or

(b) Briefly describe file handling in VB .Net.

14. (a) Explain the usage of Global. asax file.

Or

(b) Discuss on the creation of user custom controls.

15. (a) Explain the characteristics of ADO.Net

Or

(b) How data blinding is used in ASP.Net Applications? Explain with example.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. How is method overloading different from method overriding? Explain with example.

17. Elaborate on conditional statement in VB.Net with an Example.

18. Discuss about the significance of built in Dialog boxes.

19. Give a detailed note on Http Request and Http response.

20. Explain the step to implement forms- based security with Diagram.

F–3054

Sub. Code
7MCE2C3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer science

DISTRIBUTED OPERATING SYSTEM

(CBCS – 2017 onwards)

Time : 3 hours — Maximum : 75 Marks

Part A — $(10 \times 2 = 20)$

Answer **all** questions.

1. What are the two primary tasks of operating system?

2. What are PSEs?

3. What are the two basic methods for information sharing?

4. Define buffering.

5. Mention the four factors that are influencing the block size selection?

6. Why does a computer need timer mechanism?

7. Define: File system

8. What do you mean by mutable file model?

9. What do you mean by external security?

10. What are the main types of authentication in distributed system?

Part B (5× 5= 25)

Answer **ALL** questions, choosing either (a) or (b).

11. (a) What is DCE? Explain its components in detail.

Or

(b) Differentiate LAN and WAN using their key characteristics.

12. (a) Explain the role of syncronization in distributed system message passcing.

Or

(b) Explain the many-to many communication scheme in group communication of message passing.

13. (a) Write down the advantages of DSM.

Or

(b) Explain the WFG- based distributed algorithm for deadlock detection.

14. (a) Write the difference between replication and caching.

Or

(b) State the general principles for designing distributed file system.

15. (a) Explain about key distribution in asymmetric cryptosystems.

Or

(b) Explain the mechanism of password based authentication system.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Discuss about the issues in designing distributed system.

17. What are the desirable features of a good message-passing system? Explain.

18. Explain the different approaches used to implement mutual exclusion.

19. What are the desirable features of good distributed file system? Explain.

20. Explain the concept of digital signature for distributed system security in detail.

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F–3055		Sub. Code
		7MCE2E1

M.SC DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer science

Elective – MOBILE COMPUTING

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What is meant by laptop computing?

2. Distinguish between mobility and portability.

3. Define Multiplexing.

4. What is mobility management?

5. What is agent discovery?

6. What do you mean by registration reply?

7. What is a Datagram?

8. What is foreign agent key?

9. What is smooth handoff?

10. Define Ingress filtering.

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) What is mobile networking? Explain.

Or

(b) Describe the architectural model of IETF Mobile IP protocol.

12. (a) Write a note on signal propagation.

Or

(b) Briefly explain about handover in cellular systems.

13. (a) Explain the operation of mobile agent.

Or

(b) Explain the procedure to register mobile node.

14. (a) Write a note on generic routing encapsulation.

Or

(b) How do you bind caches? Explain.

15. (a) Write about DHCP protocol and its functions.

Or

(b) What is reverse tunneling? Explain.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain the overview of IP and routing with neat diagram.

17. Describe the GSM system architecture with appropriate diagram.

18. Explain in detail about agent advertisement.

19. Explain the different route optimization message formats.

20. Explain in detail about Wireless Telephony Application.

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F–3057

Sub. Code
7MCE2E3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer Science

Elective — COMPUTER GRAPHICS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** the questions.

1. Define Morphing.

2. Distinguish between image processing and computer graphics.

3. State the attributes of character.

4. Define Shear.

5. What is the purpose of input modes of input functions?

6. Define point clipping.

7. State any two applications of depth cueing.

8. What is meant by parallel and perspective projections?

9. Define cabinet projection.

10. What is vanishing point?

Part B (5 × 5 = 25)

Answer **all** the questions, choosing either (a) or (b).

11. (a) Describe midpoint circle algorithm in detail.

Or

(b) Explain the techniques used for color displays.

12. (a) Write short notes on character attributes.

Or

(b) Explain composite transformations with proper illustration.

13. (a) Describe in detail about text clipping.

Or

(b) Write briefly about segment attributes.

14. (a) Explain the three dimensional graphics packages in detail.

Or

(b) Discuss briefly about the three-dimensional display techniques.

15. (a) Explain general parallel-projection transformations in detail.

Or

(b) Explain back-face detection method in detail.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Discuss briefly about interactive input devices.

17. Explain in detail about the following transformations in detail.

    (a) Reflection

    (b) Shear

    (c) Translation, Scaling and Rotation

18. Enlighten about the interactive-picture construction methods.

19. Explain the three dimensional transformations in detail.

20. Explain depth buffer method in detail.

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F3058

Sub. Code
7MCE2E4

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer Science

Elective — PARALLEL PROCESSING

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **All** Questions.

1. Define parallelism.

2. What is hypercubes?

3. What is ring network?

4. What is control parallelism?

5. Write the types of mapping?

6. Define message passing.

7. Write any two performance laws.

8. Write any two parallel search algorithms.

9. What is multiport memory?

10. Expand NUMA.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) How to implement parallel processing.

Or

(b) Describe the computational demands of parallel processing.

12. (a) Give a brief note on loosely coupled systems.

Or

(b) Describe mesh & hypercube architecture.

13. (a) Differentiate message passing & shared adders space.

Or

(b) Discuss three types of Granularity.

14. (a) Explain Amdahl's & Gustafson's laws.

Or

(b) Write a note on types of complexities.

15. (a) Explain cross bar & multiport memory.

Or

(b) Discus about eache coherence.

Part C (3 × 10 = 30)

Answer any **Three** questions.

16. Describe the major issues in parallel processing.

17. Explain tightly coupled systems.

18. Discuses the types of mapping.

19. Explain depth first & breadth first search algorithms.

20. Describe memory Contention techniques.

F–3059

Sub. Code
7MCE2E5

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Comuputer Science

Elective : ADVANCED DATABASE SYSTEMS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** the questions.

1. What is data dictionary?

2. Differentiate between schema and instances.

3. What are the main reasons for the delay in development and implementation of relational model.

4. Compare the derived attribute and stored attribute.

5. Describe the concept of full functional dependency.

6. Write the purpose of normalising data.

7. What is client/server computing? What are its main components?

8. What is semi-JOIN?

9. What are multimedia databases?

10. What are the newer modules available for MySQL stability.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Write short notion the functions and responsibilities of DBAs.

Or

(b) Write a note on data model.

12. (a) Describe with example the different types of keys used in relational model.

Or

(b) An enterprise database needs to store information as follows :

EMPLOYEE(EMP-ID, SALARY, PHONE)

DEPARTMENTS(DEPT-ID, DEPT-NAME, BUDGET)

EMPLOYEE-CHILDREN(NAME, AGE)

Employees 'work' in departments. Each department is 'managed by' an employee. A child must be identified uniquely by 'name' when the parent (who is an employee) is known. Once the parent leaves the enterprise, the information about the child is not required. Draw an E-R diagram that captures the above information.

13. (a) Illustrate the three Armstrong's axioms using diagrammatical representation.

Or

(b) Consider the universal relation R (A, B, C, D, E, F, G, H, I, J) and the set of FDs are given as

$F = (\{A, B\} \to \{A\} \to \{D, E\}, \{B\} \to \{F\}, \{F\} \to \{G, H\},$

$\{D\} \to \{I, J\}.$

(i) What is the key of R?

(ii) Decompose R into 2NF, then 3NF relations.

14. (a) What is middleware system architecture? Explain with a neat sketch and an example.

Or

(b) What is distributed locking? What are its advantages and disadvantages?

15. (a) What is a mobile database? Explain the architecture of mobile database with meat sketch.

Or

(b) Write the features of MySQL 4.1.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain the important operations performed on the data file with example.

17. What are the problems that arise when constructing an E-R model? How will you resolve them? Illustrate with examples.

18. Define the concept of multi valued dependency and describe how this concept relates to 4NF. Provide an example to illustrate your answer.

19. Explain the functioning of two-phase and three-phase commit protocols used in recovery control of distributed database system.

20. Define MySQL database. How will you create the MySQL tables? Explain with examples the insertion of data into and retrieval of information from the MySQI table.

F–3060

Sub. Code
7MCE2E6

M.Sc. DEGREE EXAMINATION,
NOVEMBER 2019

Second Semester

Computer Science

***Elective* — DIGITAL IMAGE PROCESSING**

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What are the modalities of imaging based on CAT principle?

2. Define sampling and quantization.

3. What is meant by Bit-plane slicing?

4. Define histogram of a digital image.

5. What is spatial and temporal aliasing? Give examples.

6. Define 2-D ideal highpass filter.

7. List out order-statistic filters.

8. State Fourier-slice theorem.

9. What is meant by intensity slicing?

10. What is meant by Radiance and Luminance?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain image representation, sampling and quantization in detail.

Or

(b) Explain the role of image transforms and probabilistic methods in image processing.

12. (a) Explain intensity-level slicing and bit-plane slicing in detail.

Or

(b) Write short notes histogram matching.

13. (a) Explain the following properties of 2-D Discrete Fourier Transform:

(i) Symmetry

(ii) Fourier Spectrum and Phase angle.

Or

(b) Describe Image Smoothing using frequency domain filters in detail.

14. (a) Describe Constrained Least Squares filtering.

Or

(b) Explain the model of the image Degradation/Restoration Process in detail.

15. (a) Enlighten about color models.

Or

(b) Discuss in brief about the image compression fundamentals.

Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. Discuss in detail about the relationships between pixels in a digital image.

17. How fuzzy sets used in intensity transformations? Explain.

18. Describe image sharpening using frequency domain filters in detail.

19. Explain the three principal ways to estimate the degradation function for use in image restoration.

20. Discuss in detail about the following image compression methods.

    (a) Huffman coding

    (b) LZW coding

    (c) Run-Length coding

    (d) Wavelet coding.

F–3061

Sub. Code
7MCE3C1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Computer science

CRYPTOGRAPHY AND NETWORK SECURITY

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What are the services of security?

2. What is one-time pad?

3. What is block cipher?

4. State the difference between Rijndael and AES.

5. What are the keys used for asymmetric encryption?

6. Write the purpose of Diffie-hellman key exchange.

7. What is hash function?

8. What are the properties of digital signature?

9. What is S/MIME?

10. Write the use of Handshake protocol.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Briefly describe categories of passive and active security attacks.

Or

(b) Explain Caesar cipher and play fair cipher with example

12. (a) Summarize the strength of DES.

Or

(b) Briefly describe the key expansion algorithm.

13. (a) Explain the applications and requirements of public key cryptography.

Or

(b) Discuss about Elliptic curve cryptography.

14. (a) Write a note on cryptanalysis.

Or

(b) Explain public key encryption approach to deal with replay attacks.

15. (a) Explain different types of keys exchange methods.

Or

(b) Discuss the principle services provided by PGP.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Briefly define categories of security services.

17. Explain in detail about AES structure.

18. Describe RSA algorithm with example.

19. Discuss about Digital signature algorithm.

20. Explain in detail about secure socket layer architecture.

———————

F–3062

Sub. Code
7MCE3C2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Computer Science

PROGRAMMING IN PHP

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. State the added features of PHP 4 when compared to PHP 3.

2. Distinguish between Value assignment and Reference assignment.

3. What is the purpose of break and continue statement.

4. List out any four inbuilt string functions.

5. Write a code for checking existence of a file?

6. What is the use of forms?

7. Define a class.

8. Write a code to find the number of rows in a table?

9. What is session?

10. Expand AJAX and DOM.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain how PHP scripts work.

Or

(b) What are Type-related functions and type identifier functions? Explain.

12. (a) Elucidate the For and For each looping statements with suitable example.

Or

(b) Define function. Explain the concept of passing arguments to a function by reference.

13. (a) Write a short notes on file creation and deletion.

Or

(b) How do you get input from user in PHP?

14. (a) Discuss about the base exception class and its methods.

Or

(b) Write notes on creating session cookie?

15. (a) Explain in detail about Email creation in PHP?

Or

(b) Write about methods and properties of Http Request?

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Discuss in detail about the PHP's supported Data types.

17. How do you sort the arrays in PHP? Explain with example.

18. How do you read the characters from a file? Explain it.

19. Discuss in detail about table creation and update the table structure.

20. Describe the concepts of starting a session and working with session variables.

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F-3063

Sub. Code
7MCE3C3

M.Sc DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Computer Science

DATA MINING AND DATA WAREHOUSING

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. How is a data warehouse different from a database?
2. List out the strategies for data reduction.
3. What is a data cube?
4. Give the contents of metadata repository.
5. Define the accuracy of a classifier.
6. What is back propagation?
7. List out the categories of clustering methods.
8. What are the two types of hierarchical clustering methods?
9. Name the three types of dimensions in spatial data cube.
10. What is a signature file?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain about classification and prediction with suitable example.

Or

(b) Discuss about Principal Component Analysis.

12. (a) Write notes on snowflake schema for multidimensional databases.

Or

(b) Discuss about the OLAP operations in the multidimensional data model.

13. (a) Describe the issues regarding classification and prediction.

Or

(b) Write notes on Bayes' theorem.

14. (a) Write notes on binary variables.

Or

(b) Discuss about grid based methods.

15. (a) Give explanation for text retrieval methods.

Or

(b) How data mining can be applied for financial data analysis?

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Give detailed explanation for data cleaning process.

17. Give the architecture for On-Line Analytical Mining and explain.

18. Discuss in detail about classification by back propagation.

19. Explain the k-means and k-medoid methods for partitioning.

20. Explain the various dimensionality reduction techniques for text.

———————

F-3064

Sub. Code
7MCE3E3

M.Sc DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Computer Science

Elective- MULTIMEDIA SYSTEM

(CBCS – 2017onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **All** questions.

1. What are the hardware/software components needed for a multimedia development system?

2. Mention some of the image formats used in multimedia.

3. What is the use of graphics in multimedia?

4. Mention the various CD formats.

5. What is meant by adaptive data pulse code modulation?

6. What are the key parameters need to be considered to evaluate compression performance?

7. What is voice mail?

8. Define HTML.

9. What is meant by Hoptic signals?

10. Define scientific visualization.

Part B (5 × 5 = 25)

Answer **All** questions, choosing either (a) or (b).

11. (a) Write briefly about Multimedia hardware.

Or

(b) Discuss about Multimedia standards.

12. (a) Write short notes on Text.

Or

(b) Discuss about Digital Audio.

13. (a) Write short notes on Transform representation of sounds.

Or

(b) Describe the various file storage in video.

14. (a) Write short notes on MIME.

Or

(b) Discuss briefly about the features of Authoring tools in multimedia.

15. (a) Discuss about the mode of interaction.

Or

(b) Describe about the modelling virtual world.

Part C (3 × 10 = 30)

Answer any **Three** questions.

16. Explain in detail about the Multimedia Applications.

17. Write briefly about the video.

18. Discuss in brief about the digital representation of sound.

19. Explain about the Internet content in Multimedia.

20. Explain in detail about the sensor Hardware.

F–3065

Sub. Code
7MCE3E6

M.Sc DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Computer science

Elective-WAP AND XML

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. List the components of WAP.

2. Write the features of WAP.

3. Expand UML.

4. Define WAP gateway.

5. What is Event?

6. Write any 4 standard Libraries in WML.

7. What is the purpose of XML?

8. Write the use of CSS.

9. Write the difference between attribute & elements.

10. What is Unicode character set?

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain in detail about WAP protocal stack.

Or

(b) Give a note on WAP resources.

12. (a) Compare web model with WAP model.

Or

(b) Describe WML structures.

13. (a) Explain selection statement with example.

Or

(b) Write about input &output statements with example.

14. (a) Write a XML document for product catalog.

Or

(b) Write a XML document for displaying the covariant function of Maxwell's equation in math ML.

15. (a) How to create tables using XSL?

Or

(b) Explain &give example for Attributes Elements.

Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. Explain in detail about WAP architecture.

17. Explain how to position a WAP gateway in the network.

18. Give suitable example for

    (a) Looping statement (4)

    (b) Automatic type conversion (4)

    (c) Operators. (2)

19. Describe how to prepare a style sheet for document display.

20. Write a brief note on legacy character sets.

F–3045

Sub. Code
7MCE1C1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science

APPLIED MATHEMATICS FOR COMPUTER SCIENCE

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Define tautology. Give example.
2. What is the condition for a statement A to tautologically imply a statement B?
3. What is existential Quantifier? Give example.
4. Define disjunctive normal form.
5. Define Rooted tree. Give example.
6. Define level and height of a rooted tree. Give example.
7. Define the canonical form of linear programming problem.
8. What is meant by optimum solution of an LPP?
9. State the mathematical formulation of an assignment problem.
10. What is meant by prohibited assignments?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Prove that following implications

(i) $(P \wedge Q) \Rightarrow (P \rightarrow Q)$

(ii) $P \Rightarrow (Q \rightarrow P)$.

Or

(b) Show the following equivalence

$\neg(P \rightleftarrows Q) \Leftrightarrow (P \vee Q) \wedge \neg(P \wedge Q)$.

12. (a) Obtain the disjunctive normal form of $P \vee (Q \wedge R)$.

Or

(b) Obtain the disjunctive normal form of $\neg(P \vee Q) \rightleftarrows (P \wedge Q)$.

13. (a) Explain spanning tree with example.

Or

(b) Explain binary tree with example.

14. (a) Use graphical method to solve the following problem

Maximize $z = 2x + 3y$

Subject to $x + y \leq 30$

$x - y \geq 0$

$y \geq 3$, $0 \leq x \leq 20$, $0 \leq y \leq 12$

Or

(b) An animal feed company must produce 200lbs of a mixture containing the ingredients X_1 and X_2. X_1 costs Rs. 3 per lb and X_2 cost Rs. 8 per lb. Note that more than 80 lbs of X_1 can be used and minimum quantity to be used for X_2 is 60 lbs. Find how much of each ingredient should be used if the company wants to minimize the cost. Formulate the above problem.

15. (a) Obtain an initial basic feasible solution to the following transportain problem using Vogel's approximation method.

	To			Available
	7	3	4	2
From	2	1	3	3
	3	4	6	5
Demand	4	1	5	

Or

(b) The Head of the department has five jobs A, B, C, D, E and five sub-ordinates V, W, X, Y, Z. The number of hours each man would take to perform each job is as follows.

$$\begin{array}{c} \\ A \\ B \\ C \\ D \\ E \end{array} \begin{array}{c} \begin{array}{ccccc} V & W & X & Y & Z \end{array} \\ \begin{pmatrix} 3 & 5 & 10 & 15 & 8 \\ 4 & 7 & 15 & 18 & 8 \\ 8 & 12 & 20 & 20 & 12 \\ 5 & 5 & 8 & 10 & 6 \\ 10 & 10 & 15 & 25 & 10 \end{pmatrix} \end{array}$$

How should the jobs be allocated to minimize the total time?

Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. Obtain an equivalent formula for the following which contains neither the biconditional or conditional

(a) $P \wedge (Q \rightleftarrows R) \vee (R \rightleftarrows P)$

(b) $((P \vee Q) \wedge R) \rightarrow (P \vee R)$.

17. Obtain the principal disjunctive normal forms of the following and also identify whether they are tautologies or not

(a) $Q \wedge (P \vee \neg Q)$

(b) $(Q \rightarrow P) \wedge (\neg P \wedge Q)$.

18. Discuss in detail about matrix representation of Graphs.

19. Use two-phage simplex method to solve the following LPP.

Maximize $Z = 5x_1 + 8x_2$

Subject to $3x_1 + 2x_2 \geq 3$

$x_1 + 4x_2 \geq 4$

$x_1 + x_2 \leq 5$, $x_1, x_2 \geq 0$.

20. Find the optimum solution to the following transportation problem using MODI method.

	T_1	T_2	T_3	T_4	Availability
B_1	5	3	6	2	19
B_2	4	7	9	1	37
B_3	3	4	7	5	34
Requirement	16	18	31	25	

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F–3046

Sub. Code
7MCE1C2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science

DESIGN AND ANALYSIS OF ALGORITHMS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Define space and time complexity.

2. Differentiate stack and queue.

3. Write the recurrence relation of divide and conquer algorithm.

4. Write the recurrence relation for computing time of quick sort.

5. What is feasible solution?

6. Write the purpose of Huffman codes.

7. Define multistage graph.

8. Give example for biconnected graph.

9. What is backtracking?

10. Give example for hamiltonian cycles.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Give a brief note on recursive function with example.

Or

(b) Write an algorithm for stack operations.

12. (a) Explain how to use recursion for finding maximum and minimum of set of elements.

Or

(b) Prove that the average computing time $T_A(n)$ of selection sort is O(n).

13. (a) Find the feasible solution to the job sequencing instance $n = 4$, $\{p_1, p_2, p_3, p_4\} = \{100, 10, 15, 27\}$ and $\{d_1, d_2, d_3, d_4\} = \{2, 1, 2, 1\}$.

Or

(b) Write greedy algorithm to generate shortest path.

14. (a) Explain Bellman Ford algorithm to compute shortest path.

Or

(b) Write an algorithm for tree traversals.

15. (a) Explain how to estimate the efficiency of backtracking.

Or

(b) Describe the function for Knapsack problem.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain different representation of Graph.

17. Discuss about binary search with example.

18. Describe the stages of Kruskal's algorithm.

19. Explain breadth first search tree.

20. Give a brief note on Graph Coloring.

F–3047

Sub. Code
7MCE1C3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science

ADVANCED JAVA PROGRAMMING

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Section A $(10 \times 2 = 20)$

Answer **all** questions.

1. What is JDBC – ODBC Bridge?

2. What is the purpose of SQL Exception class?

3. What are the two kinds of TCP sockets in Java?

4. How is datagram implemented in Java?

5. What is the purpose of Bound property?

6. What is meant by persistance? How is it achieved in Java Bean?

7. What is servlet? What are the advantages of servlets over CGI?

8. What is a cookie?

9. Tabbed panes are encapsulated by ———————— class, which extends ————————.

10. What methods are used for drawing Ellipses and circles?

Section B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) What is JDBC? How does it work?

Or

(b) Explain JDBC metadata classes.

12. (a) Explain URL and URL connection classes with example code.

Or

(b) With a sample code, explain how the contents of a document is cached on a server.

13. (a) Explain JAR files.

Or

(b) What is Java Bean? Explain its advantages and disadvantages?

14. (a) What is meant by session Tracking? How is it achieved in HTTP servlet.

Or

(b) Draw a state diagram and explain the life cycle of servlet.

15. (a) Discuss the constructors and methods of color class.

Or

(b) How is a table created using swing class?

Section C (3 × 10 = 30)

Answer any **three** questions.

16. Explain the Anatomy of a JDBC application and the classes and statements involved.

17. Write a simple client/server application using RMI and explain the concepts.

18. Discuss the Design patterns for properties and Events.

19. Discuss any four important classes and interfaces in Javax.servlet package.

20. How is a Tree created in an Applet? Explain the various classes and methods used?

Ws9

F–3048

Sub. Code
7MCE1C4

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science

PRINCIPLES OF COMPILER DESIGN

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** the questions.

1. Define a compiler.

2. Define a string with an example.

3. Construct a parse tree for id + id*id.

4. List down the four actions performed by a shift-reduce parser.

5. Draw the syntax tree for a*(b + c)/d.

6. Write about unconditional jumps.

7. Write down the format of symbol table.

8. Specify any two block structured languages.

9. Define a basic block.

10. What do you mean by an optimal ordering?

Part B (5 × 5 = 25)

Answer **all qu**estions, choosing either (a) or (b).

11. (a) Why do we need translators? Explain.

Or

(b) Explain the method of constructing a deterministic finite automation from a non-deterministic one.

12. (a) Write about ambiguous grammar with an example.

Or

(b) Write an algorithm for the construction of an SLR parsing table.

13. (a) Explain the method of evaluating the postfix expressions by an example.

Or

(b) Discuss about the statements that alter the flow of control.

14. (a) Discuss about Hash tables.

Or

(b) Explain about the storage allocation in Block-structured languages.

15. (a) How can you construct a DAG? Explain.

Or

(b) Discuss in brief the problems in code generation.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Describe the structure of a compiler with a neat diagram.

17. Explain the stack implementation of Shift-Reduce Parsing with an example.

18. Discuss about any two kinds of intermediate codes used in compilers with examples.

19. Discuss the storage allocation in brief.

20. Explain a simple code generator in detail.

F–3049

Sub. Code
7MCE1E1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science

Elective — OBJECT ORIENTED ANALYSIS AND DESIGN

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

Part A   (10 × 2 = 20)

Answer **all** questions.

1. What are the characteristics of an object oriented systems?

2. What is meant by overriding?

3. Define scenarios and event trace.

4. What is a constraint? What are the different types of constraints?

5. What are the steps required in constructing an object model?

6. What is an operation in OOAD parlance? What are the different sources of operations?

7. What are the two forms of layered architecture? When is one preferred over the other?

8. Write down any four kinds of a system.

9. Draw the implementations of stack using Inheritance and delegation? Which one is better than the other?

10. What are the trade-offs between information hiding and optimization?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) How do you establish relationships among objects and classes?

Or

(b) Draw an object model of windowing system discuss the underlying O.O. concepts.

12. (a) Discuss state Generalization with example.

Or

(b) Explain the relation of object and dynamic models.

13. (a) Discuss scenario, event and event trace with an example.

Or

(b) How are object attributes identified and right attributes selected?

14. (a) How are sub systems allocated to processors and tasks?

Or

(b) Discuss the two kinds of control flows in a software system.

15. (a) Discuss any three issues in designing algorithms.

Or

(b) What are the three different models in O.O. Design? How are they combined?

Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. Discuss aggregation and multiple inheritance.

17. Discuss the components of DFD and explain how a functional model is designed using DFD.

18. Discuss the steps performed in constructing a dynamic model.

19. Discuss any four common architectural frameworks.

20. Explain design optimization. Why is it required?

F–3050

Sub. Code
7MCE1E2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science

Elective : SYSTEM SOFTWARE

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. List down the language processing activities.

2. Define a production with its format.

3. Give an example for a DFA.

4. Write down the format of an assembly language statement.

5. Write any two expansion time statements with their syntax.

6. Write the post fix form of $a + b * c + d * e \uparrow f$.

7. What are the components of a interpreter?

8. Define linking.

9. Specify the two object program forms supported by MSDOS.

10. What is a programming environment?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Write briefly about intermediate representation with its properties.

Or

(b) Write short notes on Entry formats.

12. (a) How DFA's can be built? Explain with an example.

Or

(b) Discuss about any two advanced assembler directives.

13. (a) Write about positional and keyword parameters with examples.

Or

(b) Discuss about the various parameter passing mechanisms.

14. (a) Describe pure and impure interpreters.

Or

(b) Write down the format of an object modula.

15. (a) Discuss about program testing and debugging.

Or

(b) Write about program environment with its components.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Describe any two types of table organization in brief.

17. Describe top down parsing with its implementation with an example.

18. Explain the design of a macro preprocessor.

19. Discuss about some of the optimizing transformations used in compilers.

20. Describe the structure of user Interface and UIMS.

F–3051

Sub. Code
7MCE1E3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer science

Elective – SOFTWARE ENGINEERING

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. What is meant by system software and application software?

2. State the distinguishing feature of the spiral model.

3. What is QFD?

4. Define use-case and actor.

5. State the software equation for the cost estimation model.

6. Mention the ways in which LOC and FP are used during software project estimation.

7. What is the purpose of black– box and while–box testing?

8. State the benefit of smoke testing.

9. What are the three factors that have profound influence on software quality and organizational performance?

10. Define CBSE.

Part B (5 × 5 = 25)

Answer **all** the questions, choosing either (a) or (b).

11. (a) State the characteristics of software? Discuss.

Or

(b) Write short notes on Legacy software.

12. (a) Describe the steps required to initiate requirements engineering.

Or

(b) Explain how to write effective use-cases in detail.

13. (a) Explain process-based estimation with examples.

Or

(b) Enlighten about empirical estimation models.

14. (a) Explain basis path testing in detail.

Or

(b) Describe validation testing in detail.

15. (a) Write short notes on economics of CBSE.

Or

(b) Describe in detail about Reusable components and Reuse environment.

Part C (3 × 10 = 30)

Answer any **THREE** questions.

16. Elaborate on prescriptive models and incremental models in detail.

17. Describe in detail about the function accomplished during the requirement engineering tasks.

18. Discuss briefly about problem- based estimation and Use-Case based estimation with examples.

19. Explain various black-box testing methods.

20. Describe in detail about software measurement and also the metrics used for software quality.

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F–3052

Sub. Code
7MCE2C1

M.Sc DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer Science

COMPUTER SYSTEM ARCHITECTURE

(CBCS – 2017 onwards)

Time :3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What is CPU? What are its major components?

2. Define Stack.

3. How do you define the internal hardware organization of a digital computer?

4. Define Selective complement operation.

5. What is the advantage of Microprogrammed Control unit?

6. What is the purpose of Control Address Register?

7. What is meant by Asynchronous data transfer?

8. Define Hit ratio.

9. What is meant by delayed branch?

10. Write any two characteristics of RISC architecture.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain Instruction formats.

Or

(b) Discuss the purpose of Status Register in Program Control.

12. (a) A digital computer has a common bus system for 16 registers of 32 bits each. The bus is constructed with multiplexers.

(i) How many selection input are there in each multiplexer?

(ii) What size of multiplexers are needed?

(iii) How many multiplexers are there in the bus?

Or

(b) Discuss Input-Output configuration.

13. (a) Define the following

(i) Micro operation

(ii) Microinstruction

(iii) Micro program

(iv) Microcode

Or

(b) Explain Address Sequencing in Microprogram control unit.

14. (a) Explain Associative memory.

Or

(b) Explain I/O Interface and connection of I/O bus to Input and Output devices.

15. (a) Discuss the characteristics of Multiprocessors.

Or

(b) Explain Array Processing.

Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. Explain any six Addressing modes with examples.

17. Explain Instruction Cycle with necessary flowchart.

18. Explain Microprogram sequencer.

19. Explain Parallel Priority interrupt hardware.

20. Explain Instruction Pipeline and the difficulties associated with it.

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F–3053

Sub. Code
7MCE2C2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer Science

.NET TECHNOLOGY

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What is .NET Framework?

2. What is object oriented programming?

3. Define scope.

4. What is mean by docking a control?

5. What is the difference between Tree and list views?

6. What is Typography?

7. Define name space.

8. Why do we need validator control?

9. What is the difference between ADO and ADO .Net?

10. What is a Repeater?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Write a short note on .Net Assemblies.

Or

(b) How will you create a structure? Explain with an example.

12. (a) Describe the facilities for handling sub procedures in VB Net.

Or

(b) How will you create dialog boxes? Explain with an example?

13. (a) Describe the funcbonality of splitters and notify Icons

Or

(b) Briefly describe file handling in VB .Net.

14. (a) Explain the usage of Global. asax file.

Or

(b) Discuss on the creation of user custom controls.

15. (a) Explain the characteristics of ADO.Net

Or

(b) How data blinding is used in ASP.Net Applications? Explain with example.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. How is method overloading different from method overriding? Explain with example.

17. Elaborate on conditional statement in VB.Net with an Example.

18. Discuss about the significance of built in Dialog boxes.

19. Give a detailed note on Http Request and Http response.

20. Explain the step to implement forms- based security with Diagram.

F–3054

Sub. Code
7MCE2C3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer science

DISTRIBUTED OPERATING SYSTEM

(CBCS – 2017 onwards)

Time : 3 hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What are the two primary tasks of operating system?

2. What are PSEs?

3. What are the two basic methods for information sharing?

4. Define buffering.

5. Mention the four factors that are influencing the block size selection?

6. Why does a computer need timer mechanism?

7. Define: File system

8. What do you mean by mutable file model?

9. What do you mean by external security?

10. What are the main types of authentication in distributed system?

Part B (5× 5= 25)

Answer **ALL** questions, choosing either (a) or (b).

11. (a) What is DCE? Explain its components in detail.

Or

(b) Differentiate LAN and WAN using their key characteristics.

12. (a) Explain the role of syncronization in distributed system message passcing.

Or

(b) Explain the many-to many communication scheme in group communication of message passing.

13. (a) Write down the advantages of DSM.

Or

(b) Explain the WFG- based distributed algorithm for deadlock detection.

14. (a) Write the difference between replication and caching.

Or

(b) State the general principles for designing distributed file system.

15. (a) Explain about key distribution in asymmetric cryptosystems.

Or

(b) Explain the mechanism of password based authentication system.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Discuss about the issues in designing distributed system.

17. What are the desirable features of a good message-passing system? Explain.

18. Explain the different approaches used to implement mutual exclusion.

19. What are the desirable features of good distributed file system? Explain.

20. Explain the concept of digital signature for distributed system security in detail.

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F–3055

Sub. Code
7MCE2E1

M.SC DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer science

Elective – MOBILE COMPUTING

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What is meant by laptop computing?

2. Distinguish between mobility and portability.

3. Define Multiplexing.

4. What is mobility management?

5. What is agent discovery?

6. What do you mean by registration reply?

7. What is a Datagram?

8. What is foreign agent key?

9. What is smooth handoff?

10. Define Ingress filtering.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) What is mobile networking? Explain.

Or

(b) Describe the architectural model of IETF Mobile IP protocol.

12. (a) Write a note on signal propagation.

Or

(b) Briefly explain about handover in cellular systems.

13. (a) Explain the operation of mobile agent.

Or

(b) Explain the procedure to register mobile node.

14. (a) Write a note on generic routing encapsulation.

Or

(b) How do you bind caches? Explain.

15. (a) Write about DHCP protocol and its functions.

Or

(b) What is reverse tunneling? Explain.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain the overview of IP and routing with neat diagram.

17. Describe the GSM system architecture with appropriate diagram.

18. Explain in detail about agent advertisement.

19. Explain the different route optimization message formats.

20. Explain in detail about Wireless Telephony Application.

F–3057

Sub. Code
7MCE2E3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer Science

Elective — COMPUTER GRAPHICS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. Define Morphing.

2. Distinguish between image processing and computer graphics.

3. State the attributes of character.

4. Define Shear.

5. What is the purpose of input modes of input functions?

6. Define point clipping.

7. State any two applications of depth cueing.

8. What is meant by parallel and perspective projections?

9. Define cabinet projection.

10. What is vanishing point?

Part B (5 × 5 = 25)

Answer **all** the questions, choosing either (a) or (b).

11. (a) Describe midpoint circle algorithm in detail.

Or

(b) Explain the techniques used for color displays.

12. (a) Write short notes on character attributes.

Or

(b) Explain composite transformations with proper illustration.

13. (a) Describe in detail about text clipping.

Or

(b) Write briefly about segment attributes.

14. (a) Explain the three dimensional graphics packages in detail.

Or

(b) Discuss briefly about the three-dimensional display techniques.

15. (a) Explain general parallel-projection transformations in detail.

Or

(b) Explain back-face detection method in detail.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Discuss briefly about interactive input devices.

17. Explain in detail about the following transformations in detail.

    (a) Reflection

    (b) Shear

    (c) Translation, Scaling and Rotation

18. Enlighten about the interactive-picture construction methods.

19. Explain the three dimensional transformations in detail.

20. Explain depth buffer method in detail.

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F3058	Sub. Code
	7MCE2E4

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer Science

Elective — PARALLEL PROCESSING

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **All** Questions.

1. Define parallelism.

2. What is hypercubes?

3. What is ring network?

4. What is control parallelism?

5. Write the types of mapping?

6. Define message passing.

7. Write any two performance laws.

8. Write any two parallel search algorithms.

9. What is multiport memory?

10. Expand NUMA.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) How to implement parallel processing.

Or

(b) Describe the computational demands of parallel processing.

12. (a) Give a brief note on loosely coupled systems.

Or

(b) Describe mesh & hypercube architecture.

13. (a) Differentiate message passing & shared adders space.

Or

(b) Discuss three types of Granularity.

14. (a) Explain Amdahl's & Gustafson's laws.

Or

(b) Write a note on types of complexities.

15. (a) Explain cross bar & multiport memory.

Or

(b) Discus about eache coherence.

Part C (3 × 10 = 30)

Answer any **Three** questions.

16. Describe the major issues in parallel processing.

17. Explain tightly coupled systems.

18. Discuses the types of mapping.

19. Explain depth first & breadth first search algorithms.

20. Describe memory Contention techniques.

F–3059

Sub. Code
7MCE2E5

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Comuputer Science

Elective : ADVANCED DATABASE SYSTEMS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. What is data dictionary?

2. Differentiate between schema and instances.

3. What are the main reasons for the delay in development and implementation of relational model.

4. Compare the derived attribute and stored attribute.

5. Describe the concept of full functional dependency.

6. Write the purpose of normalising data.

7. What is client/server computing? What are its main components?

8. What is semi-JOIN?

9. What are multimedia databases?

10. What are the newer modules available for MySQL stability.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Write short notion the functions and responsibilities of DBAs.

Or

(b) Write a note on data model.

12. (a) Describe with example the different types of keys used in relational model.

Or

(b) An enterprise database needs to store information as follows :

EMPLOYEE(EMP-ID, SALARY, PHONE)

DEPARTMENTS(DEPT-ID, DEPT-NAME, BUDGET)

EMPLOYEE-CHILDREN(NAME, AGE)

Employees 'work' in departments. Each department is 'managed by' an employee. A child must be identified uniquely by 'name' when the parent (who is an employee) is known. Once the parent leaves the enterprise, the information about the child is not required. Draw an E-R diagram that captures the above information.

13. (a) Illustrate the three Armstrong's axioms using diagrammatical representation.

Or

(b) Consider the universal relation R (A, B, C, D, E, F, G, H, I, J) and the set of FDs are given as

$F = (\{A, B\} \to \{A\} \to \{D, E\}, \{B\} \to \{F\}, \{F\} \to \{G, H\},$

$\{D\} \to \{I, J\}.$

(i) What is the key of R?

(ii) Decompose R into 2NF, then 3NF relations.

14. (a) What is middleware system architecture? Explain with a neat sketch and an example.

Or

(b) What is distributed locking? What are its advantages and disadvantages?

15. (a) What is a mobile database? Explain the architecture of mobile database with meat sketch.

Or

(b) Write the features of MySQL 4.1.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain the important operations performed on the data file with example.

17. What are the problems that arise when constructing an E-R model? How will you resolve them? Illustrate with examples.

18. Define the concept of multi valued dependency and describe how this concept relates to 4NF. Provide an example to illustrate your answer.

19. Explain the functioning of two-phase and three-phase commit protocols used in recovery control of distributed database system.

20. Define MySQL database. How will you create the MySQL tables? Explain with examples the insertion of data into and retrieval of information from the MySQI table.

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F–3060

Sub. Code
7MCE2E6

M.Sc. DEGREE EXAMINATION,
NOVEMBER 2019

Second Semester

Computer Science

***Elective* — DIGITAL IMAGE PROCESSING**

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A ($10 \times 2 = 20$)

Answer **all** questions.

1. What are the modalities of imaging based on CAT principle?

2. Define sampling and quantization.

3. What is meant by Bit-plane slicing?

4. Define histogram of a digital image.

5. What is spatial and temporal aliasing? Give examples.

6. Define 2-D ideal highpass filter.

7. List out order-statistic filters.

8. State Fourier-slice theorem.

9. What is meant by intensity slicing?

10. What is meant by Radiance and Luminance?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain image representation, sampling and quantization in detail.

Or

(b) Explain the role of image transforms and probabilistic methods in image processing.

12. (a) Explain intensity-level slicing and bit-plane slicing in detail.

Or

(b) Write short notes histogram matching.

13. (a) Explain the following properties of 2-D Discrete Fourier Transform:

(i) Symmetry

(ii) Fourier Spectrum and Phase angle.

Or

(b) Describe Image Smoothing using frequency domain filters in detail.

14. (a) Describe Constrained Least Squares filtering.

Or

(b) Explain the model of the image Degradation/Restoration Process in detail.

15. (a) Enlighten about color models.

Or

(b) Discuss in brief about the image compression fundamentals.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Discuss in detail about the relationships between pixels in a digital image.

17. How fuzzy sets used in intensity transformations? Explain.

18. Describe image sharpening using frequency domain filters in detail.

19. Explain the three principal ways to estimate the degradation function for use in image restoration.

20. Discuss in detail about the following image compression methods.

    (a) Huffman coding

    (b) LZW coding

    (c) Run-Length coding

    (d) Wavelet coding.

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F–3061

Sub. Code
7MCE3C1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Computer science

CRYPTOGRAPHY AND NETWORK SECURITY

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What are the services of security?

2. What is one-time pad?

3. What is block cipher?

4. State the difference between Rijndael and AES.

5. What are the keys used for asymmetric encryption?

6. Write the purpose of Diffie-hellman key exchange.

7. What is hash function?

8. What are the properties of digital signature?

9. What is S/MIME?

10. Write the use of Handshake protocol.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Briefly describe categories of passive and active security attacks.

Or

(b) Explain Caesar cipher and play fair cipher with example

12. (a) Summarize the strength of DES.

Or

(b) Briefly describe the key expansion algorithm.

13. (a) Explain the applications and requirements of public key cryptography.

Or

(b) Discuss about Elliptic curve cryptography.

14. (a) Write a note on cryptanalysis.

Or

(b) Explain public key encryption approach to deal with replay attacks.

15. (a) Explain different types of keys exchange methods.

Or

(b) Discuss the principle services provided by PGP.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Briefly define categories of security services.

17. Explain in detail about AES structure.

18. Describe RSA algorithm with example.

19. Discuss about Digital signature algorithm.

20. Explain in detail about secure socket layer architecture.

F–3062

Sub. Code
7MCE3C2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Computer Science

PROGRAMMING IN PHP

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. State the added features of PHP 4 when compared to PHP 3.

2. Distinguish between Value assignment and Reference assignment.

3. What is the purpose of break and continue statement.

4. List out any four inbuilt string functions.

5. Write a code for checking existence of a file?

6. What is the use of forms?

7. Define a class.

8. Write a code to find the number of rows in a table?

9. What is session?

10. Expand AJAX and DOM.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain how PHP scripts work.

Or

(b) What are Type-related functions and type identifier functions? Explain.

12. (a) Elucidate the For and For each looping statements with suitable example.

Or

(b) Define function. Explain the concept of passing arguments to a function by reference.

13. (a) Write a short notes on file creation and deletion.

Or

(b) How do you get input from user in PHP?

14. (a) Discuss about the base exception class and its methods.

Or

(b) Write notes on creating session cookie?

15. (a) Explain in detail about Email creation in PHP?

Or

(b) Write about methods and properties of Http Request?

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Discuss in detail about the PHP's supported Data types.

17. How do you sort the arrays in PHP? Explain with example.

18. How do you read the characters from a file? Explain it.

19. Discuss in detail about table creation and update the table structure.

20. Describe the concepts of starting a session and working with session variables.

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F-3063

Sub. Code
7MCE3C3

M.Sc DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Computer Science

DATA MINING AND DATA WAREHOUSING

(CBCS – 2017 onwards)

Time : 3 Hours — Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. How is a data warehouse different from a database?
2. List out the strategies for data reduction.
3. What is a data cube?
4. Give the contents of metadata repository.
5. Define the accuracy of a classifier.
6. What is back propagation?
7. List out the categories of clustering methods.
8. What are the two types of hierarchical clustering methods?
9. Name the three types of dimensions in spatial data cube.
10. What is a signature file?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain about classification and prediction with suitable example.

Or

(b) Discuss about Principal Component Analysis.

12. (a) Write notes on snowflake schema for multidimensional databases.

Or

(b) Discuss about the OLAP operations in the multidimensional data model.

13. (a) Describe the issues regarding classification and prediction.

Or

(b) Write notes on Bayes' theorem.

14. (a) Write notes on binary variables.

Or

(b) Discuss about grid based methods.

15. (a) Give explanation for text retrieval methods.

Or

(b) How data mining can be applied for financial data analysis?

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Give detailed explanation for data cleaning process.

17. Give the architecture for On-Line Analytical Mining and explain.

18. Discuss in detail about classification by back propagation.

19. Explain the k-means and k-medoid methods for partitioning.

20. Explain the various dimensionality reduction techniques for text.

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F-3064

Sub. Code
7MCE3E3

M.Sc DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Computer Science

Elective- MULTIMEDIA SYSTEM

(CBCS – 2017onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **All** questions.

1. What are the hardware/software components needed for a multimedia development system?

2. Mention some of the image formats used in multimedia.

3. What is the use of graphics in multimedia?

4. Mention the various CD formats.

5. What is meant by adaptive data pulse code modulation?

6. What are the key parameters need to be considered to evaluate compression performance?

7. What is voice mail?

8. Define HTML.

9. What is meant by Hoptic signals?

10. Define scientific visualization.

Part B (5 × 5 = 25)

Answer **All** questions, choosing either (a) or (b).

11. (a) Write briefly about Multimedia hardware.

Or

(b) Discuss about Multimedia standards.

12. (a) Write short notes on Text.

Or

(b) Discuss about Digital Audio.

13. (a) Write short notes on Transform representation of sounds.

Or

(b) Describe the various file storage in video.

14. (a) Write short notes on MIME.

Or

(b) Discuss briefly about the features of Authoring tools in multimedia.

15. (a) Discuss about the mode of interaction.

Or

(b) Describe about the modelling virtual world.

Part C (3 × 10 = 30)

Answer any **Three** questions.

16. Explain in detail about the Multimedia Applications.

17. Write briefly about the video.

18. Discuss in brief about the digital representation of sound.

19. Explain about the Internet content in Multimedia.

20. Explain in detail about the sensor Hardware.

F–3065

Sub. Code
7MCE3E6

M.Sc DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Computer science

Elective-WAP AND XML

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. List the components of WAP.
2. Write the features of WAP.
3. Expand UML.
4. Define WAP gateway.
5. What is Event?
6. Write any 4 standard Libraries in WML.
7. What is the purpose of XML?
8. Write the use of CSS.
9. Write the difference between attribute & elements.
10. What is Unicode character set?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain in detail about WAP protocal stack.

Or

(b) Give a note on WAP resources.

12. (a) Compare web model with WAP model.

Or

(b) Describe WML structures.

13. (a) Explain selection statement with example.

Or

(b) Write about input &output statements with example.

14. (a) Write a XML document for product catalog.

Or

(b) Write a XML document for displaying the covariant function of Maxwell's equation in math ML.

15. (a) How to create tables using XSL?

Or

(b) Explain &give example for Attributes Elements.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain in detail about WAP architecture.

17. Explain how to position a WAP gateway in the network.

18. Give suitable example for

    (a) Looping statement (4)

    (b) Automatic type conversion (4)

    (c) Operators. (2)

19. Describe how to prepare a style sheet for document display.

20. Write a brief note on legacy character sets.

F–3071

Sub. Code
7MCI1C2

M.SC DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science and Information Technology

PROGRAMMING IN C

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. How are comments introduced in C?

2. What is the difference between & and &&?

3. What is a character array? How will you initialize a character array?

4. What is a dynamic array?

5. What is meant by call by value?

6. What are the advantages of using register variable?

7. How is a pointer variable initialized?

8. Write any two limitations of array of pointers to strings.

9. What is the use of getchar() and putchar() function?

10. Write the general format of fseek function.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Compare the while structure with the do-while structure.

Or

(b) What are the types of programming languages? Describe.

12. (a) How are the one-dimensional array elements read and written?

Or

(b) Write a C program to find the sum of given 'n' numbers.

13. (a) What is a function? Explain the different categories of functions.

Or

(b) Name the storage classes used in C and explain them.

14. (a) What is a pointer? Explain the advantages of using pointers in C.

Or

(b) Write C program to find the smallest number in an array using pointers.

15. (a) What are the different modes of files? Describe.

Or

(b) What is macro and how is it different from a C variable name?

Part C (3 × 10 = 30)

Answer any **three** questions.

16. What are the fundamental data types supported by C? How are they declared? Give examples.

17. Write a C program to arrange the given names in an alphabetical order.

18. Write a C program to print the Fibonacci sequence of number using recursion.

19. Write a C program to Multiply two matrices using pointed.

20. Explain how defining, opening and closing a file are carried out in C with examples.

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F-3072

Sub. Code
7MCI1C3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science and Information Technology

DATA STRUCTURE AND ALGORITHMS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What do you mean by linear data structure?

2. What is sorting?

3. What is a singly linked list?

4. Find the postfix form of the following: A+B+C+D.

5. Define: Complete binary tree.

6. What are the ways to represent a binary tree?

7. What is the complexity of linear search and binary search?

8. What are the drawbacks of linear search?

9. What do you mean by Algorithm?

10. Define: Big 'O' notation.

Part B (5 × 5 = 25)

Answer **All** questions, choosing either (a) or (b).

11. (a) Write the algorithm for traversing a list and give an example.

Or

(b) Write the procedures to perform predecessor and successor in a list.

12. (a) Write an algorithm to convert infix expression into postfix expression.

Or

(b) What are the ways to represent a stack? Describe.

13. (a) What are the binary tree traversals? Explain any one.

Or

(b) Explain any two popular hash functions.

14. (a) Write an algorithm for selection sort and give an example.

Or

(b) Write a binary search algorithm and explain with examples.

15. (a) What are the components of space complexity? Describe.

Or

(b) Write an algorithm for adding "n" natural numbers and find the time and space required by that algorithm.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain the implementation of list.

17. Define a stack. What are the operations performed on it? Explain.

18. Explain the Dijkstra's algorithm for finding the shortest path in a given graph.

19. Explain about the merge sort with example.

20. What are the basic asymptotic efficiency classes? Describe.

F–3073

Sub. Code
7MCI1C4

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science and Information Technology

COMPUTER FUNDAMENTALS AND ARCHITECTURE

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Find the binary number for the following decimal number : 10

2. What is the difference between 1's complement subtraction and 2's complement subtraction of binary numbers?

3. How many entries are there on a four-variable Karnaugh map?

4. What is the function of encoder?

5. What the use of counter?

6. What are inputs and outputs of full adder?

7. What is the function of ALU?

8. Write the polish and reverse polish notation: (A/B)-(C*D).

9. Distinguish between Main Memory and Auxiliary Memory.

10. What is the use of priority interrupt?

Part B (5 × 5 = 25)

Answer **all qu**estions, choosing either (a) or (b).

11. (a) Write a short note on ASCII and EBCDIC codes.

Or

(b) Convert decimal 1000.500 into octal number.

12. (a) Draw the logic circuit and truth table for 4-to-1 multiplexer and explain it.

Or

(b) Write any fiver laws of Boolean algebra and Construct the truth table.

13. (a) What is a Half Adder? Explain.

Or

(b) Explain the different types of shift registers.

14. (a) What are the components of instruction format? Describe.

Or

(b) What are data transfer and data manipulation instructions? Describe.

15. (a) Draw the block diagram of Associative memory and explain it.

Or

(b) Explain the operations of Magnetic Tape.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Find the decimal, octal and hexadecimal number for the following binary numbers.

    (a) 1111011

    (b) 11000.0111

17. Simplify the Boolean functions F(w,x,y,z) $\sum$ (1,3,7,11,15) and the don't care conditions : d(w,x,y,z)=sum of (0,2,5).

18. Describe the operation of Master-Slave Flip-flop.

19. What are the arithmetic and logic micro operations? Explain with examples.

20. Explain in detail the different mappings used for cache memory.

F–3074

Sub. Code
7MCI1E2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science and Information Technology

Elective- OPERATING SYSTEM

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Define: Multiprogramming.
2. Write down any two advantages of virtual memory.
3. Distinguish between process and processor.
4. Define: (a) Throughput (b) Turnaround Time.
5. What is parallel processing?
6. What are the four basic functions of device management?
7. Define: (a) Record (b) file.
8. What is distributed operating system?
9. Write down any two advantages of Unix system.
10. What is the use of fork command in Unix?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) What are the types of operating systems? Explain.

Or

(b) Compare best-fit and first-fit allocations.

12. (a) What is PCB? Explain the contents of PCB.

Or

(b) What are the Strategies for handling deadlock? Explain.

13. (a) Explain about the readers and writers problem.

Or

(b) What are the three categories of system peripheral devices? Explain.

14. (a) Compare sequential and direct file organization.

Or

(b) Write a short note on NOS development.

15. (a) Write a short note on the history of Unix system.

Or

(b) What are the three types of files in Unix? Describe.

Part C (3 × 10 = 30)

Answer any **Three** questions.

16. What are page replacement polices? Explain with examples.

17. Explain any two process scheduling algorithms.

18. Discuss any two multiprocessing configurations.

19. Explain the different levels in a file management system.

20. Discuss the processor management in Unix system.

———————

F-3076

Sub. Code
7MCI2C2

M.Sc DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer Science and Information Technology

JAVA PROGRAMMING

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A ($10 \times 2 = 20$)

Answer **all** questions.

1. Write down any two features of Java Language.
2. How are constants and variables important in developing programs?
3. Write the syntax of switch statement.
4. Find the value of 10% (-3).
5. What is static import? How is it useful?
6. What do you mean by method overriding? Explain.
7. Differentiate between local applet and remote applet.
8. What is the use of Applet Tag?
9. What are the advantages of Enterprise bean?
10. What is RMI?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) List the basic data types used in java. Explain with suitable example.

Or

(b) What is World Wide Web? What is the contribution of Java to the World Wide Web?

12. (a) Write a Java program to find the factorial of a number.

Or

(b) List out any five mathematical functions in Java and give examples.

13. (a) Write a Java program which will read a text and count all occurrences of a particular word.

Or

(b) Compare and contrast overriding and overloading a method.

14. (a) How applets differ from applications?

Or

(b) Describe the different stages in the life cycle of an applet.

15. (a) Explain any two SQL statements with example.

Or

(b) Explain about the JSP tags.

Part C (3× 10 = 30)

Answer any **three** questions.

16. Describe the structure of Java Program.

17. What are the different types of if statements available in Java? Illustrate with an example.

18. Write a Java program which will read a string and rewrite it in the alphabetical order. For example, the word STRING should be written as GINRST.

19. Write an applet to draw the square inside a circle shape.

20. Explain about the Servlet life cycle.

———————

F-3077

Sub. Code
7MCI2C3

M.Sc DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer Science and Information Technology

COMPUTER NETWORKS

(CBCS – 2017onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **All** questions.

1. What do you mean by computer network?

2. Differentiate between connection-oriented and connectionless services.

3. What are the disadvantages of optical fiber?

4. How do guided media differ from unguided media?

5. What is framing?

6. What is the purpose of Hamming code?

7. What is Congestion Control?

8. What are the transport layer quality of service parameters?

9. Differentiate between Adaptive and Non-adaptive routing.

10. What is the purpose of FTP?

Part B (5 × 5 = 25)

Answer **All** questions, choosing either (a) or (b).

11. (a) What are the topologies for a Point-To-Point subnet? Describe.

Or

(b) What is a Protocol? Explain the protocol Hierarchies.

12. (a) Describe the two forms of Twisted –pair Cable.

Or

(b) Write a short note on Terminal handling.

13. (a) Discuss the design issues of Data link layer.

Or

(b) Compare Local Area Network and Metropolitan Area Network.

14. (a) What is RPC? Explain.

Or

(b) What are the duties of the Transport layer? Explain.

15. (a) Describe the design issues of presentation layer.

Or

(b) What are the two fundamental cryptographic principles? Explain.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain the function of seven layers of ISO OSI Reference Model.

17. Discuss about the ISDN system architecture.

18. Explain the simplex protocol for a noisy channel.

19. Discuss the design issues of network layer.

20. Discuss Email Architecture in brief along with its components.

F–3078

Sub. Code
7MCI2E1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer Science and Information Technology

Elective — COMPUTER ORIENTED NUMERICAL METHODS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Section A $(10 \times 2 = 20)$

Answer **all** questions.

1. State the formula to find a root of the equation $f(x)=0$ which hits between $x=a$ and $x=b$ of Regula-Falsi method.

2. State the condition of convergence of Newton-Raphson method.

3. Distinguish between direct and iterative methods of solving simultaneous equations.

4. What is the condition for convergence of Gauss-Jacobi method of iteration?

5. Define: Interpolation.

6. State Gauss's backward and Gauss's forward interpolation formula.

7. How the accuracy can be increased in trapezoidal rule of evaluating a given definite integral?

8. What do you mean by numerical differentiation?

9. What is a predictor-corrector method of solving a differential equation?

10. Write the merits of the Taylor method of solution.

Section B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) Find the smallest positive root of the equation $3x^3 - 9x^2 + 8 = 0$ correct to 2 places of decimals, using Newton-Raphson method.

Or

(b) Apply Horner's method to find the cube root of 25.

12. (a) How does the coefficient matrix A in the system $AX = B$ get transformed in Gauss-Elimination method.

Or

(b) Solve the equations $10x + y = 7$ and $x - 10y = 31$ by Gauss-Seidel's iteration method.

13. (a) Using Newton's formula, find the value of f (1.5) from the following data :

x :	0	1	2	3	4
$f(x)$:	858.3	869.6	880.9	892.3	903.6

Or

(b) Describe the Lagrange's interpolation formula.

14. (a) Explain about the Trapezoidal and Simpson's rule.

Or

(b) From the following table of values of x and y, find dy/dx and d^2y/dx^2 for $x = 1.25$

x :	1.00	1.05	1.10	1.15	1.20	1.25	1.30
y :	1.00	1.02470	1.04881	1.07238	1.09544	1.11803	1.14017

15. (a) Find $y(1.1)$, given $dy/dx = x + y$, $y(1) = 2$ by Euler's method.

Or

(b) Use Runge-kutta of the fourth order to solve the equation and to find $y(0.2)$, $y(0.4)$ and $y(0.6)$ taking $h = 0.2$ given that $dy/dx = 1 + y * y$; $y(0) = 0$.

Section C (3 × 10 = 30)

Answer any **three** questions.

16. Find a real root of the equation $x^3 - 2x - 5 = 0$, correct to 3 places of decimals, using Bisection method.

17. Using Crout' s method, solve the system of equations

$$2x - 6y + 8z = 24$$
$$5x + 4y - 3z = 2$$
$$3x + y + 2z = 16.$$

18. Use Gauss's forward and backward formulas to find $f(3.75)$ from the following data :

x :	2.5	3.0	3.5	4.0	4.5	5.0
$f(x)$:	22.145	22.043	20.225	18.644	17.262	16.047

19. Dividing the range into 10 equal parts, find the approximate value of $\int_0^{\pi} \sin x \ dx$ by

(a) Trapezoidal

(b) Simpson's one third rule.

20. Solve numerically, using Milne method :

$y' = 1/(x+y)$, $y(0) = 2$. Take the starting values $y(0.2) = 2.0933$, $y(0.4) = 2.1755$, $y(0.6) = 2.2493$. Find the values of $y(0.8)$ and $y(1.0)$.

F–3080

Sub. Code
7MCI2E3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer Science and Information Technology

Elective – THEORY OF COMPUTATION

(CBCS – 2017 onwards)

Time : 3 Hours — Maximum : 75 Marks

Part A — $(10 \times 2 = 20)$

Answer **all** the questions.

1. Define a Nondeterministic Finite Automata.

2. State the Induction principle.

3. State the pumping Lemma for Regular Languages.

4. Wriite closure properties of Regular Languages.

5. Define a context–free Grammar.

6. Define Deterministic Pushdown Automata.

7. Write the substitution theorem.

8. Define the Turing Machine.

9. State Rice's theorem.

10. Define a Recursive language.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

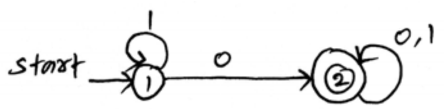
11. (a) Prove that for all $n \geq 0$, $\sum_{i=1}^{n} i^2 = \frac{n(n+1)(2n+1)}{6}$

Or

(b) Convert to a DFA the following NFA.

	0	1
$\rightarrow p$	{p,q}	{p}
q	{r}	{r}
r	{s}	ϕ
*s	{s}	{s}

12. (a) Convert the DFA of the following figure to a regular expression:



Or

(b) Write the summary of the principal closure properties for regular languages.

13. (a) Write a grammar for an inherently ambiguous language.

Or

(b) Explain the Graphical notation for PDA's.

14. (a) Write a short notes on chomsky normal form.

Or

(b) Explain the Transition diagrams for Turing Machines.

15. (a) Write the post's corresponding problem.

Or

(b) Write a note on the classes P and NP.

Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. What is DFA? Explain about Finite Automatic with Epsilon transitions.

17. If h is a homomorphism form alphabet $\sum$ to alphabet T and L is a regular language over T, then prove that $h^{-1}(L)$ is also a regular language.

18. How to construct parse Trees? Explain.

19. Prove that the context-free languages are closed under the following operations.

(a) Union

(b) Concatenation

(c) Closure (*) and positive closure (+)

(d) Homomorphism

20. Explain the Modified PCP.

F–3082	Sub. Code 7MCI2E6

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer Science and Information Technology

Elective – COMPUTER GRAPHICS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What do you mean by computer graphics?

2. What are the disadvantages of DDA algorithm?

3. List out the attributes of characters.

4. What is Transformation?

5. What is the difference between a window and view port?

6. What is dragging?

7. What do you mean by Perspective projection?

8. Write the matrix representation of scaling transformation in three-dimensional.

9. Define : Axonometric orthographic projection.

10. Differentiate between object-space and image-space methods.

Part B (5 × 5 = 25)

Answer **all questions**, choosing either (a) or (b).

11. (a) Explain how computer graphics is used in the field of art and image processing.

Or

(b) Discuss Bresenham's approach for line drawing.

12. (a) What are the attributes of area fill? Describe.

Or

(b) Describe shearing transformation with suitable example.

13. (a) Derive window to view port transformation.

Or

(b) Write down the functions of stroke and string devices.

14. (a) What are transformation commands? Explain.

Or

(b) Explain about the rotation transformation in three-dimensional.

15. (a) Explain the scan line method.

Or

(b) Describe the hardware implementation of three-dimensional viewing operations.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. What is CRT? Explain the basic construction of CRT.

17. What are the basic two dimensional transformations? Explain with examples.

18. Explain any two interactive picture-construction techniques.

19. Describe any two three-dimensional display methods.

20. Explain :

    (a) Back face Detection method

    (b) Depth buffer method for detection.

F–3083

Sub. Code
7MCI3E4

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Computer Science and Information Technology

Elective: DATA MINING AND WAREHOUSING

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Define: Data Mining.

2. What is machine learning?

3. What is data cube?

4. How are organizations using the information from data warehouses?

5. Define: Data cleaning.

6. What are the measures of central tendency?

7. Define: Gain ratio.

8. What is back propagation?

9. What are the different types of web mining?

10. What are the three types of dimensions in spatial data cube?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain any two data mining techniques.

Or

(b) Compare data mining and query tools.

12. (a) What are the different between OLTP and OLAP? Describe.

Or

(b) What is metadata? What are the types of metadata? Explain.

13. (a) Explain the different forms of data preprocessing.

Or

(b) What are the steps involved data transformations? Explain.

14. (a) What is classification? How does classification work?

Or

(b) What are the two types of hierarchial clustering methods? Explain.

15. (a) Explain the requirements of clustering in data mining.

Or

(b) Explain about the spatial mining tasks.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Describe the steps that are required in a typical Data Mining process.

17. Describe the data warehouse backend process.

18. What are the methods for concept hierarchy on data discretization? Explain.

19. Explain about the Naive Bayesian classification.

20. Discuss about the mining time-series and sequence data.

F–3045	Sub. Code
	7MCE1C1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science

APPLIED MATHEMATICS FOR COMPUTER SCIENCE

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A ($10 \times 2 = 20$)

Answer **all** questions.

1. Define tautology. Give example.
2. What is the condition for a statement A to tautologically imply a statement B?
3. What is existential Quantifier? Give example.
4. Define disjunctive normal form.
5. Define Rooted tree. Give example.
6. Define level and height of a rooted tree. Give example.
7. Define the canonical form of linear programming problem.
8. What is meant by optimum solution of an LPP?
9. State the mathematical formulation of an assignment problem.
10. What is meant by prohibited assignments?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Prove that following implications

(i) $(P \wedge Q) \Rightarrow (P \to Q)$

(ii) $P \Rightarrow (Q \to P)$.

Or

(b) Show the following equivalence

$\urcorner (P \rightleftarrows Q) \Leftrightarrow (P \vee Q) \wedge \urcorner (P \wedge Q)$.

12. (a) Obtain the disjunctive normal form of $P \vee (Q \wedge R)$.

Or

(b) Obtain the disjunctive normal form of $\urcorner (P \vee Q) \rightleftarrows (P \wedge Q)$.

13. (a) Explain spanning tree with example.

Or

(b) Explain binary tree with example.

14. (a) Use graphical method to solve the following problem

Maximize $z = 2x + 3y$

Subject to $x + y \leq 30$

$x - y \geq 0$

$y \geq 3$, $0 \leq x \leq 20$, $0 \leq y \leq 12$

Or

(b) An animal feed company must produce 200lbs of a mixture containing the ingredients X_1 and X_2. X_1 costs Rs. 3 per lb and X_2 cost Rs. 8 per lb. Note that more than 80 lbs of X_1 can be used and minimum quantity to be used for X_2 is 60 lbs. Find how much of each ingredient should be used if the company wants to minimize the cost. Formulate the above problem.

15. (a) Obtain an initial basic feasible solution to the following transportain problem using Vogel's approximation method.

	To			Available
	7	3	4	2
From	2	1	3	3
	3	4	6	5
Demand	4	1	5	

Or

(b) The Head of the department has five jobs A, B, C, D, E and five sub-ordinates V, W, X, Y, Z. The number of hours each man would take to perform each job is as follows.

$$\begin{array}{c} \\ A \\ B \\ C \\ D \\ E \end{array} \begin{array}{c} \begin{array}{ccccc} V & W & X & Y & Z \end{array} \\ \begin{pmatrix} 3 & 5 & 10 & 15 & 8 \\ 4 & 7 & 15 & 18 & 8 \\ 8 & 12 & 20 & 20 & 12 \\ 5 & 5 & 8 & 10 & 6 \\ 10 & 10 & 15 & 25 & 10 \end{pmatrix} \end{array}$$

How should the jobs be allocated to minimize the total time?

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Obtain an equivalent formula for the following which contains neither the biconditional or conditional

(a) $P \wedge (Q \rightleftarrows R) \vee (R \rightleftarrows P)$

(b) $((P \vee Q) \wedge R) \rightarrow (P \vee R)$.

17. Obtain the principal disjunctive normal forms of the following and also identify whether they are tautologies or not

(a) $Q \wedge (P \vee \neg Q)$

(b) $(Q \rightarrow P) \wedge (\neg P \wedge Q)$.

18. Discuss in detail about matrix representation of Graphs.

19. Use two-phage simplex method to solve the following LPP.

Maximize $Z = 5x_1 + 8x_2$

Subject to $3x_1 + 2x_2 \geq 3$

$x_1 + 4x_2 \geq 4$

$x_1 + x_2 \leq 5$, $x_1, x_2 \geq 0$.

20. Find the optimum solution to the following transportation problem using MODI method.

	T_1	T_2	T_3	T_4	Availability
B_1	5	3	6	2	19
B_2	4	7	9	1	37
B_3	3	4	7	5	34
Requirement	16	18	31	25	

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F–3046

Sub. Code
7MCE1C2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science

DESIGN AND ANALYSIS OF ALGORITHMS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A ($10 \times 2 = 20$)

Answer **all** questions.

1. Define space and time complexity.

2. Differentiate stack and queue.

3. Write the recurrence relation of divide and conquer algorithm.

4. Write the recurrence relation for computing time of quick sort.

5. What is feasible solution?

6. Write the purpose of Huffman codes.

7. Define multistage graph.

8. Give example for biconnected graph.

9. What is backtracking?

10. Give example for hamiltonian cycles.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Give a brief note on recursive function with example.

Or

(b) Write an algorithm for stack operations.

12. (a) Explain how to use recursion for finding maximum and minimum of set of elements.

Or

(b) Prove that the average computing time $T_A(n)$ of selection sort is O(n).

13. (a) Find the feasible solution to the job sequencing instance $n = 4$, $\{p_1, p_2, p_3, p_4\} = \{100, 10, 15, 27\}$ and $\{d_1, d_2, d_3, d_4\} = \{2, 1, 2, 1\}$.

Or

(b) Write greedy algorithm to generate shortest path.

14. (a) Explain Bellman Ford algorithm to compute shortest path.

Or

(b) Write an algorithm for tree traversals.

15. (a) Explain how to estimate the efficiency of backtracking.

Or

(b) Describe the function for Knapsack problem.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain different representation of Graph.

17. Discuss about binary search with example.

18. Describe the stages of Kruskal's algorithm.

19. Explain breadth first search tree.

20. Give a brief note on Graph Coloring.

F–3047

Sub. Code
7MCE1C3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science

ADVANCED JAVA PROGRAMMING

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Section A $(10 \times 2 = 20)$

Answer **all** questions.

1. What is JDBC – ODBC Bridge?

2. What is the purpose of SQL Exception class?

3. What are the two kinds of TCP sockets in Java?

4. How is datagram implemented in Java?

5. What is the purpose of Bound property?

6. What is meant by persistance? How is it achieved in Java Bean?

7. What is servlet? What are the advantages of servlets over CGI?

8. What is a cookie?

9. Tabbed panes are encapsulated by ———————— class, which extends ————————.

10. What methods are used for drawing Ellipses and circles?

Section B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) What is JDBC? How does it work?

Or

(b) Explain JDBC metadata classes.

12. (a) Explain URL and URL connection classes with example code.

Or

(b) With a sample code, explain how the contents of a document is cached on a server.

13. (a) Explain JAR files.

Or

(b) What is Java Bean? Explain its advantages and disadvantages?

14. (a) What is meant by session Tracking? How is it achieved in HTTP servlet.

Or

(b) Draw a state diagram and explain the life cycle of servlet.

15. (a) Discuss the constructors and methods of color class.

Or

(b) How is a table created using swing class?

Section C (3 × 10 = 30)

Answer any **three** questions.

16. Explain the Anatomy of a JDBC application and the classes and statements involved.

17. Write a simple client/server application using RMI and explain the concepts.

18. Discuss the Design patterns for properties and Events.

19. Discuss any four important classes and interfaces in Javax.servlet package.

20. How is a Tree created in an Applet? Explain the various classes and methods used?

F–3048

Sub. Code
7MCE1C4

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science

PRINCIPLES OF COMPILER DESIGN

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** the questions.

1. Define a compiler.

2. Define a string with an example.

3. Construct a parse tree for id + id*id.

4. List down the four actions performed by a shift-reduce parser.

5. Draw the syntax tree for a*(b + c)/d.

6. Write about unconditional jumps.

7. Write down the format of symbol table.

8. Specify any two block structured languages.

9. Define a basic block.

10. What do you mean by an optimal ordering?

Part B (5 × 5 = 25)

Answer **all questions**, choosing either (a) or (b).

11. (a) Why do we need translators? Explain.

Or

(b) Explain the method of constructing a deterministic finite automation from a non-deterministic one.

12. (a) Write about ambiguous grammar with an example.

Or

(b) Write an algorithm for the construction of an SLR parsing table.

13. (a) Explain the method of evaluating the postfix expressions by an example.

Or

(b) Discuss about the statements that alter the flow of control.

14. (a) Discuss about Hash tables.

Or

(b) Explain about the storage allocation in Block-structured languages.

15. (a) How can you construct a DAG? Explain.

Or

(b) Discuss in brief the problems in code generation.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Describe the structure of a compiler with a neat diagram.

17. Explain the stack implementation of Shift-Reduce Parsing with an example.

18. Discuss about any two kinds of intermediate codes used in compilers with examples.

19. Discuss the storage allocation in brief.

20. Explain a simple code generator in detail.

F–3049

Sub. Code
7MCE1E1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science

Elective — OBJECT ORIENTED ANALYSIS AND DESIGN

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What are the characteristics of an object oriented systems?

2. What is meant by overriding?

3. Define scenarios and event trace.

4. What is a constraint? What are the different types of constraints?

5. What are the steps required in constructing an object model?

6. What is an operation in OOAD parlance? What are the different sources of operations?

7. What are the two forms of layered architecture? When is one preferred over the other?

8. Write down any four kinds of a system.

9. Draw the implementations of stack using Inheritance and delegation? Which one is better than the other?

10. What are the trade-offs between information hiding and optimization?

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) How do you establish relationships among objects and classes?

Or

(b) Draw an object model of windowing system discuss the underlying O.O. concepts.

12. (a) Discuss state Generalization with example.

Or

(b) Explain the relation of object and dynamic models.

13. (a) Discuss scenario, event and event trace with an example.

Or

(b) How are object attributes identified and right attributes selected?

14. (a) How are sub systems allocated to processors and tasks?

Or

(b) Discuss the two kinds of control flows in a software system.

15. (a) Discuss any three issues in designing algorithms.

Or

(b) What are the three different models in O.O. Design? How are they combined?

Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. Discuss aggregation and multiple inheritance.

17. Discuss the components of DFD and explain how a functional model is designed using DFD.

18. Discuss the steps performed in constructing a dynamic model.

19. Discuss any four common architectural frameworks.

20. Explain design optimization. Why is it required?

F–3050

Sub. Code
7MCE1E2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science

Elective : SYSTEM SOFTWARE

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** the questions.

1. List down the language processing activities.

2. Define a production with its format.

3. Give an example for a DFA.

4. Write down the format of an assembly language statement.

5. Write any two expansion time statements with their syntax.

6. Write the post fix form of $a + b * c + d * e \uparrow f$.

7. What are the components of a interpreter?

8. Define linking.

9. Specify the two object program forms supported by MSDOS.

10. What is a programming environment?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Write briefly about intermediate representation with its properties.

Or

(b) Write short notes on Entry formats.

12. (a) How DFA's can be built? Explain with an example.

Or

(b) Discuss about any two advanced assembler directives.

13. (a) Write about positional and keyword parameters with examples.

Or

(b) Discuss about the various parameter passing mechanisms.

14. (a) Describe pure and impure interpreters.

Or

(b) Write down the format of an object modula.

15. (a) Discuss about program testing and debugging.

Or

(b) Write about program environment with its components.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Describe any two types of table organization in brief.

17. Describe top down parsing with its implementation with an example.

18. Explain the design of a macro preprocessor.

19. Discuss about some of the optimizing transformations used in compilers.

20. Describe the structure of user Interface and UIMS.

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F–3051

Sub. Code
7MCE1E3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer science

Elective – SOFTWARE ENGINEERING

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** the questions.

1. What is meant by system software and application software?

2. State the distinguishing feature of the spiral model.

3. What is QFD?

4. Define use-case and actor.

5. State the software equation for the cost estimation model.

6. Mention the ways in which LOC and FP are used during software project estimation.

7. What is the purpose of black– box and while–box testing?

8. State the benefit of smoke testing.

9. What are the three factors that have profound influence on software quality and organizational performance?

10. Define CBSE.

Part B (5 × 5 = 25)

Answer **all** the questions, choosing either (a) or (b).

11. (a) State the characteristics of software? Discuss.

Or

(b) Write short notes on Legacy software.

12. (a) Describe the steps required to initiate requirements engineering.

Or

(b) Explain how to write effective use-cases in detail.

13. (a) Explain process-based estimation with examples.

Or

(b) Enlighten about empirical estimation models.

14. (a) Explain basis path testing in detail.

Or

(b) Describe validation testing in detail.

15. (a) Write short notes on economics of CBSE.

Or

(b) Describe in detail about Reusable components and Reuse environment.

Part C (3 × 10 = 30)

Answer any **THREE** questions.

16. Elaborate on prescriptive models and incremental models in detail.

17. Describe in detail about the function accomplished during the requirement engineering tasks.

18. Discuss briefly about problem- based estimation and Use-Case based estimation with examples.

19. Explain various black-box testing methods.

20. Describe in detail about software measurement and also the metrics used for software quality.

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F–3052

Sub. Code
7MCE2C1

M.Sc DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer Science

COMPUTER SYSTEM ARCHITECTURE

(CBCS – 2017 onwards)

Time :3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What is CPU? What are its major components?

2. Define Stack.

3. How do you define the internal hardware organization of a digital computer?

4. Define Selective complement operation.

5. What is the advantage of Microprogrammed Control unit?

6. What is the purpose of Control Address Register?

7. What is meant by Asynchronous data transfer?

8. Define Hit ratio.

9. What is meant by delayed branch?

10. Write any two characteristics of RISC architecture.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain Instruction formats.

Or

(b) Discuss the purpose of Status Register in Program Control.

12. (a) A digital computer has a common bus system for 16 registers of 32 bits each. The bus is constructed with multiplexers.

(i) How many selection input are there in each multiplexer?

(ii) What size of multiplexers are needed?

(iii) How many multiplexers are there in the bus?

Or

(b) Discuss Input-Output configuration.

13. (a) Define the following

(i) Micro operation

(ii) Microinstruction

(iii) Micro program

(iv) Microcode

Or

(b) Explain Address Sequencing in Microprogram control unit.

14. (a) Explain Associative memory.

Or

(b) Explain I/O Interface and connection of I/O bus to Input and Output devices.

15. (a) Discuss the characteristics of Multiprocessors.

Or

(b) Explain Array Processing.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain any six Addressing modes with examples.

17. Explain Instruction Cycle with necessary flowchart.

18. Explain Microprogram sequencer.

19. Explain Parallel Priority interrupt hardware.

20. Explain Instruction Pipeline and the difficulties associated with it.

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F–3053

Sub. Code
7MCE2C2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer Science

.NET TECHNOLOGY

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What is .NET Framework?

2. What is object oriented programming?

3. Define scope.

4. What is mean by docking a control?

5. What is the difference between Tree and list views?

6. What is Typography?

7. Define name space.

8. Why do we need validator control?

9. What is the difference between ADO and ADO .Net?

10. What is a Repeater?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Write a short note on .Net Assemblies.

Or

(b) How will you create a structure? Explain with an example.

12. (a) Describe the facilities for handling sub procedures in VB Net.

Or

(b) How will you create dialog boxes? Explain with an example?

13. (a) Describe the funcbonality of splitters and notify Icons

Or

(b) Briefly describe file handling in VB .Net.

14. (a) Explain the usage of Global. asax file.

Or

(b) Discuss on the creation of user custom controls.

15. (a) Explain the characteristics of ADO.Net

Or

(b) How data blinding is used in ASP.Net Applications? Explain with example.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. How is method overloading different from method overriding? Explain with example.

17. Elaborate on conditional statement in VB.Net with an Example.

18. Discuss about the significance of built in Dialog boxes.

19. Give a detailed note on Http Request and Http response.

20. Explain the step to implement forms- based security with Diagram.

F–3054

Sub. Code
7MCE2C3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer science

DISTRIBUTED OPERATING SYSTEM

(CBCS – 2017 onwards)

Time : 3 hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What are the two primary tasks of operating system?

2. What are PSEs?

3. What are the two basic methods for information sharing?

4. Define buffering.

5. Mention the four factors that are influencing the block size selection?

6. Why does a computer need timer mechanism?

7. Define: File system

8. What do you mean by mutable file model?

9. What do you mean by external security?

10. What are the main types of authentication in distributed system?

Part B (5× 5= 25)

Answer **ALL** questions, choosing either (a) or (b).

11. (a) What is DCE? Explain its components in detail.

Or

(b) Differentiate LAN and WAN using their key characteristics.

12. (a) Explain the role of syncronization in distributed system message passcing.

Or

(b) Explain the many-to many communication scheme in group communication of message passing.

13. (a) Write down the advantages of DSM.

Or

(b) Explain the WFG- based distributed algorithm for deadlock detection.

14. (a) Write the difference between replication and caching.

Or

(b) State the general principles for designing distributed file system.

15. (a) Explain about key distribution in asymmetric cryptosystems.

Or

(b) Explain the mechanism of password based authentication system.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Discuss about the issues in designing distributed system.

17. What are the desirable features of a good message-passing system? Explain.

18. Explain the different approaches used to implement mutual exclusion.

19. What are the desirable features of good distributed file system? Explain.

20. Explain the concept of digital signature for distributed system security in detail.

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	7MCE2E1

M.SC DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer science

Elective – MOBILE COMPUTING

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What is meant by laptop computing?

2. Distinguish between mobility and portability.

3. Define Multiplexing.

4. What is mobility management?

5. What is agent discovery?

6. What do you mean by registration reply?

7. What is a Datagram?

8. What is foreign agent key?

9. What is smooth handoff?

10. Define Ingress filtering.

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) What is mobile networking? Explain.

Or

(b) Describe the architectural model of IETF Mobile IP protocol.

12. (a) Write a note on signal propagation.

Or

(b) Briefly explain about handover in cellular systems.

13. (a) Explain the operation of mobile agent.

Or

(b) Explain the procedure to register mobile node.

14. (a) Write a note on generic routing encapsulation.

Or

(b) How do you bind caches? Explain.

15. (a) Write about DHCP protocol and its functions.

Or

(b) What is reverse tunneling? Explain.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain the overview of IP and routing with neat diagram.

17. Describe the GSM system architecture with appropriate diagram.

18. Explain in detail about agent advertisement.

19. Explain the different route optimization message formats.

20. Explain in detail about Wireless Telephony Application.

F–3057

Sub. Code
7MCE2E3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer Science

Elective — COMPUTER GRAPHICS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** the questions.

1. Define Morphing.

2. Distinguish between image processing and computer graphics.

3. State the attributes of character.

4. Define Shear.

5. What is the purpose of input modes of input functions?

6. Define point clipping.

7. State any two applications of depth cueing.

8. What is meant by parallel and perspective projections?

9. Define cabinet projection.

10. What is vanishing point?

Part B (5 × 5 = 25)

Answer **all** the questions, choosing either (a) or (b).

11. (a) Describe midpoint circle algorithm in detail.

Or

(b) Explain the techniques used for color displays.

12. (a) Write short notes on character attributes.

Or

(b) Explain composite transformations with proper illustration.

13. (a) Describe in detail about text clipping.

Or

(b) Write briefly about segment attributes.

14. (a) Explain the three dimensional graphics packages in detail.

Or

(b) Discuss briefly about the three-dimensional display techniques.

15. (a) Explain general parallel-projection transformations in detail.

Or

(b) Explain back-face detection method in detail.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Discuss briefly about interactive input devices.

17. Explain in detail about the following transformations in detail.

    (a) Reflection

    (b) Shear

    (c) Translation, Scaling and Rotation

18. Enlighten about the interactive-picture construction methods.

19. Explain the three dimensional transformations in detail.

20. Explain depth buffer method in detail.

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F3058

Sub. Code
7MCE2E4

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer Science

Elective — PARALLEL PROCESSING

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **All** Questions.

1. Define parallelism.

2. What is hypercubes?

3. What is ring network?

4. What is control parallelism?

5. Write the types of mapping?

6. Define message passing.

7. Write any two performance laws.

8. Write any two parallel search algorithms.

9. What is multiport memory?

10. Expand NUMA.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) How to implement parallel processing.

Or

(b) Describe the computational demands of parallel processing.

12. (a) Give a brief note on loosely coupled systems.

Or

(b) Describe mesh & hypercube architecture.

13. (a) Differentiate message passing & shared adders space.

Or

(b) Discuss three types of Granularity.

14. (a) Explain Amdahl's & Gustafson's laws.

Or

(b) Write a note on types of complexities.

15. (a) Explain cross bar & multiport memory.

Or

(b) Discus about eache coherence.

Part C (3 × 10 = 30)

Answer any **Three** questions.

16. Describe the major issues in parallel processing.

17. Explain tightly coupled systems.

18. Discuses the types of mapping.

19. Explain depth first & breadth first search algorithms.

20. Describe memory Contention techniques.

F–3059

Sub. Code
7MCE2E5

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Comuputer Science

Elective : ADVANCED DATABASE SYSTEMS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** the questions.

1. What is data dictionary?

2. Differentiate between schema and instances.

3. What are the main reasons for the delay in development and implementation of relational model.

4. Compare the derived attribute and stored attribute.

5. Describe the concept of full functional dependency.

6. Write the purpose of normalising data.

7. What is client/server computing? What are its main components?

8. What is semi-JOIN?

9. What are multimedia databases?

10. What are the newer modules available for MySQL stability.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Write short notion the functions and responsibilities of DBAs.

Or

(b) Write a note on data model.

12. (a) Describe with example the different types of keys used in relational model.

Or

(b) An enterprise database needs to store information as follows :

EMPLOYEE(EMP-ID, SALARY, PHONE)

DEPARTMENTS(DEPT-ID, DEPT-NAME, BUDGET)

EMPLOYEE-CHILDREN(NAME, AGE)

Employees 'work' in departments. Each department is 'managed by' an employee. A child must be identified uniquely by 'name' when the parent (who is an employee) is known. Once the parent leaves the enterprise, the information about the child is not required. Draw an E-R diagram that captures the above information.

13. (a) Illustrate the three Armstrong's axioms using diagrammatical representation.

Or

(b) Consider the universal relation R (A, B, C, D, E, F, G, H, I, J) and the set of FDs are given as

$F = (\{A, B\} \rightarrow \{A\} \rightarrow \{D, E\}, \{B\} \rightarrow \{F\}, \{F\} \rightarrow \{G, H\},$

$\{D\} \rightarrow \{I, J\}.$

(i) What is the key of R?

(ii) Decompose R into 2NF, then 3NF relations.

14. (a) What is middleware system architecture? Explain with a neat sketch and an example.

Or

(b) What is distributed locking? What are its advantages and disadvantages?

15. (a) What is a mobile database? Explain the architecture of mobile database with meat sketch.

Or

(b) Write the features of MySQL 4.1.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain the important operations performed on the data file with example.

17. What are the problems that arise when constructing an E-R model? How will you resolve them? Illustrate with examples.

18. Define the concept of multi valued dependency and describe how this concept relates to 4NF. Provide an example to illustrate your answer.

19. Explain the functioning of two-phase and three-phase commit protocols used in recovery control of distributed database system.

20. Define MySQL database. How will you create the MySQL tables? Explain with examples the insertion of data into and retrieval of information from the MySQI table.

F–3060

Sub. Code
7MCE2E6

M.Sc. DEGREE EXAMINATION,
NOVEMBER 2019

Second Semester

Computer Science

***Elective* — DIGITAL IMAGE PROCESSING**

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A ($10 \times 2 = 20$)

Answer **all** questions.

1. What are the modalities of imaging based on CAT principle?

2. Define sampling and quantization.

3. What is meant by Bit-plane slicing?

4. Define histogram of a digital image.

5. What is spatial and temporal aliasing? Give examples.

6. Define 2-D ideal highpass filter.

7. List out order-statistic filters.

8. State Fourier-slice theorem.

9. What is meant by intensity slicing?

10. What is meant by Radiance and Luminance?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain image representation, sampling and quantization in detail.

Or

(b) Explain the role of image transforms and probabilistic methods in image processing.

12. (a) Explain intensity-level slicing and bit-plane slicing in detail.

Or

(b) Write short notes histogram matching.

13. (a) Explain the following properties of 2-D Discrete Fourier Transform:

(i) Symmetry

(ii) Fourier Spectrum and Phase angle.

Or

(b) Describe Image Smoothing using frequency domain filters in detail.

14. (a) Describe Constrained Least Squares filtering.

Or

(b) Explain the model of the image Degradation/Restoration Process in detail.

15. (a) Enlighten about color models.

Or

(b) Discuss in brief about the image compression fundamentals.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Discuss in detail about the relationships between pixels in a digital image.

17. How fuzzy sets used in intensity transformations? Explain.

18. Describe image sharpening using frequency domain filters in detail.

19. Explain the three principal ways to estimate the degradation function for use in image restoration.

20. Discuss in detail about the following image compression methods.

    (a) Huffman coding

    (b) LZW coding

    (c) Run-Length coding

    (d) Wavelet coding.

F–3061

Sub. Code
7MCE3C1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Computer science

CRYPTOGRAPHY AND NETWORK SECURITY

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A ($10 \times 2 = 20$)

Answer **all** questions.

1. What are the services of security?
2. What is one-time pad?
3. What is block cipher?
4. State the difference between Rijndael and AES.
5. What are the keys used for asymmetric encryption?
6. Write the purpose of Diffie-hellman key exchange.
7. What is hash function?
8. What are the properties of digital signature?
9. What is S/MIME?
10. Write the use of Handshake protocol.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Briefly describe categories of passive and active security attacks.

Or

(b) Explain Caesar cipher and play fair cipher with example

12. (a) Summarize the strength of DES.

Or

(b) Briefly describe the key expansion algorithm.

13. (a) Explain the applications and requirements of public key cryptography.

Or

(b) Discuss about Elliptic curve cryptography.

14. (a) Write a note on cryptanalysis.

Or

(b) Explain public key encryption approach to deal with replay attacks.

15. (a) Explain different types of keys exchange methods.

Or

(b) Discuss the principle services provided by PGP.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Briefly define categories of security services.

17. Explain in detail about AES structure.

18. Describe RSA algorithm with example.

19. Discuss about Digital signature algorithm.

20. Explain in detail about secure socket layer architecture.

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F–3062

Sub. Code
7MCE3C2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Computer Science

PROGRAMMING IN PHP

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A ($10 \times 2 = 20$)

Answer **all** questions.

1. State the added features of PHP 4 when compared to PHP 3.

2. Distinguish between Value assignment and Reference assignment.

3. What is the purpose of break and continue statement.

4. List out any four inbuilt string functions.

5. Write a code for checking existence of a file?

6. What is the use of forms?

7. Define a class.

8. Write a code to find the number of rows in a table?

9. What is session?

10. Expand AJAX and DOM.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain how PHP scripts work.

Or

(b) What are Type-related functions and type identifier functions? Explain.

12. (a) Elucidate the For and For each looping statements with suitable example.

Or

(b) Define function. Explain the concept of passing arguments to a function by reference.

13. (a) Write a short notes on file creation and deletion.

Or

(b) How do you get input from user in PHP?

14. (a) Discuss about the base exception class and its methods.

Or

(b) Write notes on creating session cookie?

15. (a) Explain in detail about Email creation in PHP?

Or

(b) Write about methods and properties of Http Request?

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Discuss in detail about the PHP's supported Data types.

17. How do you sort the arrays in PHP? Explain with example.

18. How do you read the characters from a file? Explain it.

19. Discuss in detail about table creation and update the table structure.

20. Describe the concepts of starting a session and working with session variables.

F-3063

Sub. Code
7MCE3C3

M.Sc DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Computer Science

DATA MINING AND DATA WAREHOUSING

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. How is a data warehouse different from a database?

2. List out the strategies for data reduction.

3. What is a data cube?

4. Give the contents of metadata repository.

5. Define the accuracy of a classifier.

6. What is back propagation?

7. List out the categories of clustering methods.

8. What are the two types of hierarchical clustering methods?

9. Name the three types of dimensions in spatial data cube.

10. What is a signature file?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain about classification and prediction with suitable example.

Or

(b) Discuss about Principal Component Analysis.

12. (a) Write notes on snowflake schema for multidimensional databases.

Or

(b) Discuss about the OLAP operations in the multidimensional data model.

13. (a) Describe the issues regarding classification and prediction.

Or

(b) Write notes on Bayes' theorem.

14. (a) Write notes on binary variables.

Or

(b) Discuss about grid based methods.

15. (a) Give explanation for text retrieval methods.

Or

(b) How data mining can be applied for financial data analysis?

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Give detailed explanation for data cleaning process.

17. Give the architecture for On-Line Analytical Mining and explain.

18. Discuss in detail about classification by back propagation.

19. Explain the k-means and k-medoid methods for partitioning.

20. Explain the various dimensionality reduction techniques for text.

F-3064

Sub. Code
7MCE3E3

M.Sc DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Computer Science

Elective- MULTIMEDIA SYSTEM

(CBCS – 2017onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **All** questions.

1. What are the hardware/software components needed for a multimedia development system?

2. Mention some of the image formats used in multimedia.

3. What is the use of graphics in multimedia?

4. Mention the various CD formats.

5. What is meant by adaptive data pulse code modulation?

6. What are the key parameters need to be considered to evaluate compression performance?

7. What is voice mail?

8. Define HTML.

9. What is meant by Hoptic signals?

10. Define scientific visualization.

Part B (5 × 5 = 25)

Answer **All** questions, choosing either (a) or (b).

11. (a) Write briefly about Multimedia hardware.

Or

(b) Discuss about Multimedia standards.

12. (a) Write short notes on Text.

Or

(b) Discuss about Digital Audio.

13. (a) Write short notes on Transform representation of sounds.

Or

(b) Describe the various file storage in video.

14. (a) Write short notes on MIME.

Or

(b) Discuss briefly about the features of Authoring tools in multimedia.

15. (a) Discuss about the mode of interaction.

Or

(b) Describe about the modelling virtual world.

Part C (3 × 10 = 30)

Answer any **Three** questions.

16. Explain in detail about the Multimedia Applications.

17. Write briefly about the video.

18. Discuss in brief about the digital representation of sound.

19. Explain about the Internet content in Multimedia.

20. Explain in detail about the sensor Hardware.

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F–3065	Sub. Code
	7MCE3E6

M.Sc DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Computer science

Elective-WAP AND XML

(CBCS – 2017 onwards)

Time : 3 Hours　　　　Maximum : 75 Marks

Part A　　　　$(10 \times 2 = 20)$

Answer **all** questions.

1. List the components of WAP.

2. Write the features of WAP.

3. Expand UML.

4. Define WAP gateway.

5. What is Event?

6. Write any 4 standard Libraries in WML.

7. What is the purpose of XML?

8. Write the use of CSS.

9. Write the difference between attribute & elements.

10. What is Unicode character set?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain in detail about WAP protocal stack.

Or

(b) Give a note on WAP resources.

12. (a) Compare web model with WAP model.

Or

(b) Describe WML structures.

13. (a) Explain selection statement with example.

Or

(b) Write about input &output statements with example.

14. (a) Write a XML document for product catalog.

Or

(b) Write a XML document for displaying the covariant function of Maxwell's equation in math ML.

15. (a) How to create tables using XSL?

Or

(b) Explain &give example for Attributes Elements.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain in detail about WAP architecture.

17. Explain how to position a WAP gateway in the network.

18. Give suitable example for

    (a) Looping statement (4)

    (b) Automatic type conversion (4)

    (c) Operators. (2)

19. Describe how to prepare a style sheet for document display.

20. Write a brief note on legacy character sets.

F–3045	Sub. Code
	7MCE1C1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science

APPLIED MATHEMATICS FOR COMPUTER SCIENCE

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Define tautology. Give example.
2. What is the condition for a statement A to tautologically imply a statement B?
3. What is existential Quantifier? Give example.
4. Define disjunctive normal form.
5. Define Rooted tree. Give example.
6. Define level and height of a rooted tree. Give example.
7. Define the canonical form of linear programming problem.
8. What is meant by optimum solution of an LPP?
9. State the mathematical formulation of an assignment problem.
10. What is meant by prohibited assignments?

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) Prove that following implications

(i) $(P \wedge Q) \Rightarrow (P \rightarrow Q)$

(ii) $P \Rightarrow (Q \rightarrow P)$.

Or

(b) Show the following equivalence

$\urcorner (P \rightleftarrows Q) \Leftrightarrow (P \vee Q) \wedge \urcorner (P \wedge Q)$.

12. (a) Obtain the disjunctive normal form of $P \vee (Q \wedge R)$.

Or

(b) Obtain the disjunctive normal form of $\urcorner (P \vee Q) \rightleftarrows (P \wedge Q)$.

13. (a) Explain spanning tree with example.

Or

(b) Explain binary tree with example.

14. (a) Use graphical method to solve the following problem

Maximize $z = 2x + 3y$

Subject to $x + y \leq 30$

$x - y \geq 0$

$y \geq 3$, $0 \leq x \leq 20$, $0 \leq y \leq 12$

Or

(b) An animal feed company must produce 200lbs of a mixture containing the ingredients X_1 and X_2. X_1 costs Rs. 3 per lb and X_2 cost Rs. 8 per lb. Note that more than 80 lbs of X_1 can be used and minimum quantity to be used for X_2 is 60 lbs. Find how much of each ingredient should be used if the company wants to minimize the cost. Formulate the above problem.

15. (a) Obtain an initial basic feasible solution to the following transportain problem using Vogel's approximation method.

	To			Available
	7	3	4	2
From	2	1	3	3
	3	4	6	5
Demand	4	1	5	

Or

(b) The Head of the department has five jobs A, B, C, D, E and five sub-ordinates V, W, X, Y, Z. The number of hours each man would take to perform each job is as follows.

$$\begin{array}{c|c} & \begin{array}{ccccc} V & W & X & Y & Z \end{array} \\ \begin{array}{c} A \\ B \\ C \\ D \\ E \end{array} & \begin{pmatrix} 3 & 5 & 10 & 15 & 8 \\ 4 & 7 & 15 & 18 & 8 \\ 8 & 12 & 20 & 20 & 12 \\ 5 & 5 & 8 & 10 & 6 \\ 10 & 10 & 15 & 25 & 10 \end{pmatrix} \end{array}$$

How should the jobs be allocated to minimize the total time?

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Obtain an equivalent formula for the following which contains neither the biconditional or conditional

    (a) $P \wedge (Q \rightleftarrows R) \vee (R \rightleftarrows P)$

    (b) $((P \vee Q) \wedge R) \rightarrow (P \vee R)$.

17. Obtain the principal disjunctive normal forms of the following and also identify whether they are tautologies or not

    (a) $Q \wedge (P \vee \neg Q)$

    (b) $(Q \rightarrow P) \wedge (\neg P \wedge Q)$.

18. Discuss in detail about matrix representation of Graphs.

19. Use two-phage simplex method to solve the following LPP.

    Maximize $Z = 5x_1 + 8x_2$

    Subject to $3x_1 + 2x_2 \geq 3$

    $x_1 + 4x_2 \geq 4$

    $x_1 + x_2 \leq 5$, $x_1, x_2 \geq 0$.

20. Find the optimum solution to the following transportation problem using MODI method.

	T_1	T_2	T_3	T_4	Availability
B_1	5	3	6	2	19
B_2	4	7	9	1	37
B_3	3	4	7	5	34
Requirement	16	18	31	25	

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F–3046

Sub. Code
7MCE1C2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science

DESIGN AND ANALYSIS OF ALGORITHMS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Define space and time complexity.
2. Differentiate stack and queue.
3. Write the recurrence relation of divide and conquer algorithm.
4. Write the recurrence relation for computing time of quick sort.
5. What is feasible solution?
6. Write the purpose of Huffman codes.
7. Define multistage graph.
8. Give example for biconnected graph.
9. What is backtracking?
10. Give example for hamiltonian cycles.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Give a brief note on recursive function with example.

Or

(b) Write an algorithm for stack operations.

12. (a) Explain how to use recursion for finding maximum and minimum of set of elements.

Or

(b) Prove that the average computing time $T_A(n)$ of selection sort is O(n).

13. (a) Find the feasible solution to the job sequencing instance $n = 4$, $\{p_1, p_2, p_3, p_4\} = \{100, 10, 15, 27\}$ and $\{d_1, d_2, d_3, d_4\} = \{2, 1, 2, 1\}$.

Or

(b) Write greedy algorithm to generate shortest path.

14. (a) Explain Bellman Ford algorithm to compute shortest path.

Or

(b) Write an algorithm for tree traversals.

15. (a) Explain how to estimate the efficiency of backtracking.

Or

(b) Describe the function for Knapsack problem.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain different representation of Graph.

17. Discuss about binary search with example.

18. Describe the stages of Kruskal's algorithm.

19. Explain breadth first search tree.

20. Give a brief note on Graph Coloring.

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ws7

F–3047

Sub. Code
7MCE1C3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science

ADVANCED JAVA PROGRAMMING

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Section A $(10 \times 2 = 20)$

Answer **all** questions.

1. What is JDBC – ODBC Bridge?

2. What is the purpose of SQL Exception class?

3. What are the two kinds of TCP sockets in Java?

4. How is datagram implemented in Java?

5. What is the purpose of Bound property?

6. What is meant by persistance? How is it achieved in Java Bean?

7. What is servlet? What are the advantages of servlets over CGI?

8. What is a cookie?

9. Tabbed panes are encapsulated by ———————— class, which extends ————————.

10. What methods are used for drawing Ellipses and circles?

Section B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) What is JDBC? How does it work?

Or

(b) Explain JDBC metadata classes.

12. (a) Explain URL and URL connection classes with example code.

Or

(b) With a sample code, explain how the contents of a document is cached on a server.

13. (a) Explain JAR files.

Or

(b) What is Java Bean? Explain its advantages and disadvantages?

14. (a) What is meant by session Tracking? How is it achieved in HTTP servlet.

Or

(b) Draw a state diagram and explain the life cycle of servlet.

15. (a) Discuss the constructors and methods of color class.

Or

(b) How is a table created using swing class?

Section C (3 × 10 = 30)

Answer any **three** questions.

16. Explain the Anatomy of a JDBC application and the classes and statements involved.

17. Write a simple client/server application using RMI and explain the concepts.

18. Discuss the Design patterns for properties and Events.

19. Discuss any four important classes and interfaces in Javax.servlet package.

20. How is a Tree created in an Applet? Explain the various classes and methods used?

Ws9

F–3048

Sub. Code
7MCE1C4

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science

PRINCIPLES OF COMPILER DESIGN

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** the questions.

1. Define a compiler.

2. Define a string with an example.

3. Construct a parse tree for id + id*id.

4. List down the four actions performed by a shift-reduce parser.

5. Draw the syntax tree for a*(b + c)/d.

6. Write about unconditional jumps.

7. Write down the format of symbol table.

8. Specify any two block structured languages.

9. Define a basic block.

10. What do you mean by an optimal ordering?

Part B (5 × 5 = 25)

Answer **all qu**estions, choosing either (a) or (b).

11. (a) Why do we need translators? Explain.

Or

(b) Explain the method of constructing a deterministic finite automation from a non-deterministic one.

12. (a) Write about ambiguous grammar with an example.

Or

(b) Write an algorithm for the construction of an SLR parsing table.

13. (a) Explain the method of evaluating the postfix expressions by an example.

Or

(b) Discuss about the statements that alter the flow of control.

14. (a) Discuss about Hash tables.

Or

(b) Explain about the storage allocation in Block-structured languages.

15. (a) How can you construct a DAG? Explain.

Or

(b) Discuss in brief the problems in code generation.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Describe the structure of a compiler with a neat diagram.

17. Explain the stack implementation of Shift-Reduce Parsing with an example.

18. Discuss about any two kinds of intermediate codes used in compilers with examples.

19. Discuss the storage allocation in brief.

20. Explain a simple code generator in detail.

F–3049

Sub. Code
7MCE1E1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science

Elective — OBJECT ORIENTED ANALYSIS AND DESIGN

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What are the characteristics of an object oriented systems?

2. What is meant by overriding?

3. Define scenarios and event trace.

4. What is a constraint? What are the different types of constraints?

5. What are the steps required in constructing an object model?

6. What is an operation in OOAD parlance? What are the different sources of operations?

7. What are the two forms of layered architecture? When is one preferred over the other?

8. Write down any four kinds of a system.

9. Draw the implementations of stack using Inheritance and delegation? Which one is better than the other?

10. What are the trade-offs between information hiding and optimization?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) How do you establish relationships among objects and classes?

Or

(b) Draw an object model of windowing system discuss the underlying O.O. concepts.

12. (a) Discuss state Generalization with example.

Or

(b) Explain the relation of object and dynamic models.

13. (a) Discuss scenario, event and event trace with an example.

Or

(b) How are object attributes identified and right attributes selected?

14. (a) How are sub systems allocated to processors and tasks?

Or

(b) Discuss the two kinds of control flows in a software system.

15. (a) Discuss any three issues in designing algorithms.

Or

(b) What are the three different models in O.O. Design? How are they combined?

Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. Discuss aggregation and multiple inheritance.

17. Discuss the components of DFD and explain how a functional model is designed using DFD.

18. Discuss the steps performed in constructing a dynamic model.

19. Discuss any four common architectural frameworks.

20. Explain design optimization. Why is it required?

F–3050	Sub. Code
	7MCE1E2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science

Elective : SYSTEM SOFTWARE

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** the questions.

1. List down the language processing activities.
2. Define a production with its format.
3. Give an example for a DFA.
4. Write down the format of an assembly language statement.
5. Write any two expansion time statements with their syntax.
6. Write the post fix form of $a + b * c + d * e \uparrow f$.
7. What are the components of a interpreter?
8. Define linking.
9. Specify the two object program forms supported by MSDOS.
10. What is a programming environment?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Write briefly about intermediate representation with its properties.

Or

(b) Write short notes on Entry formats.

12. (a) How DFA's can be built? Explain with an example.

Or

(b) Discuss about any two advanced assembler directives.

13. (a) Write about positional and keyword parameters with examples.

Or

(b) Discuss about the various parameter passing mechanisms.

14. (a) Describe pure and impure interpreters.

Or

(b) Write down the format of an object modula.

15. (a) Discuss about program testing and debugging.

Or

(b) Write about program environment with its components.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Describe any two types of table organization in brief.

17. Describe top down parsing with its implementation with an example.

18. Explain the design of a macro preprocessor.

19. Discuss about some of the optimizing transformations used in compilers.

20. Describe the structure of user Interface and UIMS.

F–3051

Sub. Code
7MCE1E3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer science

Elective – SOFTWARE ENGINEERING

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** the questions.

1. What is meant by system software and application software?

2. State the distinguishing feature of the spiral model.

3. What is QFD?

4. Define use-case and actor.

5. State the software equation for the cost estimation model.

6. Mention the ways in which LOC and FP are used during software project estimation.

7. What is the purpose of black– box and while–box testing?

8. State the benefit of smoke testing.

9. What are the three factors that have profound influence on software quality and organizational performance?

10. Define CBSE.

Part B (5 × 5 = 25)

Answer **all** the questions, choosing either (a) or (b).

11. (a) State the characteristics of software? Discuss.

Or

(b) Write short notes on Legacy software.

12. (a) Describe the steps required to initiate requirements engineering.

Or

(b) Explain how to write effective use-cases in detail.

13. (a) Explain process-based estimation with examples.

Or

(b) Enlighten about empirical estimation models.

14. (a) Explain basis path testing in detail.

Or

(b) Describe validation testing in detail.

15. (a) Write short notes on economics of CBSE.

Or

(b) Describe in detail about Reusable components and Reuse environment.

Part C $(3 \times 10 = 30)$

Answer any **THREE** questions.

16. Elaborate on prescriptive models and incremental models in detail.

17. Describe in detail about the function accomplished during the requirement engineering tasks.

18. Discuss briefly about problem- based estimation and Use-Case based estimation with examples.

19. Explain various black-box testing methods.

20. Describe in detail about software measurement and also the metrics used for software quality.

F–3052

Sub. Code
7MCE2C1

M.Sc DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer Science

COMPUTER SYSTEM ARCHITECTURE

(CBCS – 2017 onwards)

Time :3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What is CPU? What are its major components?

2. Define Stack.

3. How do you define the internal hardware organization of a digital computer?

4. Define Selective complement operation.

5. What is the advantage of Microprogrammed Control unit?

6. What is the purpose of Control Address Register?

7. What is meant by Asynchronous data transfer?

8. Define Hit ratio.

9. What is meant by delayed branch?

10. Write any two characteristics of RISC architecture.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain Instruction formats.

Or

(b) Discuss the purpose of Status Register in Program Control.

12. (a) A digital computer has a common bus system for 16 registers of 32 bits each. The bus is constructed with multiplexers.

(i) How many selection input are there in each multiplexer?

(ii) What size of multiplexers are needed?

(iii) How many multiplexers are there in the bus?

Or

(b) Discuss Input-Output configuration.

13. (a) Define the following

(i) Micro operation

(ii) Microinstruction

(iii) Micro program

(iv) Microcode

Or

(b) Explain Address Sequencing in Microprogram control unit.

14. (a) Explain Associative memory.

Or

(b) Explain I/O Interface and connection of I/O bus to Input and Output devices.

15. (a) Discuss the characteristics of Multiprocessors.

Or

(b) Explain Array Processing.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain any six Addressing modes with examples.

17. Explain Instruction Cycle with necessary flowchart.

18. Explain Microprogram sequencer.

19. Explain Parallel Priority interrupt hardware.

20. Explain Instruction Pipeline and the difficulties associated with it.

F–3053

Sub. Code
7MCE2C2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer Science

.NET TECHNOLOGY

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What is .NET Framework?

2. What is object oriented programming?

3. Define scope.

4. What is mean by docking a control?

5. What is the difference between Tree and list views?

6. What is Typography?

7. Define name space.

8. Why do we need validator control?

9. What is the difference between ADO and ADO .Net?

10. What is a Repeater?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Write a short note on .Net Assemblies.

Or

(b) How will you create a structure? Explain with an example.

12. (a) Describe the facilities for handling sub procedures in VB Net.

Or

(b) How will you create dialog boxes? Explain with an example?

13. (a) Describe the funcbonality of splitters and notify Icons

Or

(b) Briefly describe file handling in VB .Net.

14. (a) Explain the usage of Global. asax file.

Or

(b) Discuss on the creation of user custom controls.

15. (a) Explain the characteristics of ADO.Net

Or

(b) How data blinding is used in ASP.Net Applications? Explain with example.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. How is method overloading different from method overriding? Explain with example.

17. Elaborate on conditional statement in VB.Net with an Example.

18. Discuss about the significance of built in Dialog boxes.

19. Give a detailed note on Http Request and Http response.

20. Explain the step to implement forms- based security with Diagram.

———————

F–3054

Sub. Code
7MCE2C3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer science

DISTRIBUTED OPERATING SYSTEM

(CBCS – 2017 onwards)

Time : 3 hours   Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What are the two primary tasks of operating system?

2. What are PSEs?

3. What are the two basic methods for information sharing?

4. Define buffering.

5. Mention the four factors that are influencing the block size selection?

6. Why does a computer need timer mechanism?

7. Define: File system

8. What do you mean by mutable file model?

9. What do you mean by external security?

10. What are the main types of authentication in distributed system?

Part B (5× 5= 25)

Answer **ALL** questions, choosing either (a) or (b).

11. (a) What is DCE? Explain its components in detail.

Or

(b) Differentiate LAN and WAN using their key characteristics.

12. (a) Explain the role of syncronization in distributed system message passcing.

Or

(b) Explain the many-to many communication scheme in group communication of message passing.

13. (a) Write down the advantages of DSM.

Or

(b) Explain the WFG- based distributed algorithm for deadlock detection.

14. (a) Write the difference between replication and caching.

Or

(b) State the general principles for designing distributed file system.

15. (a) Explain about key distribution in asymmetric cryptosystems.

Or

(b) Explain the mechanism of password based authentication system.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Discuss about the issues in designing distributed system.

17. What are the desirable features of a good message-passing system? Explain.

18. Explain the different approaches used to implement mutual exclusion.

19. What are the desirable features of good distributed file system? Explain.

20. Explain the concept of digital signature for distributed system security in detail.

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F–3055

Sub. Code
7MCE2E1

M.SC DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer science

Elective – MOBILE COMPUTING

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What is meant by laptop computing?

2. Distinguish between mobility and portability.

3. Define Multiplexing.

4. What is mobility management?

5. What is agent discovery?

6. What do you mean by registration reply?

7. What is a Datagram?

8. What is foreign agent key?

9. What is smooth handoff?

10. Define Ingress filtering.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) What is mobile networking? Explain.

Or

(b) Describe the architectural model of IETF Mobile IP protocol.

12. (a) Write a note on signal propagation.

Or

(b) Briefly explain about handover in cellular systems.

13. (a) Explain the operation of mobile agent.

Or

(b) Explain the procedure to register mobile node.

14. (a) Write a note on generic routing encapsulation.

Or

(b) How do you bind caches? Explain.

15. (a) Write about DHCP protocol and its functions.

Or

(b) What is reverse tunneling? Explain.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain the overview of IP and routing with neat diagram.

17. Describe the GSM system architecture with appropriate diagram.

18. Explain in detail about agent advertisement.

19. Explain the different route optimization message formats.

20. Explain in detail about Wireless Telephony Application.

F–3057

Sub. Code
7MCE2E3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer Science

Elective — COMPUTER GRAPHICS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. Define Morphing.

2. Distinguish between image processing and computer graphics.

3. State the attributes of character.

4. Define Shear.

5. What is the purpose of input modes of input functions?

6. Define point clipping.

7. State any two applications of depth cueing.

8. What is meant by parallel and perspective projections?

9. Define cabinet projection.

10. What is vanishing point?

Part B (5 × 5 = 25)

Answer **all** the questions, choosing either (a) or (b).

11. (a) Describe midpoint circle algorithm in detail.

Or

(b) Explain the techniques used for color displays.

12. (a) Write short notes on character attributes.

Or

(b) Explain composite transformations with proper illustration.

13. (a) Describe in detail about text clipping.

Or

(b) Write briefly about segment attributes.

14. (a) Explain the three dimensional graphics packages in detail.

Or

(b) Discuss briefly about the three-dimensional display techniques.

15. (a) Explain general parallel-projection transformations in detail.

Or

(b) Explain back-face detection method in detail.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Discuss briefly about interactive input devices.

17. Explain in detail about the following transformations in detail.

    (a) Reflection

    (b) Shear

    (c) Translation, Scaling and Rotation

18. Enlighten about the interactive-picture construction methods.

19. Explain the three dimensional transformations in detail.

20. Explain depth buffer method in detail.

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F3058

Sub. Code
7MCE2E4

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer Science

Elective — PARALLEL PROCESSING

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **All** Questions.

1. Define parallelism.

2. What is hypercubes?

3. What is ring network?

4. What is control parallelism?

5. Write the types of mapping?

6. Define message passing.

7. Write any two performance laws.

8. Write any two parallel search algorithms.

9. What is multiport memory?

10. Expand NUMA.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) How to implement parallel processing.

Or

(b) Describe the computational demands of parallel processing.

12. (a) Give a brief note on loosely coupled systems.

Or

(b) Describe mesh & hypercube architecture.

13. (a) Differentiate message passing & shared adders space.

Or

(b) Discuss three types of Granularity.

14. (a) Explain Amdahl's & Gustafson's laws.

Or

(b) Write a note on types of complexities.

15. (a) Explain cross bar & multiport memory.

Or

(b) Discus about eache coherence.

Part C (3 × 10 = 30)

Answer any **Three** questions.

16. Describe the major issues in parallel processing.

17. Explain tightly coupled systems.

18. Discuses the types of mapping.

19. Explain depth first & breadth first search algorithms.

20. Describe memory Contention techniques.

F–3059

Sub. Code
7MCE2E5

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Comuputer Science

Elective : ADVANCED DATABASE SYSTEMS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. What is data dictionary?

2. Differentiate between schema and instances.

3. What are the main reasons for the delay in development and implementation of relational model.

4. Compare the derived attribute and stored attribute.

5. Describe the concept of full functional dependency.

6. Write the purpose of normalising data.

7. What is client/server computing? What are its main components?

8. What is semi-JOIN?

9. What are multimedia databases?

10. What are the newer modules available for MySQL stability.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Write short notion the functions and responsibilities of DBAs.

Or

(b) Write a note on data model.

12. (a) Describe with example the different types of keys used in relational model.

Or

(b) An enterprise database needs to store information as follows :

EMPLOYEE(EMP-ID, SALARY, PHONE)

DEPARTMENTS(DEPT-ID, DEPT-NAME, BUDGET)

EMPLOYEE-CHILDREN(NAME, AGE)

Employees 'work' in departments. Each department is 'managed by' an employee. A child must be identified uniquely by 'name' when the parent (who is an employee) is known. Once the parent leaves the enterprise, the information about the child is not required. Draw an E-R diagram that captures the above information.

13. (a) Illustrate the three Armstrong's axioms using diagrammatical representation.

Or

(b) Consider the universal relation R (A, B, C, D, E, F, G, H, I, J) and the set of FDs are given as

$F = (\{A, B\} \rightarrow \{A\} \rightarrow \{D, E\}, \{B\} \rightarrow \{F\}, \{F\} \rightarrow \{G, H\},$

$\{D\} \rightarrow \{I, J\}.$

(i) What is the key of R?

(ii) Decompose R into 2NF, then 3NF relations.

14. (a) What is middleware system architecture? Explain with a neat sketch and an example.

Or

(b) What is distributed locking? What are its advantages and disadvantages?

15. (a) What is a mobile database? Explain the architecture of mobile database with meat sketch.

Or

(b) Write the features of MySQL 4.1.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain the important operations performed on the data file with example.

17. What are the problems that arise when constructing an E-R model? How will you resolve them? Illustrate with examples.

18. Define the concept of multi valued dependency and describe how this concept relates to 4NF. Provide an example to illustrate your answer.

19. Explain the functioning of two-phase and three-phase commit protocols used in recovery control of distributed database system.

20. Define MySQL database. How will you create the MySQL tables? Explain with examples the insertion of data into and retrieval of information from the MySQI table.

F–3060

Sub. Code
7MCE2E6

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer Science

***Elective* — DIGITAL IMAGE PROCESSING**

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What are the modalities of imaging based on CAT principle?

2. Define sampling and quantization.

3. What is meant by Bit-plane slicing?

4. Define histogram of a digital image.

5. What is spatial and temporal aliasing? Give examples.

6. Define 2-D ideal highpass filter.

7. List out order-statistic filters.

8. State Fourier-slice theorem.

9. What is meant by intensity slicing?

10. What is meant by Radiance and Luminance?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain image representation, sampling and quantization in detail.

Or

(b) Explain the role of image transforms and probabilistic methods in image processing.

12. (a) Explain intensity-level slicing and bit-plane slicing in detail.

Or

(b) Write short notes histogram matching.

13. (a) Explain the following properties of 2-D Discrete Fourier Transform:

(i) Symmetry

(ii) Fourier Spectrum and Phase angle.

Or

(b) Describe Image Smoothing using frequency domain filters in detail.

14. (a) Describe Constrained Least Squares filtering.

Or

(b) Explain the model of the image Degradation/Restoration Process in detail.

15. (a) Enlighten about color models.

Or

(b) Discuss in brief about the image compression fundamentals.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Discuss in detail about the relationships between pixels in a digital image.

17. How fuzzy sets used in intensity transformations? Explain.

18. Describe image sharpening using frequency domain filters in detail.

19. Explain the three principal ways to estimate the degradation function for use in image restoration.

20. Discuss in detail about the following image compression methods.

    (a) Huffman coding

    (b) LZW coding

    (c) Run-Length coding

    (d) Wavelet coding.

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F–3061

Sub. Code
7MCE3C1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Computer science

CRYPTOGRAPHY AND NETWORK SECURITY

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A ($10 \times 2 = 20$)

Answer **all** questions.

1. What are the services of security?

2. What is one-time pad?

3. What is block cipher?

4. State the difference between Rijndael and AES.

5. What are the keys used for asymmetric encryption?

6. Write the purpose of Diffie-hellman key exchange.

7. What is hash function?

8. What are the properties of digital signature?

9. What is S/MIME?

10. Write the use of Handshake protocol.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Briefly describe categories of passive and active security attacks.

Or

(b) Explain Caesar cipher and play fair cipher with example

12. (a) Summarize the strength of DES.

Or

(b) Briefly describe the key expansion algorithm.

13. (a) Explain the applications and requirements of public key cryptography.

Or

(b) Discuss about Elliptic curve cryptography.

14. (a) Write a note on cryptanalysis.

Or

(b) Explain public key encryption approach to deal with replay attacks.

15. (a) Explain different types of keys exchange methods.

Or

(b) Discuss the principle services provided by PGP.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Briefly define categories of security services.

17. Explain in detail about AES structure.

18. Describe RSA algorithm with example.

19. Discuss about Digital signature algorithm.

20. Explain in detail about secure socket layer architecture.

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F–3062

Sub. Code
7MCE3C2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Computer Science

PROGRAMMING IN PHP

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. State the added features of PHP 4 when compared to PHP 3.

2. Distinguish between Value assignment and Reference assignment.

3. What is the purpose of break and continue statement.

4. List out any four inbuilt string functions.

5. Write a code for checking existence of a file?

6. What is the use of forms?

7. Define a class.

8. Write a code to find the number of rows in a table?

9. What is session?

10. Expand AJAX and DOM.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain how PHP scripts work.

Or

(b) What are Type-related functions and type identifier functions? Explain.

12. (a) Elucidate the For and For each looping statements with suitable example.

Or

(b) Define function. Explain the concept of passing arguments to a function by reference.

13. (a) Write a short notes on file creation and deletion.

Or

(b) How do you get input from user in PHP?

14. (a) Discuss about the base exception class and its methods.

Or

(b) Write notes on creating session cookie?

15. (a) Explain in detail about Email creation in PHP?

Or

(b) Write about methods and properties of Http Request?

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Discuss in detail about the PHP's supported Data types.

17. How do you sort the arrays in PHP? Explain with example.

18. How do you read the characters from a file? Explain it.

19. Discuss in detail about table creation and update the table structure.

20. Describe the concepts of starting a session and working with session variables.

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F-3063

Sub. Code
7MCE3C3

M.Sc DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Computer Science

DATA MINING AND DATA WAREHOUSING

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. How is a data warehouse different from a database?

2. List out the strategies for data reduction.

3. What is a data cube?

4. Give the contents of metadata repository.

5. Define the accuracy of a classifier.

6. What is back propagation?

7. List out the categories of clustering methods.

8. What are the two types of hierarchical clustering methods?

9. Name the three types of dimensions in spatial data cube.

10. What is a signature file?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain about classification and prediction with suitable example.

Or

(b) Discuss about Principal Component Analysis.

12. (a) Write notes on snowflake schema for multidimensional databases.

Or

(b) Discuss about the OLAP operations in the multidimensional data model.

13. (a) Describe the issues regarding classification and prediction.

Or

(b) Write notes on Bayes' theorem.

14. (a) Write notes on binary variables.

Or

(b) Discuss about grid based methods.

15. (a) Give explanation for text retrieval methods.

Or

(b) How data mining can be applied for financial data analysis?

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Give detailed explanation for data cleaning process.

17. Give the architecture for On-Line Analytical Mining and explain.

18. Discuss in detail about classification by back propagation.

19. Explain the k-means and k-medoid methods for partitioning.

20. Explain the various dimensionality reduction techniques for text.

F-3064

Sub. Code
7MCE3E3

M.Sc DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Computer Science

Elective- MULTIMEDIA SYSTEM

(CBCS – 2017onwards)

Time : 3 Hours Maximum : 75 Marks

Part A ($10 \times 2 = 20$)

Answer **All** questions.

1. What are the hardware/software components needed for a multimedia development system?

2. Mention some of the image formats used in multimedia.

3. What is the use of graphics in multimedia?

4. Mention the various CD formats.

5. What is meant by adaptive data pulse code modulation?

6. What are the key parameters need to be considered to evaluate compression performance?

7. What is voice mail?

8. Define HTML.

9. What is meant by Hoptic signals?

10. Define scientific visualization.

Part B (5 × 5 = 25)

Answer **All** questions, choosing either (a) or (b).

11. (a) Write briefly about Multimedia hardware.

Or

(b) Discuss about Multimedia standards.

12. (a) Write short notes on Text.

Or

(b) Discuss about Digital Audio.

13. (a) Write short notes on Transform representation of sounds.

Or

(b) Describe the various file storage in video.

14. (a) Write short notes on MIME.

Or

(b) Discuss briefly about the features of Authoring tools in multimedia.

15. (a) Discuss about the mode of interaction.

Or

(b) Describe about the modelling virtual world.

Part C (3 × 10 = 30)

Answer any **Three** questions.

16. Explain in detail about the Multimedia Applications.

17. Write briefly about the video.

18. Discuss in brief about the digital representation of sound.

19. Explain about the Internet content in Multimedia.

20. Explain in detail about the sensor Hardware.

F–3065

Sub. Code
7MCE3E6

M.Sc DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Computer science

Elective-WAP AND XML

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. List the components of WAP.

2. Write the features of WAP.

3. Expand UML.

4. Define WAP gateway.

5. What is Event?

6. Write any 4 standard Libraries in WML.

7. What is the purpose of XML?

8. Write the use of CSS.

9. Write the difference between attribute & elements.

10. What is Unicode character set?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain in detail about WAP protocal stack.

Or

(b) Give a note on WAP resources.

12. (a) Compare web model with WAP model.

Or

(b) Describe WML structures.

13. (a) Explain selection statement with example.

Or

(b) Write about input &output statements with example.

14. (a) Write a XML document for product catalog.

Or

(b) Write a XML document for displaying the covariant function of Maxwell's equation in math ML.

15. (a) How to create tables using XSL?

Or

(b) Explain &give example for Attributes Elements.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain in detail about WAP architecture.

17. Explain how to position a WAP gateway in the network.

18. Give suitable example for

    (a) Looping statement (4)

    (b) Automatic type conversion (4)

    (c) Operators. (2)

19. Describe how to prepare a style sheet for document display.

20. Write a brief note on legacy character sets.

F–3071

Sub. Code
7MCI1C2

M.SC DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science and Information Technology

PROGRAMMING IN C

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. How are comments introduced in C?

2. What is the difference between & and &&?

3. What is a character array? How will you initialize a character array?

4. What is a dynamic array?

5. What is meant by call by value?

6. What are the advantages of using register variable?

7. How is a pointer variable initialized?

8. Write any two limitations of array of pointers to strings.

9. What is the use of getchar() and putchar() function?

10. Write the general format of fseek function.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Compare the while structure with the do-while structure.

Or

(b) What are the types of programming languages? Describe.

12. (a) How are the one-dimensional array elements read and written?

Or

(b) Write a C program to find the sum of given 'n' numbers.

13. (a) What is a function? Explain the different categories of functions.

Or

(b) Name the storage classes used in C and explain them.

14. (a) What is a pointer? Explain the advantages of using pointers in C.

Or

(b) Write C program to find the smallest number in an array using pointers.

15. (a) What are the different modes of files? Describe.

Or

(b) What is macro and how is it different from a C variable name?

Part C (3 × 10 = 30)

Answer any **three** questions.

16. What are the fundamental data types supported by C? How are they declared? Give examples.

17. Write a C program to arrange the given names in an alphabetical order.

18. Write a C program to print the Fibonacci sequence of number using recursion.

19. Write a C program to Multiply two matrices using pointed.

20. Explain how defining, opening and closing a file are carried out in C with examples.

F-3072

Sub. Code
7MCI1C3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science and Information Technology

DATA STRUCTURE AND ALGORITHMS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What do you mean by linear data structure?

2. What is sorting?

3. What is a singly linked list?

4. Find the postfix form of the following: A+B+C+D.

5. Define: Complete binary tree.

6. What are the ways to represent a binary tree?

7. What is the complexity of linear search and binary search?

8. What are the drawbacks of linear search?

9. What do you mean by Algorithm?

10. Define: Big ‘O’ notation.

Part B (5 × 5 = 25)

Answer **All** questions, choosing either (a) or (b).

11. (a) Write the algorithm for traversing a list and give an example.

Or

(b) Write the procedures to perform predecessor and successor in a list.

12. (a) Write an algorithm to convert infix expression into postfix expression.

Or

(b) What are the ways to represent a stack? Describe.

13. (a) What are the binary tree traversals? Explain any one.

Or

(b) Explain any two popular hash functions.

14. (a) Write an algorithm for selection sort and give an example.

Or

(b) Write a binary search algorithm and explain with examples.

15. (a) What are the components of space complexity? Describe.

Or

(b) Write an algorithm for adding "n" natural numbers and find the time and space required by that algorithm.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain the implementation of list.

17. Define a stack. What are the operations performed on it? Explain.

18. Explain the Dijkstra's algorithm for finding the shortest path in a given graph.

19. Explain about the merge sort with example.

20. What are the basic asymptotic efficiency classes? Describe.

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F–3073

Sub. Code
7MCI1C4

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science and Information Technology

COMPUTER FUNDAMENTALS AND ARCHITECTURE

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Find the binary number for the following decimal number : 10

2. What is the difference between 1's complement subtraction and 2's complement subtraction of binary numbers?

3. How many entries are there on a four-variable Karnaugh map?

4. What is the function of encoder?

5. What the use of counter?

6. What are inputs and outputs of full adder?

7. What is the function of ALU?

8. Write the polish and reverse polish notation: (A/B)-(C*D).

9. Distinguish between Main Memory and Auxiliary Memory.

10. What is the use of priority interrupt?

Part B (5 × 5 = 25)

Answer **all qu**estions, choosing either (a) or (b).

11. (a) Write a short note on ASCII and EBCDIC codes.

Or

(b) Convert decimal 1000.500 into octal number.

12. (a) Draw the logic circuit and truth table for 4-to-1 multiplexer and explain it.

Or

(b) Write any fiver laws of Boolean algebra and Construct the truth table.

13. (a) What is a Half Adder? Explain.

Or

(b) Explain the different types of shift registers.

14. (a) What are the components of instruction format? Describe.

Or

(b) What are data transfer and data manipulation instructions? Describe.

15. (a) Draw the block diagram of Associative memory and explain it.

Or

(b) Explain the operations of Magnetic Tape.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Find the decimal, octal and hexadecimal number for the following binary numbers.

    (a) 1111011

    (b) 11000.0111

17. Simplify the Boolean functions F(w,x,y,z) $\sum$ (1,3,7,11,15) and the don't care conditions : d(w,x,y,z)=sum of (0,2,5).

18. Describe the operation of Master-Slave Flip-flop.

19. What are the arithmetic and logic micro operations? Explain with examples.

20. Explain in detail the different mappings used for cache memory.

F–3074	Sub. Code
	7MCI1E2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Computer Science and Information Technology

Elective- OPERATING SYSTEM

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A ($10 \times 2 = 20$)

Answer **all** questions.

1. Define: Multiprogramming.
2. Write down any two advantages of virtual memory.
3. Distinguish between process and processor.
4. Define: (a) Throughput (b) Turnaround Time.
5. What is parallel processing?
6. What are the four basic functions of device management?
7. Define: (a) Record (b) file.
8. What is distributed operating system?
9. Write down any two advantages of Unix system.
10. What is the use of fork command in Unix?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) What are the types of operating systems? Explain.

Or

(b) Compare best-fit and first-fit allocations.

12. (a) What is PCB? Explain the contents of PCB.

Or

(b) What are the Strategies for handling deadlock? Explain.

13. (a) Explain about the readers and writers problem.

Or

(b) What are the three categories of system peripheral devices? Explain.

14. (a) Compare sequential and direct file organization.

Or

(b) Write a short note on NOS development.

15. (a) Write a short note on the history of Unix system.

Or

(b) What are the three types of files in Unix? Describe.

Part C (3 × 10 = 30)

Answer any **Three** questions.

16. What are page replacement polices? Explain with examples.

17. Explain any two process scheduling algorithms.

18. Discuss any two multiprocessing configurations.

19. Explain the different levels in a file management system.

20. Discuss the processor management in Unix system.

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F-3076	Sub. Code 7MCI2C2

M.Sc DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer Science and Information Technology

JAVA PROGRAMMING

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Write down any two features of Java Language.
2. How are constants and variables important in developing programs?
3. Write the syntax of switch statement.
4. Find the value of 10% (-3).
5. What is static import? How is it useful?
6. What do you mean by method overriding? Explain.
7. Differentiate between local applet and remote applet.
8. What is the use of Applet Tag?
9. What are the advantages of Enterprise bean?
10. What is RMI?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) List the basic data types used in java. Explain with suitable example.

Or

(b) What is World Wide Web? What is the contribution of Java to the World Wide Web?

12. (a) Write a Java program to find the factorial of a number.

Or

(b) List out any five mathematical functions in Java and give examples.

13. (a) Write a Java program which will read a text and count all occurrences of a particular word.

Or

(b) Compare and contrast overriding and overloading a method.

14. (a) How applets differ from applications?

Or

(b) Describe the different stages in the life cycle of an applet.

15. (a) Explain any two SQL statements with example.

Or

(b) Explain about the JSP tags.

Part C (3× 10 = 30)

Answer any **three** questions.

16. Describe the structure of Java Program.

17. What are the different types of if statements available in Java? Illustrate with an example.

18. Write a Java program which will read a string and rewrite it in the alphabetical order. For example, the word STRING should be written as GINRST.

19. Write an applet to draw the square inside a circle shape.

20. Explain about the Servlet life cycle.

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F-3077

Sub. Code
7MCI2C3

M.Sc DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer Science and Information Technology

COMPUTER NETWORKS

(CBCS – 2017onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **All** questions.

1. What do you mean by computer network?
2. Differentiate between connection-oriented and connectionless services.
3. What are the disadvantages of optical fiber?
4. How do guided media differ from unguided media?
5. What is framing?
6. What is the purpose of Hamming code?
7. What is Congestion Control?
8. What are the transport layer quality of service parameters?
9. Differentiate between Adaptive and Non-adaptive routing.
10. What is the purpose of FTP?

Part B (5 × 5 = 25)

Answer **All** questions, choosing either (a) or (b).

11. (a) What are the topologies for a Point-To-Point subnet? Describe.

Or

(b) What is a Protocol? Explain the protocol Hierarchies.

12. (a) Describe the two forms of Twisted –pair Cable.

Or

(b) Write a short note on Terminal handling.

13. (a) Discuss the design issues of Data link layer.

Or

(b) Compare Local Area Network and Metropolitan Area Network.

14. (a) What is RPC? Explain.

Or

(b) What are the duties of the Transport layer? Explain.

15. (a) Describe the design issues of presentation layer.

Or

(b) What are the two fundamental cryptographic principles? Explain.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain the function of seven layers of ISO OSI Reference Model.

17. Discuss about the ISDN system architecture.

18. Explain the simplex protocol for a noisy channel.

19. Discuss the design issues of network layer.

20. Discuss Email Architecture in brief along with its components.

F–3078

Sub. Code
7MCI2E1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer Science and Information Technology

Elective — COMPUTER ORIENTED NUMERICAL METHODS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Section A $(10 \times 2 = 20)$

Answer **all** questions.

1. State the formula to find a root of the equation $f(x) = 0$ which hits between $x = a$ and $x = b$ of Regula-Falsi method.

2. State the condition of convergence of Newton-Raphson method.

3. Distinguish between direct and iterative methods of solving simultaneous equations.

4. What is the condition for convergence of Gauss-Jacobi method of iteration?

5. Define: Interpolation.

6. State Gauss's backward and Gauss's forward interpolation formula.

7. How the accuracy can be increased in trapezoidal rule of evaluating a given definite integral?

8. What do you mean by numerical differentiation?

9. What is a predictor-corrector method of solving a differential equation?

10. Write the merits of the Taylor method of solution.

Section B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) Find the smallest positive root of the equation $3x^3 - 9x^2 + 8 = 0$ correct to 2 places of decimals, using Newton-Raphson method.

Or

(b) Apply Horner's method to find the cube root of 25.

12. (a) How does the coefficient matrix A in the system $AX = B$ get transformed in Gauss-Elimination method.

Or

(b) Solve the equations $10x + y = 7$ and $x - 10y = 31$ by Gauss-Seidel's iteration method.

13. (a) Using Newton's formula, find the value of f (1.5) from the following data :

x :	0	1	2	3	4
$f(x)$:	858.3	869.6	880.9	892.3	903.6

Or

(b) Describe the Lagrange's interpolation formula.

14. (a) Explain about the Trapezoidal and Simpson's rule.

Or

(b) From the following table of values of x and y, find dy/dx and d^2y/dx^2 for $x = 1.25$

x :	1.00	1.05	1.10	1.15	1.20	1.25	1.30
y :	1.00	1.02470	1.04881	1.07238	1.09544	1.11803	1.14017

15. (a) Find $y(1.1)$, given $dy/dx = x + y$, $y(1) = 2$ by Euler's method.

Or

(b) Use Runge-kutta of the fourth order to solve the equation and to find $y(0.2)$, $y(0.4)$ and $y(0.6)$ taking $h = 0.2$ given that $dy/dx = 1 + y * y$; $y(0) = 0$.

Section C (3 × 10 = 30)

Answer any **three** questions.

16. Find a real root of the equation $x^3 - 2x - 5 = 0$, correct to 3 places of decimals, using Bisection method.

17. Using Crout' s method, solve the system of equations

$$2x - 6y + 8z = 24$$
$$5x + 4y - 3z = 2$$
$$3x + y + 2z = 16.$$

18. Use Gauss's forward and backward formulas to find $f(3.75)$ from the following data :

x :	2.5	3.0	3.5	4.0	4.5	5.0
$f(x)$:	22.145	22.043	20.225	18.644	17.262	16.047

19. Dividing the range into 10 equal parts, find the approximate value of $\int_0^{\pi} \sin x \ dx$ by

(a) Trapezoidal

(b) Simpson's one third rule.

20. Solve numerically, using Milne method :

$y' = 1/(x+y)$, $y(0) = 2$. Take the starting values $y(0.2) = 2.0933$, $y(0.4) = 2.1755$, $y(0.6) = 2.2493$. Find the values of $y(0.8)$ and $y(1.0)$.

F–3080

Sub. Code
7MCI2E3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer Science and Information Technology

Elective – THEORY OF COMPUTATION

(CBCS – 2017 onwards)

Time : 3 Hours — Maximum : 75 Marks

Part A — $(10 \times 2 = 20)$

Answer **all** the questions.

1. Define a Nondeterministic Finite Automata.
2. State the Induction principle.
3. State the pumping Lemma for Regular Languages.
4. Wriite closure properties of Regular Languages.
5. Define a context–free Grammar.
6. Define Deterministic Pushdown Automata.
7. Write the substitution theorem.
8. Define the Turing Machine.
9. State Rice's theorem.
10. Define a Recursive language.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

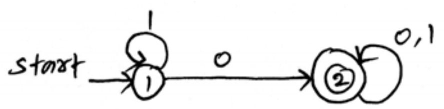
11. (a) Prove that for all $n \geq 0$, $\sum_{i=1}^{n} i^2 = \frac{n(n+1)(2n+1)}{6}$

Or

(b) Convert to a DFA the following NFA.

	0	1
$\rightarrow p$	{p,q}	{p}
q	{r}	{r}
r	{s}	ϕ
*s	{s}	{s}

12. (a) Convert the DFA of the following figure to a regular expression:



Or

(b) Write the summary of the principal closure properties for regular languages.

13. (a) Write a grammar for an inherently ambiguous language.

Or

(b) Explain the Graphical notation for PDA's.

14. (a) Write a short notes on chomsky normal form.

Or

(b) Explain the Transition diagrams for Turing Machines.

15. (a) Write the post's corresponding problem.

Or

(b) Write a note on the classes P and NP.

Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. What is DFA? Explain about Finite Automatic with Epsilon transitions.

17. If h is a homomorphism form alphabet $\sum$ to alphabet T and L is a regular language over T, then prove that $h^{-1}(L)$ is also a regular language.

18. How to construct parse Trees? Explain.

19. Prove that the context-free languages are closed under the following operations.

(a) Union

(b) Concatenation

(c) Closure (*) and positive closure (+)

(d) Homomorphism

20. Explain the Modified PCP.

F–3082

Sub. Code
7MCI2E6

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Computer Science and Information Technology

Elective – COMPUTER GRAPHICS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What do you mean by computer graphics?

2. What are the disadvantages of DDA algorithm?

3. List out the attributes of characters.

4. What is Transformation?

5. What is the difference between a window and view port?

6. What is dragging?

7. What do you mean by Perspective projection?

8. Write the matrix representation of scaling transformation in three-dimensional.

9. Define : Axonometric orthographic projection.

10. Differentiate between object-space and image-space methods.

Part B (5 × 5 = 25)

Answer **all qu**estions, choosing either (a) or (b).

11. (a) Explain how computer graphics is used in the field of art and image processing.

Or

(b) Discuss Bresenham's approach for line drawing.

12. (a) What are the attributes of area fill? Describe.

Or

(b) Describe shearing transformation with suitable example.

13. (a) Derive window to view port transformation.

Or

(b) Write down the functions of stroke and string devices.

14. (a) What are transformation commands? Explain.

Or

(b) Explain about the rotation transformation in three-dimensional.

15. (a) Explain the scan line method.

Or

(b) Describe the hardware implementation of three-dimensional viewing operations.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. What is CRT? Explain the basic construction of CRT.

17. What are the basic two dimensional transformations? Explain with examples.

18. Explain any two interactive picture-construction techniques.

19. Describe any two three-dimensional display methods.

20. Explain :

    (a) Back face Detection method

    (b) Depth buffer method for detection.

F–3083

Sub. Code
7MCI3E4

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Computer Science and Information Technology

Elective: DATA MINING AND WAREHOUSING

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Define: Data Mining.

2. What is machine learning?

3. What is data cube?

4. How are organizations using the information from data warehouses?

5. Define: Data cleaning.

6. What are the measures of central tendency?

7. Define: Gain ratio.

8. What is back propagation?

9. What are the different types of web mining?

10. What are the three types of dimensions in spatial data cube?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain any two data mining techniques.

Or

(b) Compare data mining and query tools.

12. (a) What are the different between OLTP and OLAP? Describe.

Or

(b) What is metadata? What are the types of metadata? Explain.

13. (a) Explain the different forms of data preprocessing.

Or

(b) What are the steps involved data transformations? Explain.

14. (a) What is classification? How does classification work?

Or

(b) What are the two types of hierarchial clustering methods? Explain.

15. (a) Explain the requirements of clustering in data mining.

Or

(b) Explain about the spatial mining tasks.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Describe the steps that are required in a typical Data Mining process.

17. Describe the data warehouse backend process.

18. What are the methods for concept hierarchy on data discretization? Explain.

19. Explain about the Naive Bayesian classification.

20. Discuss about the mining time-series and sequence data.

F–2960	Sub. Code
	7MCH1C1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Chemistry

ORGANIC CHEMISTRY – I

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What do you understand by the term "negative hyper conjugation"?

2. State and explain the terms involved in Taft equation.

3. How will you distinguish asymmetric and dissymmetric molecules?

4. Define prochiral centre and give any one suitable example.

5. Mention the important difference between alterant and non-alterant hydrocarbon. Give one suitable example each.

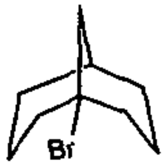
6. State and explain Huckel's Rule for aromaticity.

7. State and explain Hammond's postulate.

8. What do you understand by the term “nucleophilic carbene”? Give an example.

9. State and explain Bredt’s rule with suitable example.

10. The following compound fails to undergo nucleophilic substitution reactions (both S_N1 and S_N2. Give reason.



1 - bromobicyclo$[3.3.1]$nonane

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain the significance and the factors that influence the reaction constant ρ and substituent constant σ a in the Hammett equation with suitable examples.

Or

(b) Explain the following terms with suitable examples:

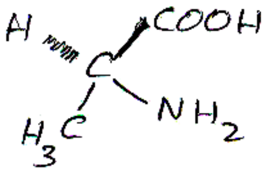
(i) Inductive (3)

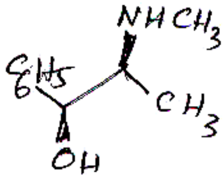
(ii) Cross conjugation (2)

12. (a) Illstrate the optical isomerism exihibited by biphenyl, allenes and spiranes.

Or

(b) (i) Specify the configuration of the following by R and S system of notation.

(1) 

(2) 

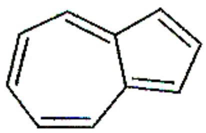
(3)

(ii) State and illustrate the relationship between substrate symmetry and chirality. (2)

13. (a) Discuss how Craig's rule can be applied to determine aromaticity.

Or

(b) (i) Azulene $(C_{10}H_8)$ is a deep-blue compound with the structure shown below:



azulene

Account for its aromaticity and its dipole moment $(\mu = 1.0D)$.

(ii) Define mesoionic compounds? Explain the aromaticity of sydnones. (3+2)

14. (a) Explain the following:

(i) Nitration of anisole with fuming HNO_3 in Ac_2O yields mainly ortho product but with nitration mixture para isomer is the chief product? Give mechanism.

(ii) Using resonance contributors, why a phenyl group is ortho/para director? (3+2)

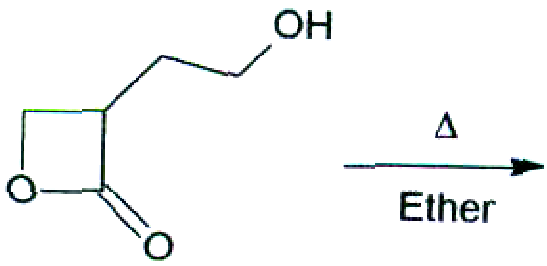
Or

(b) Account for the following:

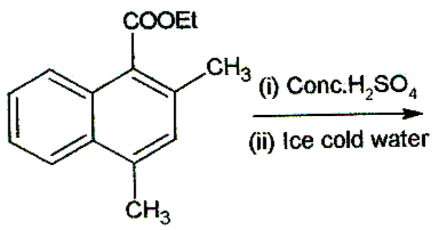
(i) N-Alkyl derivatives of aniline and O-Alkyl derivatives of phenol have reactivity comparable to aniline and phenol respectively, while their acyl derivatives are very much less reactive in electrophilic substitution.

(ii) Bromination of toluene is five times faster that that of t-butyl benzene. (2+3)

15. (a) Outline the mechanism for each of the following reactions:

(i) 

(3)

(ii) 

(2)

Or

(b) (i) Explain why $CHC1_3$ is more reactive than CHF_3 in SE1 reaction?

(ii) Outline the mechanism of aliphatic diazonium coupling reaction. (2+3)

Part C (3 × 10 = 30)

Answer any **three** questions.

16. What are the applications of Hammett equation? Illustrate with suitable examples. Comment on deviations from Hammett equation

17. (a) Define the term asymmetric synthesis and state and illustrate Cram's rule of asymmetric induction,

(b) Write a brief note on stereoisomerism involving substituted cyclopropane systems. (5+5)

18. Write a note on the aromaticity of the following compounds:

(a) Annulenes

(b) Tropolones and

(c) Cyclopentadienyl anion. (3+4+3)

19. (a) What are singlet and triplet carbenes? Explain the stereochemical outcome of these carbene additions to cis and trans 2- butenes.

(b) Discuss the factors that affect the stability of free radicals. Explain captodative effect with suitable example. (5+5)

20. With suitable example, explain the following:

(a) Pyrolytic cis elimination.

(b) Ambient nucleophile and substrates

(c) Neighbouring group participation involving σ electrons. (3+4+3)

F–2961

Sub. Code
7MCH1C2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Chemistry

INORGANIC CHEMISTRY – I

(CBCS – 2017 onwards)

Time : 3 Hours　　　　Maximum : 75 Marks

Part A　　　　$(10 \times 2 = 20)$

Answer **all** the questions.

1. Define ionization energy.

2. $BeCO_3$ is thermally more unstable compared to $MgCO_3$. Explain.

3. Draw the MO diagram of NO.

4. Calculate the number of bond pair and lone pair in XeO_2F_2.

5. What are the basic features of Bronsted-Lowry concept of acids and bases?

6. The ionic mobility of H^+ and OH^- in water are very high. Explain.

7. How is S_2N_2 prepared?

8. Draw the structure of boron nitride.

9. Due to Frenkel defect, the dielectric constant in the ionic crystals increases. Explain.

10. Explain the conductivity mechanism of n-type semi conductors.

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) What is hydrogen bond? Explain their applications.

Or

(b) Explain the following:

(i) many salts of lithium and magnesium are soluble in organic solvents

(ii) Ge is more stable than C than its nearest neighbours Sn and Pb.

12. (a) Boron (B_2) is paramagnetic while Carbon (C_2) is diamagnetic. Discuss.

Or

(b) Using Hybridization theory, deduce the geometry of XeF_4.

13. (a) Discuss the factors affecting the strength of acid and bases.

Or

(b) Discuss the solvolysis reaction in different protic and aprotic solvents.

14. (a) How is polymeric sulphur nitride prepared? Discuss its structure.

Or

(b) How is Inorganic benzene prepared? Mention any four properties.

15. (a) Explain the role of semiconductors in solar energy conversion.

Or

(b) How are solids classified? Explain the electronic structure of solids.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. (a) Explain the Pauling method of determining ionic radii.

(b) What is lattice energy? Calculate the enthalpy of formation of KBr, which crystallises in NaCl lattice using Born Haber Cycle. Use these data in the calculation: $\Delta H_{vap}(Br_2) = 29.8\,KJ/mol; Br_2$ bond energy = 190.2 KJ / mol; and $\Delta H_{sub}(K) = 79\,KJ/mol.$

17. (a) Construct the wave function of SP^3 hybridisation.

(b) Draw and explain the MO diagram of carbon dioxide. (5+5)

18. (a) Discuss the chemistry of Liquid acetic acid as solvent.

Or

(b) Explain HSAB principle. Discuss its applications. (4+6)

19. Discuss the preparation and structure of P_4S_7 and S_4N_4.

20. What are the major effect of Schotky and Frankel defects on the ionic properties of the ionic crystal? What are the differences between these two types of defects?

F–2962

Sub. Code
7MCH1C3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Chemistry

PHYSICAL CHEMISTRY – I

(CBCS – 2017 onwards)

Time : 3 Hours　　　　　　　　　　Maximum : 75 Marks

Part A　　　　　　$(10 \times 2 = 20)$

Answer **all** questions.

1. Calculate the ionic strength of 0.2 molal $Bacl_2$ solution.

2. Write down the expression for Debye-Huckel limiting law at higher concentration. Identify the terms involved in it.

3. Define partial molar quantity.

4. What is the relation between fugacity and activity of a substance?

5. State and explain he-chatelier-Brawn principle.

6. Deduce the Gibbs phase rule.

7. Define micro canonical and macro canonical ensembles.

8. What is population inversion? How is it achieved?

9. What is meant by electrical double layer?

10. Write Ferundlich's adsroption isotherm and explain the terms involved.

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) How will you determine the solubility product of a sparingly soluble salt using conductometric technique?

Or

(b) Derive the Butler-Volmer equation. What are its high field and low field approximations?

12. (a) Derive Gibbs-Helmholtz equation.

Or

(b) Explain an experimental method of determining fugacity of real gases.

13. (a) The equilibrium constant kp for the reaction $N_2 + 3H_2 \rightleftharpoons 2NH_3$ is 1.64×10^{-4} at m^{-2} at 400°C. What will be the equilibrium constant at 500°C if the heat of reaction in this temperature range is $-105185.8J$?

Or

(b) Draw a labelled phase diagram of $KI - H_2O$ system and describe the main features.

14. (a) Derive Boltzmann distribution law.

Or

(b) Derive an expression for Fermi-Dirac statistics.

15. (a) What is electrtophoresis? How does this phenomenon provide information about the sign of charge on particles?

Or

(b) Derive hangmuir adsorption isotherm and discuss the effect of pressure on θ, surface covered.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Derive the Debye-Huckel-Onsager conductivity equation, giving clearly the assumptions made.

17. (a) Deduce Gibbs-Duhem equation. Explain its significance.

(b) How do you determine the activity and activity co-efficient of an electrolyte? (5+5)

18. Draw the labelled phase diagram of $Na_2So_4 - H_2O$ system and describe the main features.

19. (a) Explain the partition function and equilibrium constant.

(b) Write a note on Quantum statistices. (5+5)

20. (a) Bring out the differences between chemisorption and physisorption.

(b) Write a note on BET isotherm. (5+5)

F–2963

Sub. Code
7MCH1E2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Chemistry

Elective – POLYMER CHEMISTRY

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. What are Homopolymer and Copolymer?

2. Explain the term ‘Repeating units in Polymerisation.

3. Give the structure of PMMA

4. Mention the uses of polycarbonate.

5. Draw the planar zig-zag structure of polyethylene molecule.

6. Give the names of the polymers: PVC, PMMA, PAN and PTFE.

7. What is meant by photodegradation?

8. What are photoconducting polymers?

9. Mention the use of polymer used in blood cells.

10. Give any two examples of colorants.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Write a note on Block co-polymer.

Or

(b) What is rubber? Explain the significance of vulcanization of rubber.

12. (a) How is polystyrene prepared? Mention their uses.

Or

(b) Write the monomer of urethane and explain the preparation of polyurethane.

13. (a) Discuss the various factors affecting the glass transition temperature.

Or

(b) Write a note on kinetics of polymerisation.

14. (a) Explain the role of photostabilser in polymer.

Or

(b) How are polymer degradation classified? Explain ultrasonic degradation of polymer.

15. (a) Write short notes on Calendering in Plastic processing.

Or

(b) Polymers in biomedical sciences.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. (a) How are they classified on the basis of chemical structure?

(b) Discuss the mechanism of coordination polymerization. (5+5)

17. Describe the preparation, properties and uses of the following

(a) Polyethylene

(b) Epoxy resin. (5+5)

18. (a) Equal number of molecules with M1 = 10,000 and M2 = 90,000 are mixed.

Calculate Number - average molar mass and Mass-average molar mass.

(b) Explain the various geometrical structures of polymer. (5+5)

19. Discuss the following polymerization techniques:

(a) Bulk

(b) Solution. (5+5)

20. Using schematic diagram, explain the process of rotational casting and reinforcing.

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F–2964

Sub. Code
7MCH2C1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Chemistry

ORGANIC CHEMISTRY – II

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is meant by conformatoinal free energy difference?

2. Which is the most stable conformation of methylcyclohexane and why?

3. Cis –1,2- dicholoroethylene is IR active while its Trans isomer is IR inactive. Explain.

4. A parent ion with m/z 120 undergoes fragmentation and gives an ion with m/z 105. Calculate the mass of the metastable ion.

5. How will you distinguish among ortho -, meta- and para - xylenes on the basis of their proton decoupled CMR spectra?

6. ^{13}C carbonyl chemical shift of acetophenone is 196 ppm, whereas that of 2,6- dimethylaotophenone is 206 ppm. Explain.

7. Explain any one synthetic use of osmium tetroxide.

8. What do you mean by Birch reduction? Give an example.

9. What happens when cholesterol is distilled with selenium?

10. How is dehydroepiandrosterone converted to androsterone?

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain how conformational free energy difference is calculated by kinetic method?

Or

(b) Explain the terms stereoelectronic and steric factors with suitable examples.

12. (a) Write briefly on MaLafferty rearrangement in mass spectrometry.

Or

(b) Discuss the various vibrational modes in a molecule.

13. (a) Describe briefly the difference in the position of absorption as notes in the case of ^{1}H NMR spectra of acetylene and benzene.

Or

(b) Discuss the basic principle of FT technique.

14. (a) What is oppenauer oxidation? Discuss its mechanism.

Or

(b) Write briefly on Meerwein-Pondorf–verly reduction.

15. (a) Describe about the conformation of A/B rings, B/C rings and C/D rings in steroids.

Or

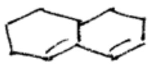
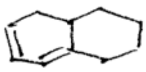
(b) Give an account on bile acids. Indicate how cholesterol is converted into cholanic acid?

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Give an account of the correlation of the conformation of acycilc and cyclic systems with their physical and chemical properties.

17. (a) How will you distinguish between the following pairs of compounds using spectral data?

(i)  and 

(ii) Acetamide and N–methylacetamide.

(b) Write briefly on IR spectroscopy of organic molecules with respect to inter and intra molecular hydrogen bonding. (3)

(c) How will you distinguish between 3-methyl and 4-methylcyclohexene on the basis of mass spectrometry? (3)

18. (a) Discuss the double resonance technique in ^{1}H NMR.

(b) Write a note on spin-spin coupling.

(c) What are NMR shift reagents? Indicates their uses? (4 + 3 + 3)

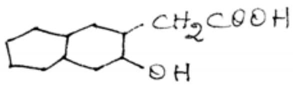
19. (a) Explain the applications of the following reagents in organic synthesis.

 (i) LDA and

 (ii) 1,3-Dithiane (4 + 4)

 (b) Predict the major product of each of the following :

 (i) $C_6H_5CH=CH\text{-}COOC_2H_5 \xrightarrow{\text{LiAlH}_4}$

 (ii)  $\xrightarrow{\text{DCC/Pyridine}}$

 (1 + 1)

20. Discuss the following :

 (a) Position and Configuration of hydraxyl group in cholesterol.

 (b) Position of double bond in cholesterol

 (c) Position of the angular methyl groups in cholesterol.

 (4 + 3 + 3)

F–2965

Sub. Code
7MCH2C2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Chemistry

INORGANIC CHEMISTRY — II

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. H_2S cannot precipitate Ag as AgS in presence of excess CN^-. Explain

2. What is meant by stepwise stability constant? How is it related to overall stability constant?

3. Generally, low spin complexes are more inert than the high spin complexes. Explain.

4. What is anation reaction? Give an example.

5. What is Bohr effect?

6. Give the structures of any two synthetic oxygen carriers.

7. What is meant by reductive elimination reaction?

8. Ziegler-Natta mixed catalyst produces the high density polythene. Explain.

9. What are magic numbers? What information do you know from these numbers?

10. Differentiate fissile and fertile isotopes.

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) Discuss the basic assumptions of CFT in understanding the bonding in the coordination compounds.

Or

(b) State and explain Jahn Teller distortion.

12. (a) What are complementary and non-complementary reactions? Explain with suitable examples.

Or

(b) Using the substitution reactions, synthesize any two six coordinated complexes.

13. (a) What are *in-vivo* and *in-vitro* nitrogen fixation? Explain with suitable examples.

Or

(b) Discuss the structure of chlorophyll.

14. Discuss the mechanistic steps in the following reactions :

(a) Hydroformylation reaction.

Or

(b) Wacker's process.

15. (a) Explain the origin of energy in Sun and Stars.

Or

(b) Discuss the applications of radioactive isotopes in the field of medicine and agriculture.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. (a) Explain the factors affecting CFSE values.

    (b) Discuss the spinel and inverse spinel structures of the mixed oxides in terms of CFT. (5 + 5)

17. (a) Discuss the applications of trans-effect series in the preparation of isomers of Pt(Il) compexes.

    (b) Illustrate inner and outer sphere electron transfer reactions with suitable examples. (5 + 5)

18. (a) Discuss the mechanism of the intake of oxygen by myoglobin and haemoglobin.

    (b) Write a note on iron-sulphur protein. (5 + 5)

19. (a) What is Wilkinson's catalyst? Discuss the mechanism of hydrogenation of olefin.

    (b) Discuss the mechanism of Cyclooligimerisation of acetylene. (5 + 5)

20. (a) The activity of radioactive isotope falls to 75% in 90 days. Calculate the half life and decay constant.

    (b) Discuss the theory of liquid drop model. (5 + 5)

F–2966

Sub. Code
7MCH2C3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Chemistry

PHYSICAL CHEMISTRY – II

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What are the assumptions of collision theory?

2. Mention any two characteristics of chain reactions.

3. How are fundamental and overtone frequencies in IR explained?

4. What is meant by normal modes of vibration?

5. Explain the term chemical shift in ESCA.

6. State frank condon principle.

7. Coupling constant in NMR spectroscopy is independent of applied magnetic flux density – Justify.

8. What are the limitations of NQR?

9. Explain with a suitable example the term improper axis of symmetry.

10. Give the symmetry based selection rule for vibrational Raman Spectroscopy.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) What are the postulates of ARRT? Write thermo dynamic equation for rate constant of unimolecular reaction.

Or

(b) Explain the mechanism and kinetics of N_2O_5 decomposition.

12. (a) Discuss the effect of isotopic substitution in rotational spectra.

Or

(b) Describe the basic principles of FT–IR spectroscopy.

13. (a) Describe the different types of electronic transitions possible in poly atomic molecules.

Or

(b) outline the classical theory of Raman effect.

14. (a) Discuss the theory of NQR spectroscopy.

Or

(b) What is shift reagents? Discuss its applications.

15. (a) Construct the character table for C_{3v} point group.

Or

(b) State and explain great ortho gonality theorem.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. (a) Discuss the theory of explosion reactions and explain the causes for the explosion limits of H_2–O_2 reactions. (5)

(b) Discuss the kinetics of decomposition of acetaldehyde. (5)

17. (a) What is Fermi Resonance? How does it affect the intensities of spectral lines.

(b) Deduce an expression for Einstein's coefficient of induced absorption. (5+5)

18. (a) Explain the basic principles of PES spectroscopy.

(b) Describe the rotational fine structure of electronic spectra. (5+5)

19. (a) Discuss how NQR is used to study hybridisation and ionic character of the bond. (4)

(b) Explain the terms zerofield splitting and kramer's degeneracy. (6)

20. By applying selection rule, predict the IR and Raman normal modes of water and ammonia.

F–2967		Sub. Code 7MCH2E1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Chemistry

Elective-ENVIRONMENTAL CHEMISTRY

(CBCS – 2017 onwards)

Time: 3 Hours Maximum: 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What is green house effect?

2. What is the reason for ozone layer depletion?

3. What are industrial effluents?

4. Define the term eutrophication.

5. Mention any three reasons of soil pollution.

6. Write a short note on soil analysis.

7. What is incineration?

8. What are the biochemical effects of arsenic?

9. What is earthquake?

10. Why does tsunami happen?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) What is acid rain? Explain how it happens and affects the environment.

Or

(b) Illustrate the sulphur cycle in the environment.

12. (a) Discuss the water quality parameters and standards.

Or

(b) What are the metallic in water? Give their harmful effects.

13. (a) What is soil fertility? Give the factors affecting it.

Or

(b) Discuss the methods of controlling soil pollution.

14. (a) Explain about the pollution made by fertilizer and chemical industries.

Or

(b) Give the chemical and biochemical properties of various species mercury found in the environment?

15. (a) What is cyclone? Give its types.

Or

(b) Give the note on parameters of earthquake.

Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. (a) Give the harmful effects of global warming.

    (b) What are the causes and the effects of ozone layer depletion?

17. (a) What are the metallic pollutants in water? Give their harmful effects.

    (b) What are the harmful effects of eutrophication?

18. Discuss in detail about the parameters of soil analysis.

19. (a) Mention five sources, which contribute to thermal pollution.

    (b) Discuss about the procedures of protection from radiation.

20. Describe the nuclear accidents and its effects on the lives of human being.

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F–2969

Sub. Code
7MCH3C1

M.Sc. DEGREE EXAMINATION,
NOVEMBER 2019

Chemistry

ORGANIC CHEMISTRY – III

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What is Stevens rearrangement?

2. Explain Vilsmeir haak reaction with an example.

3. Give any two important applications of Wittig reaction.

4. What is Sharpless asymmetric epoxidation?

5. How are the terpenoids classified?

6. Write down the structures of (a) camphor_ (b) α – pinene.

7. What are the requirements of an ideal synthesis?

8. Explain the term retro synthetic analysis with an example.

9. What is photosensitization? Under what condition does it effectively occur?

10. What do you mean by allowed and forbidden transitions?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) What is Curtius rearrangement? Explain with mechanism.

Or

(b) Narrate the mechanism of Arndt – Eistert reaction.

12. (a) Discuss the mechanism of Michael addition.

Or

(b) Explain the stereochemistry of electrophilic addition of HBr to alkenes.

13. (a) Outline the synthesis of zingiberene from ρ - anisylmagnesium bromide.

Or

(b) Give an account on biosynthesis of terpenoids.

14. (a) Write the role of blocking groups in organic synthesis.

Or

(b) Discuss the synthesis of 2,4 – dimethyl – 2 – hydroxy pentanoic acid.

15. (a) Draw the molecular orbital diagram of 1,3,5 – hexatriene and depict the HOMO and LUMO.

Or

(b) Explain the cycloaddition reaction between butadiene and ethlylene using FMO method.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain Wagner – Meerwin and Di – Pi methane rearrangements with mechanism.

17. Explain the following reactions with mechanism.

    (a) Mannich reaction,

    (b) Shapiro reaction

    (c) Darzen's reaction. (4 + 3 + 3)

18. How will you synthesize the following?

    (a) Cadinene,

    (b) Abietic acid

    (c) α – pinene. (3 + 4 + 3)

19. (a) Schematically explain convergent synthesis is more advantageous than linear synthesis.

    (b) Write a notes on homogeneous hydrogenation.

    (7 + 3)

20. (a) Construct a correlation diagram for the disrotatory opening of cyclohexadiene to 1,3,5 – hexatriene. Consider whether the reaction is thermally or photochemically allowed.

    (b) Write a notes on Paterno – Buchi reaction. (7 + 3)

F–2970

Sub. Code
7MCH3C2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Chemistry

INORGANIC CHEMISTRY – III

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** the questions.

1. How can you determine the structure of BF_3 from its IR and Raman spectra?

2. What is meant by Doppler shift?

3. What is the ground term for d4 high spin state of octahedral complex?

4. Predict ^{19}FNMR spectrum for SF_4.

5. Give the structure of basic beryllium acetate.

6. What is meant by synergic effect?

7. How is Plutonium produced from Uranium?

8. Write down the electronic configuration of Europium (z= 63).

9. How is diborane prepared? What happens when it is heated?

10. Give the preparation of any one isopoly acid.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Distinguish between cis- and trans- isomers of [PtCl2(NH3)2] by using IR and Raman spectra.

Or

(b) Explain the terms Mossbauer effect and isomer shift.

12. (a) Discuss the electronic spectra $[Cu(H_2O)_6]^{2+}$ complex.

Or

(b) Discuss the effect of chemical exchange on the nmr spectra.

13. (a) Mention the ores of selenium How is selenium extracted from its ore?

Or

(b) What are n-acceptors? Discuss the nature of bonding in metal carbonyls.

14. (a) What is a shift reagent? Explain the importance of the shift reagent in the elucidation of complex NMR spectra.

Or

(b) How does thorium occur in nature? How is the metal extracted from monazite sand?

15. (a) What are poly acids? How are they classified? Give an example for each.

Or

(b) What is styx numbers? Calculate the styx number for B_4H_{10} and B_5H_{11}.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. (a) Discuss the vibrational spectra of any three metal carbonyls.

(b) Illustrate the nature of quadrupole splitting of the MB signal for ^{57}Fe and ^{119}Sn. (5 + 5)

17. (a) Explain Contact shift and Pseudo Contact shift with suitable examples.

(b) The electronic spectrum of $[Co(H_2O)_6]^{2+}$ has exhibited bands at 8100 (v_1), 16000 (v_2), and 19400 $(v_3)cm^{-1}$. Calculate the 10 Dq and B values. (5 + 5)

18. (a) Discuss the preparation and properties of any two Germanium compounds.

(b) How is ferrocene synthesised? Explain its structure and bonding. (5 + 5)

19. (a) What is lanthanide contraction? What are its consequences?

(b) How is UO_3 prepared? How does it react with HCl, NaOH and Li_2CO_3? (5 + 5)

20. (a) What are Wade's rule? Discuss the application of these rules in classifying carboranes into closo, nido and arachno carboranes.

(b) Discuss the Keggin structure of 12-hetero poly acids. (5 + 5)

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F–2971

Sub. Code
7MCH3C3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Chemistry

PHYSICAL CHEMISTRY – III

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What is chemiluminescence? Explain with an example.

2. What are the differences between singlet and triplet excited states?

3. State and explain Heisenberg's uncertainity principle.

4. What is de Broglie's hypothesis?

5. What are orthogonal wave functions?

6. Define eigen values and eigen functions.

7. What are the limitations of perturbation theory?

8. Predict the shape of is orbital with the help of its wave function.

9. Define Acid-base catalysis.

10. Define mean free path and write the equation for it.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Derive Stern-Volmer equation? Discuss its applications.

Or

(b) Explain the phenomenon of photo sensitization with an example and give its mechanism.

12. (a) State the postulates of quantum mechanics.

Or

(b) Obtain the operator for kinetic energy.

13. (a) Explain the following

(i) degeneracy

(ii) normalisation of wave functions.

Or

(b) Derive time independent schrodinger wave equation.

14. (a) Set up the schrodinger wave equation for a simple harmonic oscilator.

Or

(b) Apply the variation method for solution of hydrogen atom problem.

15. (a) Explain the set up of flash photolysis and indicate its uses.

Or

(b) State and explain the principle of equipartition of energy.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. (a) Discuss the salient features of Jablonski's diagram.

    (b) Write briefly the elementary aspects of photosynthesis.

17. Derive the quantum mechanical operator for potential energy and position.

18. (a) For a particle in a one-dimensional box, show that the average value of the momentum along the x-axis is zero.

    (b) Give the schrodinger equation for rigid rotor and obtain its solution.

19. Using HMO theory calculate the delocalization energy for butadiene system.

20. Derive Michaelis and Menton equation in enzyme catalysis.

F-2972

Sub. Code
7MCH3E1

M.Sc DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Chemistry

***Elective* - PHARMACEUTICAL CHEMISTRY**

(CBCS – 2017onwards)

Time : 3 Hours   Maximum : 75 Marks

Part A   ($10 \times 2 = 20$)

Answer **all** questions.

1. What is meant by inductive effect? Give example.
2. Give the reasons for prodrug formation.
3. Draw the structure of penicillin- G.
4. What is AIDS? How can it be prevented?
5. What are antineoplastic agents?
6. Define general anaesthetics. Give examples.
7. What are local antiinfective drugs? Give example.
8. Write the synthesis of atenolol.
9. Give the preparation of nifedipine.
10. List out the ideal characteristic of anaeathetic agent.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Discuss occupancy and induced fit theory in detail.

Or

(b) Explain in detail about the process of drug distribution and factors affecting drug distribution.

12. (a) Describe the structure activity relationship of chloramphenicol.

Or

(b) Outline the synthesis of penicillin-V.

13. (a) Brief out the role of cytotoxic agent and antimetabolites in treatment of cancer.

Or

(b) Write a short note on:

(i) Neurotransmitters.

(ii) CNS depressants.

14. (a) Give a brief account on cardiovascular diseases.

Or

(b) Explain the central intervention of cardiovascular output.

15. (a) Describe the analgesic action of morphine.

Or

(b) Explain the synthesis and therapeutic action of sodium nitroprusside and guanothidine.

Part C (3 × 10 = 30)

Answer any **Three** questions.

16. Give a brief account on any five physiochemical parameters.

17. (a) Discuss the structural features and SAR of erythromycin. (7)

    (b) Give the synthesis of chloroquine. (3)

18. (a) Give the synthesis for the following antineoplastic agents. (5)

    (i) Mechlorethamine

    (ii) Cyclophosphamide.

    (b) Write a brief note on neurochemistry of mental diseases. (5)

19. (a) Discuss the drug inhibitors of peripheral sympathetic function. (5)

    (b) Outline the synthesis for the following, (5)

    (i) Methyldopa

    (ii) Verapamil.

20. (a) Discuss the synthesis, properties and uses of aspirin and methyl salicylate. (7)

    (b) Write the synthesis of pethidine. Give its uses. (3)

F–2973

Sub. Code
7MCH4C1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Fourth Semester

Chemistry

INSTRUMENTAL METHODS Of ANALYSIS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** the questions.

1. Round 5.21498 to

   (a) three significant figures and

   (b) five significant figures

2. A copper determination is having a standard deviation of 4 mg. If the sample is having a mean value of 50 mg of copper, calculate the variance.

3. How is purity of precipitates determined?

4. What are the disadvantages of organic precipitants?

5. Define standard electrode potential

6. What are the advantages of auxiliary electrode in three electrode system?

7. What is the property measured in DTA?

8. Define glass transition temperature.

9. A solution of thickness 2 cm transmits 40 % incident light. Calculate the concentration of the solution, given that ε = 6000 dm^3/mol/cm.

10. Why acetylene gas is used in AAS?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Write a note on student's 't' test to compare the precision of two methods

Or

(b) What are determinate errors and indeterminate errors? Explain

12. (a) Enumerate the method of precipitation from homogeneous solution

Or

(b) Give a brief account on drying and ignition of precipitates.

13. (a) Discuss the principle and applications of stripping voltsammetly.

Or

(b) What is the principle of amperometry? Discuss the applications of amperometric titration.

14. (a) Discuss the principle of DTA.

Or

(b) Explain the factors affecting TG curves.

15. (a) Determine the amount of copper in colorimetric analysis in the presence of Nickel.

Or

(b) Discuss the principle and applications of Turbidimetry.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Define correlation coefficient and linear regression. Discuss the method of least square to fit the set of data.

17. (a) What are organic precipitants? How are they classified? Give examples

(b) What is meant by co-precipitation? In what ways, it differs from post-precipitation? (5 + 5)

18. (a) Explain the theory of electro gravimetric analysis

(b) Discuss the applications of coulometry. (5 + 5)

19. (a) Explain TG and DTA of calcium oxalate monohydrate in N_2 and air atmosphere

(b) How is DSC used to determine the degree of conversion of high alumina cement? (5 + 5)

20. Describe the principle, instrumentation and applications of Flame photometry.

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F–2974

Sub. Code
7MCH4E1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Fourth Semester

Chemistry

Elective — NANO CHEMISTRY

(CBCS – 2017 onwards)

Time : Three Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What are Quantum dots? Give example.

2. What is meant by hydrodynamic cavitation?

3. What are fullerenes?

4. What are nanofibres? Give example.

5. What is carbon cluster? Mention its application.

6. Give the preparation of CdO nanoparticles.

7. Mention the advantage of AFM over electron microscopy.

8. Give the basic principle of particle size analyzer.

9. What are nanopipettes?

10. What are DNA knots?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Write notes on Reverse Micelle synthesis of nanomaterials.

Or

(b) Illustrate the unique properties of materials due to nano size and give explanation.

12. (a) Describe applications of carbon nanotubes.

Or

(b) What are Graphenes? Give its unique properties and applications.

13. (a) Give an account of Catenanes and their applications.

Or

(b) Write short notes on discovery of C_{60}.

14. (a) Give the principles and applications of Scanning Electron Microscopy (SEM).

Or

(b) Discuss the principles and applications of Electron Spectroscopy for chemical analysis (ESCA).

15. (a) Give a brief account of nanomechanical device designed by Seeman.

Or

(b) Explain the force measurements in simple protein molecules.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Describe :

    (a) Sol-Gel mediated synthesis of nanomaterials.

    (b) synthesis of nanomaterials using biological agents. (5+5)

17. Describe the applications of nanomaterials in

    (a) Energy

    (b) Environment

    (c) Medicine and

    (d) Defence. (4 × 2½ =10)

18. (a) Discuss the methods of preparation TiO_2 and ZnO nanomaterials.

    (b) Write short notes on the superconductivity in C_{60}. (5+5)

19. Give the principles and applications of

    (a) X-Ray diffraction analysis (XRD) and

    (b) Transmission Electron Microscopy (TEM). (5+5)

20. Give detailed account of

    (a) Self assembled nano transistors.

    (b) Nanoparticles mediated transfection. (5+5)

F–2975

Sub. Code
7MCH4E2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Fourth Semester

Chemistry

Elective : CORROSION CHEMISTRY

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is dry corrosion? Give an example.
2. Give any two factors influencing the rate of corrosion.
3. What are stress corrosion? Give an example.
4. Define the term Galvanic corrosion.
5. What is cladding?
6. What are the requirements of good paint?
7. Define energydensity.
8. Explain the term polarization.
9. What are fuel cells?
10. What is limiting current density?

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Bring out the differences between chemical and electrochemical corrosion.

Or

(b) Explain the theory of electrochemical corrosion.

12. (a) Write short notes on :

(i) Waterline corrosion

(ii) Erosion corrosion.

Or

(b) What is soil corrosion? Explain the factors influencing the soil corrosion.

13. (a) What is protective coatings? Explain the classification of protective coatings.

Or

(b) Define electroplating. Mention the factors influencing the electroplating.

14. (a) Write a note on thermodynamic reversibility.

Or

(b) List out the applications of primary and secondary cells.

15. (a) Explain the electrocatalysis of hydrogen oxidation and oxygen reduction.

Or

(b) Discuss the construction of phosphoric acid fuel cell system.

Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. (a) Write a note on EMF and Galvanic series.

(b) Explain the corrosion control methods. (5 + 5)

17. (a) What are the factors influencing the atmospheric corrosion?

(b) Discuss the microbiological corrosion. (5 + 5)

18. Explain the following :

(a) Chromate coating. (4)

(b) Phosphate coating. (3)

(c) Oxide coating. (3)

19. What are electrolytes? Explain the non-aqueous, molten salt and solid electrolytes.

20. (a) Write a note on porous electordes.

(b) Discuss the construction and working of solid oxide fuel cell system. (5 + 5)

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F–2976

Sub. Code
7MCH4E3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Fourth Semester

Chemistry

Elective – GREEN CHEMISTRY

(CBCS 2017 Onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Suggest any two methods to prevent water pollution
2. What are green products? Give one suitable example.
3. Explain the term "Atom economy" with suitable example.
4. Mention any two green chemistry awards and their motive.
5. Mention any two health impacts of nickel.
6. Define heavy metals. Give suitable examples.
7. What is supercritical CO_2? Explain.
8. Explain how does the choice of catalyst impacts green synthesis.
9. Give any two important difference between microwave assisted and ultrasound assisted green synthesis.
10. Give any two examples of polymer supported catalysts.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Describe in detail, the challenges before green chemist.

Or

(b) Write a note on pollution control and prevention method.

12. (a) Write a note on the role of international organisations in promoting green chemistry.

Or

(b) Describe the scope of green chemistry in the present scenario.

13. (a) Briefly describe the health impacts of lead and selenium.

Or

(b) Describe any two methods for removal of cadmium and beryllium from water.

14. (a) Discuss the role of starting materials and solvents in designing green synthesis method.

Or

(b) Illustrate Strecker synthesis in water by green method.

15. (a) Describe the role, advantages and special effects of microwave oven in microwave assisted green synthesis method.

Or

(b) What are phase transfer catalyst? Describe their types, advantages and applications in synthesis of nitriles from alkyl and aryl halides.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Write a short notes on the following: (3 + 3 + 4)

    (a) eco-efficiency

    (b) waste recycling

    (c) environmental protection laws.

17. State and explain twelve principles of green chemistry.

18. Briefly discuss the impact of heavy metals like cobalt, arsenic and mercury on human health and ways to remove them from environment.

19. Describe the following: (5 + 5)

    (a) Kolbe-Schmidt synthesis using super critical CO_2.

    (b) Suzuki coupling using ionic liquids.

20. Briefly describe the following: (3 + 4 + 3)

    (a) Oxidation of toluene by microwave assisted synthesis.

    (b) Hydroboration reaction using ultra sound.

    (c) Enzymatic hydrolysis

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F–2977

Sub. Code
7MCH4E4

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Fourth Semester

Chemistry

Elective — MOLECULAR PHOTOCHEMISTRY

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Distinguish between internal conversion and intersystem crossing in photochemical reactions.

2. What are radiationless transitions? Give any two examples.

3. Outline the mechanism of photoreduction.

4. Give an example of cycloaddition reaction.

5. With one suitable example, explain photo rearrangement reaction involving transition metal complexes.

6. What are photo-redox reactions? Give an example.

7. Give any one reaction involving singlet molecular oxygen.

8. What is photoisomerisation reaction?

9. Define LASER. Mention the type of LASERs used in photochemistry.

10. What is chemical actinometry?

Part B $(5 \times 5 = 25)$

Answer **all** questions choosing either (a) or (b).

11. (a) Bring out the essential differences between the following :

    (i) Thermal and photochemical reaction

    (ii) Florescence and phosphorescence. $(2\frac{1}{2} + 2\frac{1}{2})$

Or

(b) Describe the photophysical kinetics of unimolecular processes in detail.

12. (a) With the help of woodword-Hoffman rules, discuss the stereochemical course of cyclisation of 1,3, 5-Hexatriene.

Or

(b) What is singlet oxygen? Discuss its common reactions.

13. (a) Write a note on :

    (i) Photo substitution reaction. (2)

    (ii) Photochemistry of metallocenes. (3)

Or

(b) Describe the photochemistry involved in storage and conversion of solar energy.

14. (a) Write a note on :

    (i) Barton reaction (3)

    (ii) Di-π-methane rearrangement. (2)

Or

(b) Write a note on Hoffmann-Loefler-Freytag reaction.

15. (a) Describe the role of uranyl oxalate in chemical actinometry.

Or

(b) What are the applications of LASER in photochemistry? Give suitable examples.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain with the help of Jablonski diagram, the various photophysical processes of an excited state.

17. Construct the correlation diagram for [2 + 2] cycloaddition and state the conditions under which the addition occurs.

18. Write a note on :

    (a) Photo-Fries rearrangement of ethers and anilides

    (b) Photo-Cleavage reaction. (5 + 5)

19. Explain the following with any one suitable example and its mechanism.

    (a) Photo redox reaction using transition metal complexes

    (b) Photo rearrangement reaction with transition metal complexes. (5 + 5)

20. Explain the following experimental technique in photochemistry :

    (a) Reinecke's salt actinometers

    (b) Photochroic actinometers. (5 + 5)

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F–2911

Sub. Code
7MMA1C1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Mathematics

ALGEBRA – I

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A ($10 \times 2 = 20$)

Answer **all** questions.

1. If His a subgroup of G and K is a subgroup of H, then prove that K is a subgroup of G.

2. Prove that $\phi(x) = x$ for energy $x \in G$ is a homomorphism.

3. Prove that $N(a)$ is a subgroup of G.

4. Determine $P(5)$.

5. Define a division ring with an example.

6. If R is a ring, then prove that, for all $a, b \in R$, $(-a)(-b) = ab$.

7. Define a left – ideal of R.

8. If R is a ring and $a \in R$ let $r(a) = \{x \in R / ax = 0\}$. Prove that $r(a)$ is a right – ideal of R.

9. Define a greatest common divisor of a and b.

10. If $p(x) = 1 + x - x^2$ and $q(x) = 2 + x^2 + x^3$, then find $p(x)q(x)$.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) If G is a finite group and $a \in G$. then prove that $0(a) \mid 0(G)$.

Or

(b) Prove that the subgroup N of G is a normal subgroup of G if and only if every left Coset of N in G is a right Coset of N in G.

12. (a) State and prove second part of Sylow's theorem.

Or

(b) If P is a prime number and $p \mid O(G)$, then prove that G has an element of order P.

13. (a) Prove that a finite integral domain is a field.

Or

(b) If D is an integral domain and D is of finite characteristic, prove that the characteristic of D is a prime number.

14. (a) If U is an ideal of R and $1 \in U$, prove that $U=R$.

Or

(b) Let R be a commutative ring with unit element whose only ideals are (O) and R itself. Then prove that R is a field.

15. (a) Let R be a Euclidean ring. Then prove that any two elements a and b in R have a greatest common divisor d. Moreover $d = \lambda a + \mu b$ for some $\lambda, \mu \in R$.

Or

(b) Prove that $J[i]$ is a Euclidean ring.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. State and prove Cayley's theorem.

17. Let G be a group and suppose that G is the internal direct product of $N_1, \ldots, N_n$.. Let $T = N_1 \times N_2 \times \ldots . \times N_n$. Then prove that G and T are isomorphic.

18. Let $C = \{(\alpha, \beta) / \alpha, \beta \in R\}$. We define $(\alpha, \beta) = (\gamma, \delta)$ if and only if $\alpha = \gamma$ and $\beta = \delta$. We also introduce

    (a) $(\alpha, \beta) + (\gamma, \delta) = (\alpha + \gamma, \beta + \delta)$

    (b) $(\alpha, \beta)(\gamma, \delta) = (\alpha\gamma -, \beta\delta, \alpha\delta + \beta\gamma)$ Prove that C is a field.

19. Prove that every integral domain can be imbedded in a field.

20. If R is an integral domain, then prove that $R[x_1, \ldots, x_n]$ is an integral domain.

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F–2912

Sub. Code
7MMA1C2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Mathematics

ANALYSIS – I

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Define compact set. Give an example.

2. Give an example to show that disjoint sets need not be separated.

3. When do you say that a series converges? Give an example of a divergent series.

4. State the roof test.

5. Find the radins of convergence of the power series $\sum \frac{2^n}{n^2} z^n$.

6. State the partial summation formula.

7. Define bounded function.

8. Give an example of a function which has second kind discontinuity at every point.

9. State the generalized mean value theorem.

10. Give an example of a function f differentiable at all points but f' is not continuous.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Prove that a set E is open if and only if its complements is closed.

Or

(b) State and prove the Weierstrass theorem.

12. (a) Define a Cauchy sequence. If X is a compact metric space and if $\{p_n\}$ is a Cauchy sequence in X then prove that $\{p_n\}$ converges to some point of X

Or

(b) Define e, prove that e is irrational.

13. (a) Suppose

(i) The partial sums An of $\sum an$ for a bounded sequence.

(ii) $b_0 \geq b_1 \geq b_2 \geq b_3 \geq ....,$

(iii) $\lim\limits_{n \to \infty} b_n = 0$ prove $\sum anbn$ that converges

Or

(b) If $\sum a_n = A$ and $\sum b_n = B$, then prove that

(i) $\sum(a_n + b_n) = A + B$;

(ii) $\sum can = CA$, for any fixed C

14. (a) Let F be a continuous mapping of a compact metric space X into a metric space Y. Prove that F is uniformly continuous on X

Or

(b) If F is a continuous mapping of a metric space X into a metric space Y, and if E is a corrected subset of X, then prove that $F(E)$ is connected.

15. (a) State and prove the chain rule for differentiation.

Or

(b) Examine for differentiability the function F given by $f(x)=\begin{cases} x\sin\frac{1}{x}, & x \neq 0 \\ 0 \quad , & x = 0 \end{cases}$. Also verify that F is continuous at 0

Part C (3 × 10 = 30)

Answer any **three** questions.

16. (a) Prove that every K–cell is compact.

(b) For $x \in R^1$ and $y \in R^1$ define $d(x,y)=\left|x^2-y^2\right|$. Verify whether it is a metric or not.

17. (a) Investigate the behavior (Convergence or divergence) of $\sum an$ if

(i) $a_n = \dfrac{\sqrt{n+1}-\sqrt{n}}{n}$

(ii) $a_n = \left(\sqrt[n]{n}-1\right)^n$

(b) Suppose $\{s_n\}$ is monotonic. Prove that $\{s_n\}$ converges if and only if it is bounded.

18. Let $\sum an$ be a series of real numbers which converges, but not absolutely. Suppose $-\infty \le \alpha \le \beta \le \infty$. Prove that there exists a rearrangement $\sum an$ with partial sums $\{s_n\}$ such that $\lim_{n\to\infty} \inf s_n' = \alpha$, $\lim_{n\to\infty} \inf s_n' = \beta$

19. Prove that a mapping F of a metric space X into a metric space Y is continuous on X if and only if $f^{-1}(v)$ is open in X for every open set V in Y

20. State and prove the L' Hospital's rule.

Ws9

F–2913

Sub. Code
7MMA1C3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Mathematics

DIFFERENTIAL GEOMETRY

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Define an osculating plane.

2. What is meant by circular helix?

3. Define an involutes.

4. State the fundamental existance theorem for space curves.

5. Define geodesic.

6. State the Whitehead theorem.

7. Write an expression for Geodesic curvature kg.

8. Define Gaussian curvature.

9. State the Meusnier's theorem.

10. What do you mean by osculating developable of the curve?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Calculate the curvature and torsion of the cubic curve given by $\vec{r} = (u, u^2, u^3)$.

Or

(b) Prove that the involute of a circular helix are plane curves.

12. (a) Find the area of the Anchor Ring.

Or

(b) Obtain the necessary and sufficient condition for the direction at (u, v) of $Pdu^2 + 2Qdudv + Rdv^2 = 0$ to be orthogonal.

13. (a) Prove that on a general surface a necessary and sufficient condition that the curve $v = c$ be a Geodesic is $EE_2 + FE_1 - 2EF_1 = 0$.

Or

(b) Show that a curve on a surface is Geodesic if and only if its Gaussian curvature vector is zero.

14. (a) With the usual notations, prove that

$$kg = [\overline{N}, \overline{r}', \overline{r}''] = \frac{1}{\dot{s}^3} \overline{N} \cdot [\dot{\overline{r}} \times \ddot{\overline{r}}].$$

Or

(b) Enumerate the geodesic polar form. Also find the circumference of a geodesic circle of small radius r.

15. (a) Write a brief note on second fundamental form of a surface.

Or

(b) Show that the characteristics point of the plane u is determined by the equations $\vec{r} \cdot \vec{a} = p$, $\vec{r} \cdot \dot{\vec{a}} = \dot{p}$, $\vec{r} \cdot \ddot{\vec{a}} = \ddot{p}$.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. State and prove Serret-Frenet formulae.

17. (a) Find the coefficient of the direction which makes an angle $\pi/2$ with the direction whose coefficients are (l, m).

(b) On the paraboloid $x^2 - y^2 = z$, find the orthogonal trajectories of the sections by the plane $z =$ constant.

18. Derive the christoffel symbols of the second kind.

19. State and prove the Gauss-Bonnet theorem.

20. Derive the Rodrigue's formula.

F–2914

Sub. Code
7MMA1C4

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Mathematics

ORDINARY DIFFERENTIAL EQUATIONS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Find all solutions ϕ of $y'' + y = 0$ satisfying $\phi(0) = 1$, $\phi\left(\frac{\pi}{2}\right) = 2$.

2. If $\varphi_1(x) = e^{r_1 x}, \varphi_2 = (x) = xe^{r_1 x}\ \varphi_3(x) = x^2 e^{r_1 x}$, find $W(\varphi_1, \varphi_2, \varphi_3)$.

3. Show that $P_n(-x) = (-1)^n P_n(x)$.

4. Consider the equation $L(y) = y'' + a_1(x)\, y' + a_2(x) y = 0$, where a_1, a_2 are continuous on some interval I. Let $\varphi_1 \varphi_2$ and ψ_1, ψ_2 be two bases for the solutions of $L(y) = 0$. Show that there is a non zero constant K such that $W\,(\psi_1\,\psi_2)(x) = KW(\varphi_1, \varphi_2)(x)$.

5. Define regular singular point.

6. Show that $K_0'(x) = -K_1(x)$.

7. Solve $y' = 3y^{2/3}$.

8. Determine whether the equation $2xy\,dx + \left(x^2 + 3y^2\right)dy = 0$ is exact or not.

9. Give an example for a function does not satisfy a Lipschitz condition on any strip S_a, although it satisfies one on any rectangle R.

10. State non-local existence theorem.

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) Let ϕ_1, ϕ_2 be two solutions of $L(y) = 0$ as an interval I, and let x_0 be any point in I. Prove that ϕ_1, ϕ_2 are linearly independent on I if and only if $W_{(\phi_1, \phi_2)}(x_0) \neq 0$.

Or

(b) Consider the equation $y''' - 4y' = 0$

(i) Compute three linearly independent solution

(ii) Compute the Wronskian of the solutions found in (i)

12. (a) One solution of $x^3 y''' - 3x^2 y'' + 6xy' - 6y = 0$ for $x > 0$ is $\phi_1(x) = x$. Find a basis for the solutions for $x > 0$.

Or

(b) Show that $\int_{-1}^{1} P_n^2(x)\,dx = \frac{2}{2n+1}$.

13. (a) Show that -1 and 1 are regular singular points for the Legendre equation

$\left(1 - x^2\right) y'' - 2xy^1 + \alpha \ (\alpha + 1)\, y = 0$.

Or

(b) Show that $x^{1/2} J_{1/2}(x) = \frac{\sqrt{2}}{\sqrt{\left(\frac{1}{2}\right)}} \sin x$.

14. (a) Consider the initial value problem $y' = 3y + 1$, $y(0) = 2$.

(i) Show that all the successive approximations $\phi_0, \phi_1, \ldots$ exists for all real x.

(ii) Compute the first four approximation $\phi_0, \phi_1, \phi_2, \phi_3$ to the solution.

Or

(b) Find all real-valued solution of the equation $y' = x^2 y^2 - 4x^2$.

15. (a) Consider the system

$$y_1' = 3y_1 + xy_3$$

$$y_2' = y_2 + x^3 y_3$$

$$y_3' = 2xy_1 - y_2 + e^x y_3$$

Show that every initial value problem for this system has a unique solution which exists for all real x.

Or

(b) Let $f(x, y) = \dfrac{\cos y}{1 - x^2} \left(|x| < 1\right)$. Show that f satisfies a Lipschitz condition on every strip $S_a : |x| \le a$, where $0 < a < 1$.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Let ϕ be any solution of $L(y) = y'' + a_1 y' + a_2 y = 0$ on an interval I containing a point x_0. Prove that for all x in $I \, \| \phi(x_0) \| \, e^{-k|x - x_0|} \leqq \| \phi(x) \| \leqq \| \phi(x_0) \| \, e^{k|x - x_0|}$ where $\| \phi(x) \| = \left[|\phi(x)^2| + |\phi'(x)^2|^{1/2} \right]$, $K = 1 + |a_1| + |a_2|$.

17. The equation $y'' - 2xy' + 2\alpha y = 0$, where α is a constant.

    (a) Find two linearly independent solutions on $-\alpha < x < \alpha$.

    (b) Show that there is a polynomial solution of degree n, in case $\alpha = n$ is a non-negative integer.

18. Compute the solutions for the Bessel equation of order α

    $L(y) = x^2 y'' + xy' + (x^2 - \alpha^2) y = 0$ where $\alpha \neq 0$, and $\operatorname{Re}\alpha \geqq 0$.

19. Let M, N be two reach- valued functions which have continuous first partial derivatives on some rectangle $R : |x - x_0| \leqq a$, $|y - y_0| \leqq b$.

    Prove that the equation $M(x,y) + N(x,y)\, y' = 0$ is exact in R if and only if $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$ in R.

20. Let f be a real-valued continuous function on the strip $S : |x - x_0| \leqq a$, $|y| < \infty$, $(a > 0)$, and suppose that f satisfies on S a Lipschitz condition with constant $K > 0$.

    Show that the successive approximations $\{\phi_k\}$ for the problem $y' = f(x,y), y(x_0) = y_0 \rightarrow$ (1) exists on the entire interval $|x - x_0| \leqq a$, and converge there to a solution ϕ of (1).

F–2915

Sub. Code
7MMA1E1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Mathematics

***Elective* — NUMBER THEORY**

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What is meant by divisibility? Give an example.

2. When will you say that an integer is said to be square free?

3. Define the Mobius function $\mu(n)$.

4. If f is multiplicative then prove that $f(1) = 1$.

5. Write down the Euler's summation formula.

6. State the Legendre's identity.

7. If $a \equiv b (\bmod m)$ and if $0 \leq |b - a| < m$, then prove that $a = b$.

8. State the Little Fermat theorem.

9. Define the Jacobi symbol $\left(\frac{n}{p}\right)$

10. Find the values of $\left(\frac{-1}{11}\right)$ and $\left(\frac{-1}{17}\right)$.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Prove that every $n \geq 12$ is the sum of two composite numbers.

Or

(b) State and prove the fundamental theorem of arithmetic.

12. (a) Define the Euler totient function $\varphi(n)$. If $n \geq 1$, prove that $\varphi(n) = \sum_{d|n} \mu(d)\left(\frac{n}{d}\right)$.

Or

(b) Let f be multiplicative. Prove that f is completely multiplicative if and only if $f^{-1}(n) = \mu(n) f(n)$ for all $n \geq 1$.

13. (a) If $x \geq 1$, prove that $\sum_{n>x} \frac{1}{n^s} = 0\,(x^{1-s})$ if $s > 1$.

Or

(b) Prove that the set of lattice points visible from the origin has density $\frac{6}{\pi^2}$.

14. (a) Let p be a prime, $p \geq 5$, and write $1+\frac{1}{2}+\frac{1}{3}+\ldots+\frac{1}{p}=\frac{r}{ps}$. Prove that $\frac{p^3}{(r-s)}$.

Or

(b) Solve the congruence $25x \equiv 15 (\bmod 120)$.

15. (a) Show that Legendre's symbol $\left(\frac{n}{p}\right)$ is a completely multiplicative function of n.

Or

(b) State and prove reciprocity law for Jacobi symbols.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. State and prove the Euclidean algorithm.

17. (a) Define the Liouville's function $\lambda(n)$. For every $n \geq 1$,

Prove that $\sum_{d|n} \lambda(d) = \begin{cases} 1 & \textit{if } n \textit{ is a square,} \\ 0 & \textit{otherwise.} \end{cases}$

Also prove $\lambda^{-1}(n) = |\mu(n)|$ for all n.

(b) Derive the generalized inversion formula.

18. For $x \geq 1$, prove that

(a) $\sum_{n \leq x} \mu(n)\left[\frac{x}{n}\right] = 1$;

(b) $\sum_{n \leq x} \Lambda(n)\left[\frac{x}{n}\right] = \log[x]!$;

(c) $\left|\sum_{n \leq x} \frac{\mu(n)}{n}\right| \leq 1$, with equality holding only if $x < 2$.

19. State and prove the Lagrange theorem.

20. State and prove the Gauss's lemma.

F–2916

Sub. Code
7MMA2C1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Mathematics

ALGEBRA – II

(CBCS 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. If V is a vector space over F, then prove that $(-\alpha)v = -(\alpha v)$ for $\alpha \in F, v \in V$.

2. In a vector space, show that $\alpha(v - w) = \alpha v - \alpha w$.

3. If $U \subset W$, then prove that $A(\cup) \supset A(w)$.

4. In $F^{(2)}$ define for $u = (\alpha_1, \alpha_2)$ and $v = (\beta_1, \beta_2), (u, v) = 2\alpha_1\overline{\beta_1} + \alpha_1\overline{\beta_2} + \alpha_2\overline{\beta_1} + \alpha_2\overline{\beta_2}$.. Then prove that this defines an inner product on $F^{(2)}$.

5. What is the degree of $\sqrt{2}\sqrt{3}$ over Q?

6. Define an algebraic number with an example.

7. Define a fixed field of a group of automorphisms of K with an example.

8. What is $[F(x_1, ..., x_n) : S]$?

9. Define right and left invertible element of $A(V)$.

10. If $T \in A(V)$ then prove that $T^* \in A(V)$.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) If S is a nonempty subset of the vector space V, then prove that L(S) is a subspace of V.

Or

(b) If V is finite–dimensional and if W is a subspace of V, then prove that W is finite-dimensional, dim $W \leq \dim v$ and dim $V/_W = \dim V - \dim W$.

12. (a) If V is finite-dimensional and $v \neq o \in V$, then prove that there is an element $f \in \hat{V}$ Such that $f(v) \neq 0$.

Or

(b) In V, prove the parallelogram law.

$||u+v||^2 + ||u-v||^2 = 2(||u||^2 + ||v||^2)$.

13. (a) Prove that a polynomial of degree n over a filed Can have atmost n roots in any extension field.

Or

(b) If F is of characteristics O and if a,b are algebraic over F, then prove that there exists an elements $C \in F(a,b)$ such that $F(a,b) = F(c)$.

14. (a) If k is a field and if $\sigma_1,....,\sigma_n$ are distinct automorphisms of K, then prove that it is impossible to find elements $a_1,....,a_n$ not all 0, in K such that $a_1\sigma_1(u) + a_2\sigma_2(u) + ... + a_n\sigma_n(u) = 0$ for all $u \in K$.

Or

(b) Let F be a field and let $F(x_1,....x_n)$be the field of rational functions in $x_1,....x_n$ over F. Suppose that S is the field of symmetric rational functions that prove that $G(F(x_1,....x_n), S) = S_n$.

15. (a) If V is finite-dimensional over F, then prove that $T \in A(v)$ is regular if and only if T maps V onto V.

Or

(b) If V is n-dimensional over F and if $T \in A(v)$ has all its characteristic roots in F, then prove that T satisfies a polynomial of degree n over F.

Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. Prove that any two finite–dimensional vector spaces over F of the same dimension are isomorphic.

17. Let V be a finite–dimensional inner product space, then prove that V has an orthonormal set as a basis.

18. If L is a finite extension of K and if K is a finite extension of F, then prove that L is a finite extension of F. Moreover [L:F]=[L:K][K:F]

19. State and prove the fundamental theorem of Galois theory.

20. (a) If N is a normal linear transformation and ,if $vN = 0$ for $v \in V$, then prove that $vN^* = 0$.

(b) If λ is a characteristics root of the normal transformation N and if $vN = \lambda v$ the prove that $vN^* = \bar{\lambda} v$.

F–2917

Sub. Code
7MMA2C2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Mathematics

ANALYSIS — II

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Define the unit step function.

2. State fundamental theorem of calculus.

3. Define an equi continuous function on a set E in a metric space X.

4. Define a uniformly bounded function on a set E.

5. Prove that $E(z)\ E(-z) = 1,\ z \in \mathbb{C}$.

6. Prove that the function E is periodic with period $2\pi i$.

7. Define a measurable set with an example.

8. Define a Lebesgue measurable function.

9. State Fatou's lemma.

10. Define a characteristic function and a simple function.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) If P^* is a retirement of P, then prove that $L(P, f\ \alpha) \leq L\left(P^*, f, \alpha\right)$ and $U\left(P^*, f, \alpha\right) \leq U(p, f, a)$.

Or

(b) If f is monotonic on $[a, b]$ and if α is continuous on $[a, b]$, then prove that $f \in \mathbb{R}\,(\alpha)$.

12. (a) State and prove Cauchy criterion for uniform convergence.

Or

(b) Let α be monotonically increasing on $[a, b]$ suppose $f_n \in \mathbb{R}\,(\alpha)$ on $[a, b]$, for $n = 1, 2, 3, \cdots$, and suppose $f_n \to f$ uniformly on $[a, b]$. Then prove that $f \in \mathbb{R}\,(\alpha)$ on $[a, b]$, and $\int_a^b f\, d\alpha = \lim_{n \to \infty} \int_a^b f_n\, d\alpha$.

13. (a) Suppose ΣC_n converges. Put $f(x) = \sum_{n=0}^{\infty} C_n x^n$, $-1 < x < 1$. Then prove that $\lim_{x \to 1} f(x) = \sum_{n=0}^{\infty} C_n$.

Or

(b) Prove that every non constant polynomial with complex coefficients has a complex root.

14. (a) If E_1 and E_2 are measurable, then prove that $E_1 \cup E_2$ is measurable.

Or

(b) Let f and g be two measurable real-valued functions defined on the same domain. Then prove that the functions $f + g$ and fg are also measurable.

15. (a) State and prove Monotone convergence theorem.

Or

(b) Let f and g be integrable over E. Then prove that the function $f+g$ is integrable over E and

$$\int_E f+g = \int_E f + \int_E g .$$

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Assume α increases monotonically and $\alpha' \in \mathbb{R}$ on $[a, b]$. Let f be a bounded real function on $[a, b]$. Then prove that $f \in \mathbb{R}(\alpha)$ if and only if $f\alpha' \in \mathbb{R}$ Also prove that $\int_a^b f d\alpha = \int_a^b f(x)\, \alpha'(x)\, dx$.

17. Prove that there exists a real continuous function on the real line which is no where differentiable.

18. State and prove Parseval's theorem.

19. Let $\langle E_i \rangle$ be a sequence of measurable sets. Then prove that $m(UE_i) \le \Sigma m E_i$. If the sets E_n are pairwise disjoint, then prove that $m(UE_i) = \Sigma m E_i$.

20. Show that the Lebesgue integral is a generalization of the Riemann integral.

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F–2918

Sub. Code
7MMA2C3

M.Sc. DEGREE EXAMINATION,
NOVEMBER 2019

Second Semester

Mathematics

PARTIAL DIFFERENTIAL EQUATIONS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Define Pfaffian differential equation.

2. Write down the existence and uniqueness theorem for simultaneous differential equations of the first order and the first degree in Three variables.

3. Form a differential equation by eliminating the arbitrary constants from $2 = (ax + y)^2 + b$.

4. Define complete integral.

5. Find the complete integral of the equation $p^2 z^2 + q^2 = 1$.

6. Write down the compatible conditions for systems of first order equations.

7. Write down the telegraphy equation.

8. If u is the complementary function and z_1 a particular integral of a linear partial differential equation, then prove that $u+z_1$ is a general solution of the equation.

9. Define interior Neumann problem.

10. Write down the d'Alembert solution of the one-dimensional wave equation.

Part B $(5 \times 5 = 25)$

Answer **all** the questions, choosing either (a) or (b).

11. (a) Find the integral curves of the equations $\frac{dx}{x+z} = \frac{dy}{y} = \frac{dz}{z+y^2}$.

Or

(b) Verify that the equation $yz(y+z)dx + xz(x+z) + xy(x+y)dz = 0$ is integrable and find its solution.

12. (a) Prove that along every characteristic strip of the equation $F(x,y,z,p,q)=0$ the function $F(x,y,z,p,q)$ is a constant.

Or

(b) Form a partial differential equation by eliminating the arbitrary function from $z = f(\frac{xy}{z})$.

13. (a) Find the complete integral of the equation $p^2x + q^2y = z$.

Or

(b) Show that a complete integral of the equation $f(\frac{\partial u}{\partial x}, \frac{\partial u}{\partial y}, \frac{\partial u}{\partial z}) = 0$.

14. (a) Find the solution of the equation $\frac{\partial^2 z}{\partial x^2} - \frac{\partial^2 z}{\partial y^2} = x - y.$.

Or

(b) Derive the solution of the equation: $\frac{\partial^2 v}{\partial r^2} + \frac{1}{r}\frac{\partial v}{\partial r} + \frac{\partial^2 v}{\partial z^2} = 0$ for the region $r \geq 0, z \geq 0$ satisfying the conditions:

(i) $v \to 0$ as $z \to \infty$ and as $r \to \infty$.

(ii) $v = f(r)$, on $z = 0, r > 0$.

15. (a) If $p > 0$ and $\psi(t)$ is given by $\psi = \int_v \frac{p(r')d\tau'}{|r - r'|}$. Where the volume is bounded, prove that $\lim_{r=\infty} r\psi(r) = M$, where $M = \int_v p(r')d\tau^1$.

Or

(b) Find the temperature in a sphere of radius a when its surface is maintained at zero temperature and its initial temperature is $f(r, \theta)$.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Prove that a necessary and sufficient condition that there exists between two functions *u(x, y)* and *v(x, y)* a relation *F(u, v)=0*, not involving *x* or *y* explicitly is that $\frac{\partial(u,v)}{\partial(x,y)} = 0$.

17. If u is a function of x, y and z which satisfies the partial differential equation $(y - z)\frac{\partial u}{\partial x} + (z - x)\frac{\partial u}{\partial z} = 0$. Show that v contains x, y and z only in combinations $x + y + z$ and $x^2 + y^2 + z^2$.

18. Show that the only integral of the equation $2q(z - px - qy) = 1 + q^2$

which is circumscribed about the paraboloid $2x = y^2 + z^2$ is the enveloping cylinder which touches it along its section by the plane $y + 1 = 0$.

19. Solve $\frac{\partial^2 z}{\partial x^2} = \frac{1}{k}\frac{\partial z}{\partial t}$ by Separable Variable Method.

20. Prove that the solution $\psi(r, \theta, \phi)$ of the exterior Dirichlet problem for the unit sphere

$$\nabla^2\psi = 0, r > 1, \psi = f(\theta, \phi) \text{ on } r = 1.$$

is given in terms of the solution $v(r, \theta, \phi)$ of the interior Dirichlet problem $\nabla^2 v = 0, r < 1; v = f(\theta, \phi)$ on $r = 1$

by the formula $\psi(r, \theta, \phi) = \frac{1}{r} v(\frac{1}{r}, \theta, \phi)$.

F–2919

Sub. Code
7MMA2C4

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Mathematics

MECHANICS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** the questions.

1. Define potential Energy?

2. Distinguish between absolute system and gravitational system.

3. Write down the liouville system.

4. Explain energy integral.

5. Write down Jacobi's form of the principle of least action.

6. Explain mass–spring system.

7. Write down the Hamilton–Jacobi equation.

8. State Jacobi's theorem.

9. Explain canonical transformation.

10. Explain translating mass spring system.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain equations of motion.

Or

(b) Explain unilateral constraints.

12. (a) Derive the standard form of Lagrange's equation for a non holonomic system.

Or

(b) Find the differential equations of motion for a spherical pendulum of length 'l'.

13. (a) Explain stationary value of a functions.

Or

(b) Find the stationary values of the function $f = z$ subject to the constraints $\phi_1 = x^2 + y^2 + z^2 - 4 = 0$ and $\phi_2 = xy - 1 = 0$.

14. (a) Explain Ignorable co–ordinates.

Or

(b) Explain Pfaffian differential forms

15. (a) Explain point transformation.

Or

(b) Explain principle forms of Generating functions.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. A particle of mass m is suspended by a massless wire of length $r = a + b\cos wt \, (a > b > 0)$ to from a spherical pendulum. Find the equations of motion.

17. Explain Liouville's system.

18. Explain Hamilton's principle.

19. Explain Stackel's theorem.

20. Explain Poisson Brackets.

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F–2920

Sub. Code
7MMA2E1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Second Semester

Mathematics

Elective — GRAPH THEORY

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Define a regular graph. Give an example.

2. What is meant by a bond?

3. Define a vertex cut of a graph with an example.

4. Write short notes on Eulerian graph.

5. Find the number of different perfect matching in K_{2n}.

6. Draw 4-edge Chromatic graph.

7. Define the Ramsey numbers.

8. Define a critical graph. Give an example.

9. State the Jordan curve theorem in the plane.

10. If G is a simple planar graph, then prove that $\delta \leq 5$.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) If a K-regular bipartite graph with $K > 0$ has bipartition (X, Y), then prove that $|X| = |Y|$.

Or

(b) If G is a tree, then prove that $\varepsilon = \gamma - 1$.

12. (a) If G is a block with $\gamma \geq 3$, then prove that any two edges of G lie on a common cycle.

Or

(b) If G is a simple graph with $\gamma \geq 3$ and $\delta \geq \frac{\gamma}{2}$, then prove that G is Hamiltonian.

13. (a) If G is a K-regular bipartite graph with $K > 0$, then prove that G has a perfect matching.

Or

(b) If G is bipartite graph then prove that $\chi' = \Delta$.

14. (a) With the usual notations, prove that $r(k, l) \leq \binom{k + l - 2}{k - 1}$.

Or

(b) If G is k-critical, then prove that $\delta \geq k - 1$.

15. (a) Show that K_5 is nonplanar.

Or

(b) State and prove the Euler's formula for a connected plane graph.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. With the usual notations, prove that $\tau(K_n) = n^{n-2}$.

17. State and prove the Chvatal theorem.

18. State and prove Berge theorem.

19. State and prove the Brook's theorem.

20. Prove that every planar graph is 5-vertex-colourable.

F–2921

Sub. Code
7MMA3C1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Mathematics

COMPLEX ANALYSIS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Define the radius of convergence of the power series. Also find the radius of convergence of the power series $\sum z^{n1}$:

2. Distinguish between translation, rotation and inversion.

3. Write down the representation formula.

4. State the Cauchy's estimate theorem.

5. Define an isolated singularity. Give an example.

6. Find the poles of cot z.

7. Determine the residue for $\dfrac{e^z}{(z-a)(z-b)}$.

8. State the argument principle theorem.

9. Write down the power series expansion of arc sin z.

10. What is meant by entire function? Give an example.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) State and prove the Abel's limit theorem.

Or

(b) Show that the function $f(z)$ is analytic if $\frac{\partial f}{\partial \bar{z}} = 0$.

12. (a) With the usual notations, prove that $\left|\int_a^b f(t)dt\right| \leq \int_a^b |f(t)|dt$.

Or

(b) Define the winding number of γ with respect to a. Also prove the Morera's theorem.

13. (a) Prove that an analytic function comes arbitrarily close to any complex value in every neighborhood of an essential singularity.

Or

(b) State and prove the maximum principle theorem.

14. (a) State and prove the Rouche's theorem.

Or

(b) Evaluate: $\int_0^{\pi} \frac{d\theta}{a + \cos\theta}, a > 1$.

15. (a) State and prove Hurwitz theorem.

Or

(b) Derive the Jensen's formula.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. (a) Is an analytic function $f(z)$ with a constant modulus reduces to a constant? If yes, Justify your answer.

(b) Define cross ratio. If z_1, z_2, z_3, z_4 are distinct points in the extended plane and T any linear transformation then prove that $(Tz_1, Tz_2, Tz_3, Tz_4) = (Z_1, Z_2\, Z_3, Z_4)$.

17. State and prove the Cauchy's theorem for a rectangle.

18. State and prove the Schwarz lemma.

19. Evaluate: $\int_0^{\pi} \log \sin x\, dx$.

20. Obtain the Laurent expansion $\sum_{n=-\infty}^{\infty} An(z-a)(z-a)^n$ for the function $f(z)$ analytic in $R_1 < |z-a| < R_2$.

F–2922

Sub. Code
7MMA3C2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Mathematics

TOPOLOGY – I

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Define the discrete topology. Give an example.

2. Is the subset $[a,b]$ of $\mathbb{R}$ closed? Justify your answer.

3. State the pasting lemma.

4. What is meant by quotient map?

5. Is the rationals Q connected? Justify your answer.

6. What are the continuous maps $f : \mathbb{R} \to \mathbb{R}_\ell$?

7. When will you say that the space X is said to be compact? Give an example.

8. State the uniform continuity theorem.

9. Is the product of two Lindelof spaces need not be Lindelof? Justify your answer.

10. State the Urysohn lemma.

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) If $\mathcal{B}$ is a basis for the topology of X and $\mathcal{C}$ is a basis for the topology of Y, then prove that the collection $\mathcal{D} = \{B \times C / B \in \mathcal{B}$ and $C \in \mathcal{C}\}$ is a basis for the topology of $X \times Y$.

Or

(b) Let A be a subset of the topological space X and let A' be the set of all limit points of A. Prove that $\overline{A} = A \cup A'$.

12. (a) Enumerate the following terms with an illustrations for each

(i) Box topology

(ii) Projection mapping

(iii) Metric topology.

Or

(b) Prove that $\mathbb{R} \times \mathbb{R}$ in the dictionary order topology is metrizable.

13. (a) Prove that the union of a collection of connected subspaces of X that have a point in common is connected.

Or

(b) Show that the components of X, are connected disjoint subspaces of X whose union is X, such that each non empty connected subspace of X intersects only one of them.

14. (a) State and prove the extreme value theorem.

Or

(b) Prove : Compactness implies limit point compactness , but not conversely.

15. (a) Define a Lindelof space. Prove that every metrizable Lindelof space has a countable basis.

Or

(b) Define a regular space. Prove that a subspace of a regular space is regular.

Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. (a) If $X = \{a, b, c\}$ and let $\tau_1 = \{\varphi, X, \{a\}, \{a, b\}\}$ and $\tau_2 = \{\varphi, X, \{a\}, \{b, c\}\}$. Find the smallest topology containing τ_1 and τ_2, and the largest topology contained in τ_1 and τ_2.

(b) Let X be an ordered set in the order topology and let Y be a subset of X that is convex in X. Prove that the order topology on Y is the same as the topology Y inherits as a subspace of X.

17. Let X and Y be topological spaces and let $f : X \to Y$. Prove that following are equivalent:

(a) f is continuous ,

(b) for every subset A of X, one has $f(\overline{A}) \subset \overline{f(A)}$,

(c) for every closed set B of Y, the set $f^{-1}(B)$ is closed in X

(d) for each $x \in X$ and each neighborhood V of $f(x)$, there is a neighborhood U of X such that $f(U) \subset V$.

18. (a) State and prove intermediate value theorem.

    (b) Let X be locally path connected. Show that every connected open set in X is path connected.

19. Prove that the product of finitely many compact spaces is compact.

20. State and prove the Urysohn metrization theorem.

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F–2923

Sub. Code
7MMA3C3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Mathematics

PROBABILITY AND STATISTICS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. If C_1 and C_2 are subsets of ε such that $C_1 \subset C_2$, then prove that $P(C_1) \leq P(C_2)$.

2. Define moment generating function.

3. Let X_1 and X_2 have the joint p.d.f. $f(x_1, x_2) = \begin{cases} x_1 + x_2, & 0 < x_1 < 1, 0 < x_2 < 1 \\ 0, & elsewhere \end{cases}$ Find the marginal p.d.f. of X_1 and X_2.

4. Show that the random variables X_1 and X_2 with joint p.d.f. $f(x_1, x_2) = \begin{cases} x_1 + x_2 & 0 < x_1 < 1, 0 < x_2 < 1 \\ 0, & elsewhere \end{cases}$ are dependent.

5. Define negative Binomial distribution.

6. If the m.g.f. of a random variable X is $\left(\frac{1}{3} + \frac{2}{3}e^t\right)^5$ find $P(X = 2, \text{Or } 3)$.

7. If the p.d.f. of X is $f(x)=\begin{cases} 2xe^{-x^2}, & 0<x<\infty \\ 0, & elsewhere \end{cases}$. Determine the p.d.f. of $Y=x^2$.

8. Let $\overline{X}$ be the mean of a random sample of size 5 from a normal distribution with $\mu=0$ and $\sigma^2=125$. Determine C so that $P(\overline{X}<c)=0.90$.

9. Define convergence in distribution.

10. Let y be $b(72,\frac{1}{3})$. Find $pr(22\le y\le 28)$.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Let X be a random variable such that $E[(x-b)^2]$ exists for all real b. Show that $E[(x-b)^2]$ is a minimum when $b=E(x)$.

Or

(b) Let X have the p.d.f. $f(x)=\begin{cases} {}^{(x+2)}\!/_{18}, & -2<x<4 \\ 0, & elsewhere \end{cases}$

Find $E(x)$, $E[(x+2)^3]$ and $E[6x-2(x+2)^3]$.

12. (a) If x_1 and x_2 are independent random variables with marginal probability density functions $f_1(x_1)$ and $f_2(x_2)$, respectively, then prove that $pr(a<x_1<b, c<x_2<d)=pr(a<x_1<b)$ $pr(c<x_2<d)$ for every $a<b$ and $c<d$, where a, b, c and d are constants.

Or

(b) If the correlation coefficient ρ of X exists, then prove that $-1\le\rho\le 1$.

13. (a) Let X have a poisson distribution with $\mu = 100$. Use Chebysher's inequality to determine a lower bound for $pr(75 < x < 125)$.

Or

(b) If X has a gamma distribution with $\alpha = 3$ and $\beta = 4$, find $pr(3.28 < x < 25.2)$.

14. (a) Let X have the uniform distribution over the interval $(-\pi/2, \pi/2)$. Show that $y = \tan x$ has a Cauchy distribution.

Or

(b) If $X_1, X_2 \ldots X_n$ are independent random variables with respective moment–generating functions $M_i(t)$, $i = 1, 2, 3 \ldots n$. then prove that the moment – generating function of $Y = \sum_{i=1}^{n} a_i x_i$ where $a_1, a_2 \ldots a_k$ are real constants, is $M_y(t) = \prod_{i=1}^{n} M_i(a_i t)$.

15. (a) Let $\overline{X}_n$ denote the mean of a random sample of size n from a distribution that is $N(\mu, \sigma^2)$. Find the limiting distribution of $\overline{X}_n$.

Or

(b) Let $F_n(u)$ denote the distribution function of a random variable U_n whose distribution depends upon the positive integer n. Further, let U_n converge in probability to the positive constant C and let $pr(U_n < 0) = 0$ for every n. Prove that the random variable $\sqrt{U_n}$ converges in probability to $\sqrt{C}$.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. (a) Let $f(x) = \left(\frac{1}{2}\right)^x$, $x = 1, 2, 3, ...$ zero elsewhere, be the p.d.f. of the random variable X. Find the m.g.f, the mean and the variance of X.

    (b) State and prove Chebyshev's inequality.

17. (a) Let X_1 and X_2 have the joint p.d.f. $F(x_1, x_2) = x_1 + x_2, 0 < x_1 < 1,\ 0 < x_2 < 1,$ zero elsewhere. Find the conditional mean and variance of X_2 given $X_1 = X_1$, $0 < x_1 < 1$.

    (b) Let X and Y have the p.d.f. $f(x, y) = 1,\ 0 < x < 1,$ $0 < y < 1,$ zero elsewhere. Find the p.d.f. of the product Z=XY.

18. (a) Show that the graph of a p.d.f. $N(\mu, \sigma^2)$ has pointed of inflection at $x = \mu - \sigma$ and $x = \mu + \sigma$.

    (b) Compute the measures of skewness and Kurtosis of the binomial distribution $b(n, p)$.

19. (a) Let S^2 be the variance of a random sample of size 6 from the normal distribution $N(\mu, 12)$. Find $P(2.30 < S^2 < 22.2)$.

    (b) Let $Y_1 < Y_2 < Y_3 < Y_4$ be the order statistics of a random sample of size 4 from the distribution having p.d.f. $f(x) = e^{-x}, 0 < x < \infty$, zero elsewhere. Find $pr(3 \leq Y_4)$.

20. State and prove central limit theorem.

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F–2924

Sub. Code
7MMA3E1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Mathematics

Elective — DISCRETE MATHEMATICS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Show that + is not a binary operation on $S = \{1, -1, 0\}$.

2. How many binary operations can be defined on a set A with n elements?

3. Find the recurrence relation for the Fibonacci sequence.

4. Define Ackermann's function.

5. Define a partial function and a total function.

6. Find the generating function of the recurrence relation $s(k) = 2s\ (k-1)\ \ s(0) = 1$.

7. Draw the Hasse diagram of $(X, \leq)$, where $X = \{1, 2, 3, 4, 6, 12\}$.

8. Define a lattice homomorphism.

9. Define a Karnaugh map.

10. If a and b are two distinct atoms, then prove that $a \wedge b = 0$.

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) (i) Define a monoid.

(ii) Let $(M, *, e)$ be a monoid and $a \in M$. If a is invertible, then prove that its inverse is unique.

Or

(b) Let T be the set of all even integers, show that the semigroups $(z,+)$ and $(T,+)$ are isomorphic.

12. (a) Find the recurrence relation satisfying $y_n = (A + Bn)4^n$.

Or

(b) Prove by mathematical induction that $2^n > n$ for all $n \in N$.

13. (a) Show that $f_1(x, y) = x + y$, $x, y \in N$ is primitive recursive.

Or

(b) Show that the set of divisors B of a positive integer n is recursive.

14. (a) In any lattice $(L, \leq)$, prove that the operations $\vee$ and $\wedge$ are isotone.

Or

(b) Prove that every chain is a distributive lattice.

15. (a) Write down an algorithm applied to the k-map of an Boolean function f to find a minimal expression for the function f.

Or

(b) Let B be a finite Boolean algebra and $b \neq 0$ in B. Let $a_1, a_2, \ldots\ldots, a_k$ be all the atoms of B such that $a_i \leq b$. Then prove that $b = a_1 \vee a_2 \vee \ldots \vee a_k$.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. For any commutative monoid $(M, *)$, prove that the set of idempotent elements of M forms a submonoid.

17. Solve the recurrence relation $s(k) - 9s(k-1) + 18s(k-2) = 0$, $s(0) = 1$, $s(1) = 4$.

18. Solve the recurrence relation $s(n) = s(n-1) + 2(n-1)$ with $s(0) = 3$, $s(1) = 1$ by finding its generating function.

19. Let L be a complemented, distributive lattice. For $a, b \in L$, prove that the following are equivalent

(a) $a \leq b$

(b) $a \wedge b' = 0$

(c) $a' \wedge b = 1$

(d) $b' \leq a'$.

20. A voting-machine for three voters has three YES-NO switches. Current is in the circuit precisely when YES has a majority. Draw a contact diagram and the symbolic representation by gates and simplify it.

F–2925

Sub. Code
7MMA3E4

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Mathematics

Elective : FUZZY MATHEMATICS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define a fuzzy set. Give an example.

2. Define the intersection of two fuzzy sets with an example.

3. Write down the axiomatic skeleton for fuzzy complements.

4. What is meant by pseudo-complemented distributive lattice on $p(x)$.

5. Define cylindric extension.

6. When will you say that the relation is said to be antitransitive?

7. Write down the formula for the Rempster's rule for combination.

8. Write a short notes on the lattice of possibility distributions of length n.

9. Define an index of fuzziness.

10. State the Gibbs' inequality.

Part B $(5 \times 5 = 25)$

Answer **all** questions choosing either (a) or (b).

11. (a) Compute the scalar cardinality and the fuzzy cardinality for the following fuzzy set :

$$A = \frac{0.4}{v} + \frac{0.2}{w} + \frac{0.5}{x} + \frac{0.4}{y} + \frac{1}{z}.$$

Or

(b) Show that all α-cuts of any fuzzy set A defined on $\mathbb{R}^n$ $(n \geq 1)$ are convex if and only if

$\mu_A[\lambda\vec{r} + (1-\lambda)\vec{s}] \geq \min[\mu_A(\vec{r}), \mu_A(\vec{s})]$ for all $\vec{r}, \vec{s} \in \mathbb{R}^n$ and all $\lambda \in [0, 1]$.

12. (a) What is meant by a dual point? If a complement c has an equilibrium e_c, then prove that $d_{e_c} = e_c$?

Or

(b) For all $a, b \in [0, 1]$, prove that $i(a, b) \leq \min(a, b)$.

13. (a) Let a binary fuzzy relation R be defined by the following membership matrix.

$$M_R = \begin{bmatrix} 0.7 & 0.4 & 0 \\ 0.9 & 1 & 0.4 \\ 0 & 0.7 & 1 \\ 0.7 & 0.9 & 0 \end{bmatrix}$$. Obtain its resolution form.

Or

(b) Enumerate the following terms with an illustration for each.

(i) Sagittal diagram

(ii) Fuzzy equivalence relation.

14. (a) Let $X = \{a, b, c, d\}$. Given the basic assignment $m(\{a, b, c\}) = 0.5$, $m(\{a, b, d\}) = 0.2$ and $m(x) = 0.3$. Determine the corresponding belief and plausibility measures.

Or

(b) Prove that a belief measures Bel on a finite power set up $\mathscr{P}(x)$ is a probability measure if and only if its basic assignment m is given by $m(\{x\}) = \text{Bel}\ (\{x\})$ and $m(A) = 0$ for all subsets of X that are not singletons.

15. (a) Consider two fuzzy sets, A and B defined on the set of real numbers $X = [0, 4]$ by the membership grade functions $\mu_A(x) = \dfrac{1}{1+x}$ and $\mu_B(x) = \dfrac{1}{1+x^2}$. Draw a graph for these functions.

Or

(b) Narrate the function terms :

(i) Shannon entropy

(ii) Normalized shannon entropy

(iii) Measure of confusion.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Consider the fuzzy sets A, B and C defined on the internal $x = [0, 10]$ of real numbers by the membership grade functions $\mu_A(x) = \dfrac{x}{x+2}$, $\mu_B(x) = 2^{-x}$, $\mu_C(x) = \dfrac{1}{1+10(x-2)^2}$ and let $f(x) = x^2$ for all $x \in X$. Use the extension principle to derive $f(A), f(B)$ and $f(C)$.

17. Show that fuzzy set operations of union, intersection and continuous complement that satisfy the law of excluded middle and the law of contradiction are not idempotent or distributive.

18. What is meant by a compatibility relation? Explain with suitable illustration. Also determine the complete α-covers of the compatibility relation whose membership matrix is given below.

$$
\begin{array}{c}
 \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \\ 9
\end{array}
\begin{array}{c}
\begin{array}{ccccccccc} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \end{array} \\
\begin{pmatrix}
1 & 0.8 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0.8 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 1 & 0.8 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 1 & 0.8 & 0.7 & 0.5 & 0 & 0 \\
0 & 0 & 0.8 & 0.8 & 1 & 0.7 & 0.5 & 0.7 & 0 \\
0 & 0 & 0 & 0.7 & 0.7 & 1 & 0.4 & 0 & 0 \\
0 & 0 & 0 & 0.5 & 0.5 & 0.4 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0.7 & 0 & 0 & 1 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1
\end{pmatrix}
\end{array}
$$

19. Let $x = \{a, b, c, d, e\}$ and $y = N_8$. Using a joint possibility distribution on $X \times Y$ given in terms of the matrix.

$$
\begin{array}{c}
 \\ a \\ b \\ c \\ d \\ e
\end{array}
\begin{array}{c}
\begin{array}{cccccccc} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \end{array} \\
\begin{pmatrix}
1 & 0 & 0 & 0.3 & 0.5 & 0.2 & 0.4 & 1 \\
0 & 0.7 & 0 & 0.6 & 1 & 0 & 0.4 & 0.3 \\
0 & 0.5 & 0 & 0 & 1 & 0 & 1 & 0.5 \\
1 & 1 & 1 & 0.5 & 0 & 0 & 1 & 0.4 \\
0.8 & 0 & 0.9 & 0 & 1 & 0.7 & 1 & 0.2
\end{pmatrix}
\end{array}
$$

Determine :

(a) Marginal possibilities.

(b) Joint and marginal basic assignments.

20. Let m_x and m_y be marginal basic assignments on set x and y, respectively, and let m be a joint basic assignment on $x \times y$ such that $m(A \times B) = m_x(A) \,.\, m_y(B)$ for all $A \in \mathcal{P}(x)$ and $B \in \mathcal{P}(y)$. Prove that $E(m) = E(m_x) + E(m_y)$.

F–2926

Sub. Code
7MMA3E5

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Mathematics

Elective – STOCHASTIC PROCESSES

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Classify into the four types of processes.

2. Define Bernoulli process.

3. Define stochastic graph.

4. Write down the Chapman – Kolmogorov equation.

5. Define non-null persistent.

6. Explain finite Markov Chain.

7. Explain Homogeneity in time.

8. Write down the additive property of poisson process.

9. Define renewal period.

10. Define mean recurrence time.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) When a stochastic process is sub-martingale and super martingale.

Or

(b) Explain the properties of stationary process.

12. (a) Explain random walk between two barriers.

Or

(b) Explain a simple queueing model.

13. (a) Classify Markov Chain with examples.

Or

(b) Explain first passage time distributions.

14. (a) Prove that decomposition of a Poisson process.

Or

(b) Derive the relative between Poisson process and binominal distribution.

15. (a) Explain Renewal process in discrete time.

Or

(b) Explain Renewal Interval.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Consider the process $x(t) = A \cos wt + B \sin wt$. Where A, B are uncorrelated $r.v$'s each with mean 0 and variance 1 and w is a positive constant. Prove that the process is covariance stationary.

17. Discuss correlated random walk.

18. State and prove first entrance theorem.

19. Derive the relation between Poisson process and geometric distribution.

20. Prove the following theorem:

    The renewal function M satisfies the equation $M(t) = F(t) + \int_0^t M(t-x)dF(x)$.

F–2927

Sub. Code
7MMA3E6

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Third Semester

Mathematics

Elective – COMBINATORIAL MATHEMATICS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Define an ordinary enumerator.

2. Define a partition of an integer.

3. Give an example for a linear difference equation with constant coefficients.

4. Write down the recurrence relation for the fiboracci sequence of numbers.

5. Define a rook polynomial.

6. In a group of ten girls, six have blond hair, five have blue eyes, and three have blond hair and blue eyes. How many girls are there in the group who have neither blond nor blue eyes?

7. When we say that a binary relation on a set is an equivalence relation?

8. Define a store enumerators in R with an example.

9. Define a complete block design of a set of objects.

10. Give an example for "the blocks are not necessarily distinct subset".

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) Given two each of P kinds of objects and one each of q additional kinds of objects, in how many ways can r objects be selected?

Or

(b) Find the number of r-digit quaternary sequences in which each of the digits 1, 2 and 3 appears at least once.

12. (a) Let there be n ovals drawn on the plane. If an oval intersects each of the other ovals at exactly two points and no three ovals meet at the same point, into how many regions do these ovals divide the plane?

Or

(b) Among the 4^n-n-digit quaternary sequences, how many of them have an even number of o's?

13. (a) Find the number of integers between 1 and 250 that are not divisible by any of the integers 2, 3, 5 and 7.

Or

(b) In how many ways can the integers 1, 2, 3, 4, 5, 6, 7, 8 and 9 be permuted such that no odd integer will be in its natural position?

14. (a) Prove that the binary relation on a set induced by a permutation group of the set is an equivalence relation.

Or

(b) Find the distinct ways of painting the eight vertices of a cube with two colors x and y.

15. (a) Prove that there are atmost $n-1$ Latin squares in a set of orthogonal Latin squares of order n.

Or

(b) In a balanced incomplete block design, prove that $bk=vr$ and $r(k-1)=\lambda(v-1)$.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Evaluate the sum $1^2+2^2+3^2+....+r^2$.

17. Find the number of n-digit binary sequences that have the pattern 010 occurring at the n^{th} digit.

18. Derive the principle of inclusion and exclusion identify.

19. State and prove Polya's fundamental theorem.

20. In a (b,v,r,k,λ) - configuration, prove that $b \geq v$.

F–2928

Sub. Code
7MMA4C1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Fourth Semester

Mathematics

FUNCTIONAL ANALYSIS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Give an example for a discontinuous linear map.
2. Define normed space with an example.
3. Write a note on Banach limit.
4. State Hahn-Banach separation theorem.
5. State uniform boundedness principle.
6. Let X be a metric space and Y be a metric space. If $F : X \to Y$ is closed and $R(F) \subset Z \subset Y$, then prove that $F : X \to Z$ is closed.
7. Let X, Y and Z be normed spaces. If $F_1, F_2 \in BL(X, Y)$ and $k \in K$, then prove that $(F_1 + F_2)' = F_1' + F_2'$.
8. Define the term normed dual.
9. State and prove polarization identity.
10. Define orthonormal basis.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) State and prove Jensen's inequality.

Or

(b) Let X and Y be normed spaces and $F : X \to Y$ be a linear map such that the range $R(F)$ of F is finite dimensional. Prove that F is continuous if and only if the zero space $Z(F)$ of F is closed in X.

12. (a) Prove that a normed space X is a Banach space if, and only if every absolutely summable series of elements in X is summable in X.

Or

(b) Let X be a normed space over K, $f \in X'$ and $f \neq 0$. Let $a \in X$ with $f(a) = 1$ and $r > 0$. Then prove that $U(a, r) \cap Z(f) = \phi$ if and only if $\|f\| \leq \frac{1}{r}$.

13. (a) State and prove closed graph therom.

Or

(b) State and prove Resonance theorem.

14. (a) Let X and Y be normed spaces and $F \in BL(X, Y)$. Prove that

$$R(F) \subset \{y \in Y : y'(y) = 0 \text{ for all } y' \in Z(F')\}$$

where equality holds if and only if $R(F)$ is closed in Y.

Or

(b) Let X be a Banach space and $A \in BL(X)$. Prove that $\sigma_e(\Delta) \cup \sigma_a(\Delta') = \sigma(\Delta)$.

15. (a) State and prove Schwarz inequality.

Or

(b) Let X be an inner product space and $f \in X'$. Let $\{u_1, u_2, \cdots\}$ be an orthonormal set in X. Prove that $\sum_n |f(u_n)|^2 \le \|f\|^2$.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Let X be a normed spaced. Prove that the following conditions are equivalent.

(a) Every closed and bounded subset of X is compact.

(b) The subset $\{x \in X : \|x\| \le 1\}$ of X is compact.

(c) X is finite dimensional.

17. State and prove Hahn-Banach extension theorem.

18. Let X and Y be Banach spaces and $F : X \to Y$ be a linear map which is closed and surjective. Prove that F is continuous and open.

19. Let X and Y be Banach spaces, and $F \in BL(X, Y)$. Prove that $R(F) = Y$ if and only if F' is bounded below.

20. Let $\{x_1, x_2, \cdots\}$ be a linearly independent subset of an inner product space X. Define $y_1 = x_1$, $u_1 = \dfrac{y_1}{\|y_1\|}$ and for $n = 2, 3, \cdots$

$$y_n = x_n - \langle x_n, u_1 \rangle u_1 - \cdots - \langle x_n, u_{n-1} \rangle u_{n-1}, \; u_n = \frac{y_n}{\|y_n\|}.$$

Prove that $\{u_1, u_2, \cdots\}$ is an orthonormal set in X and for $n = 1, 2, \cdots$ Span $\{u_1, \cdots u_n\}$ = span $\{x_1, \cdots, x_n\}$.

F–2929

Sub. Code
7MMA4C2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Fourth Semester

Mathematics

OPERATIONS RESEARCH

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Define a network. Give an example.

2. What is meant by Pessimistic time estimate?

3. Define the reorder point. Give an example.

4. Write down the general assumptions of the no-setup model.

5. Identify the customer and the server for the following situations:

   (a) Taxi stand serving waiting passengers.

   (b) Letters processed in a post office.

6. Define a Poisson distribution. Also write the mean of Poisson distribution.

7. Draw the transition rate diagram.

8. Write the formula for finding λ_{eff} in machine servicing model $(M/M/R):(CD/K/K)$, RCK.

9. Define the steepest ascent method.

10. Write a short notes on separable convex programming.

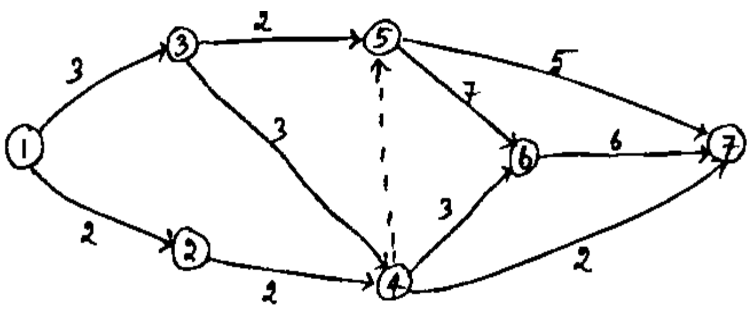
Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Enumerate the minimal spanning tree algorithm.

Or

(b) Determine the critical path for the following project network.



12. (a) A company stocks an item that is consumed at the rate of 50 units per day. It costs the company \$20 each time an order is placed. An inventory unit held in stock for a week will cost \$0.35.

    (i) Determine the optimum inventory policy, assuming a lead time of 1 week.

    (ii) Determine the optimum number of orders per year (based on 365 days per year).

Or

(b) Narrate the no-setup model.

13. (a) Describe the basic elements of a queuing model.

Or

(b) Prove that the distribution of the time between departures corresponding to the truncated Poisson in the pure death model is an exponential distribution with mean $\frac{1}{\mu}$ time units.

14. (a) Derive L_s, W_s, W_q, L_q for $(M/M/1) : (GD/\infty/\infty)$ queuing model.

Or

(b) Tooko operates a machine shop with a total of 22 machines. Each machine is known to break down once every 2 hours on the average. It takes an average of 12 minutes to complete a repair. Both the time between breakdowns and the repair time follow the exponential distribution. Determine the number of repair persons needed to keep the shop running "smoothly".

15. (a) Solve the following problem using Golden section method.

$$\text{Maximize } f(x) = \begin{cases} 3x, & 0 \le x \le 2 \\ \frac{1}{3}(-x+20), & 2 \le x \le 3 \end{cases}.$$

Given the maximum value of $f(x)$ occurs at $x = 2$ and $\Delta = 0.1$.

Or

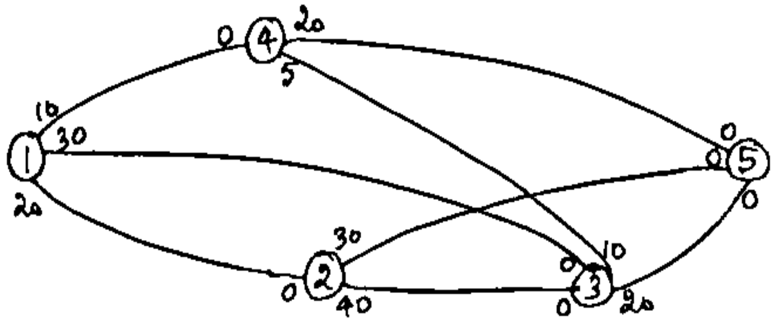
(b) Show that in general, the Newton–Raphson method when applied to a strictly concave quadratic function will converge in exactly one step. Apply the method to the maximization of

$$f(x) = 4x_1 + 6x \; - 2x_1^2 - 2x_1x_2 - 2x_2^2.$$

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Determine the maximum flow in the following network :



17. Lubecar specializes in fast automobile oil change. The garage buys can oil in bulk at \$3 per gallon. A discount price of \$2.50 per gallon is available if Lubecar purchases more than 1000 gallons. The garage services approximately 15 cars per day, and each oil change takes 1.25 gallons. Lubecar stores bulk oil at the cost of \$0.02 per gallon per day. Also, the cost of placing an order for bulk oil is \$20. There is a 2-day lead time for delivery. Determine the optimal inventory policy.

18. In a bank operation, the arrival rate is 2 customers per minute. Determine the following :

    (a) The average number of arrivals during 5 minutes.

    (b) The probability that no arrivals will occur during the next 0.5 minute.

    (c) The probability that at least one arrival will occur during the next 0.5 minute.

    (d) The probability that the time between two successive arrivals is atleast 3 minutes.

19. B & K Groceries operates with three check-out counters. The manager uses the following schedule to determine the number of counters in operation, depending on the number of customers in store.

No. of customers in store	No. of counters in operation
1 to 3	1
4 to 6	2
More than 6	3

Customers arrive in the counters area according to a Poisson distribution with a mean rate of 10 customers per hour. The average check out time per customer is exponential with mean 12 minutes. Determine the steady state probability p_n of n customers in the check-out area.

20. Solve the following non-linear programming problem using restricted basis method of separable programming.

Maximize $Z = x_1 + x_2^4$.

subject to :

$3x_1 + 2x_2^2 \leq 9$

and $x_1, x_2 \geq 0$.

WSS

F–2930

Sub. Code
7MMA4C3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Fourth Semester

Mathematics

TOPOLOGY — II

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Is the space $\mathbb{R}^n$ locally compact? Justify.

2. State the countable intersection property.

3. What is meant by completely regular space?

4. When will you say that two compactification is said to be equivalent?

5. Prove that the collection $\mathcal{A} = \{(n, n+2) / n \in z\}$ is locally finite.

6. What is meant by locally discrete?

7. When will you say that the metric space is said to be totally bounded?

8. Define an equicontinuous.

9. What is meant by the compact open topology?

10. Define a Baire space. Give an example.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Let x be locally compact Hausdorff space and let A be a subspace of X. If A is closed in X or open in X, then prove that A is locally compact.

Or

(b) Let X be a space. Let $\mathcal{D}$ be a collection of subsets of X that is maximal with respect to the finite intersection property. Let $D \in \mathcal{D}$. If $A \supset \mathcal{D}$ then prove that $A \in \mathcal{D}$.

12. (a) Show that a product of completely regular spaces is completely regular.

Or

(b) Let X be completely regular. Prove that X is connected if and only if $\beta(x)$ is connected.

13. (a) Show that if X has a countable basis, a collection $\mathcal{A}$ of subsets of X is countably locally finite if and only if it is countable.

Or

(b) Let X be normal and let A be a closed G_S set in X. Prove that there is a continuous function $f : x \to [0,1]$ such that $f(x) = 0$ for $x \in A$ and $f(x) > 0$ for $x \notin A$.

14. (a) If the space y is complete in the metric d, then prove that the space y^J is complete in the uniform metric $\overline{\rho}$ corresponding to d.

Or

(b) Let x be a compactly generated space and let (y, d) be a metric space. Prove that $\mathcal{C}(x, y)$ is closed in y^x in the topology of compact convergence.

15. (a) Let x be locally compact Hausdorff space and let $\mathcal{C}(x, y)$ have the compact open topology. Prove that the map $e : x \times \mathcal{C}(x, y) \to y$ defined by the equation $e(x, f) = f(x)$ is continuous.

Or

(b) State and prove Baire Category theorem.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Prove that an arbitrary product of compact spaces is compact in the product topology.

17. Let x be a completely regular space. If y_1 and y_2 are two compactifications of x satisfying the extension property. Prove that y_1 and y_2 are equivalent.

18. Prove that a space x is metrizable if and only if x is regular and has a basis that is countably locally finite.

19. Let $I = [0,1]$. Prove that there exists a continuous map $f : I \to I^2$ whose image fills up the entire square I^2.

20. State and prove the Ascoli's theorem.

Ws9

F–2931

Sub. Code
7MMA4E1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Fourth Semester

Mathematics

***Elective* – ADVANCED STATISTICS**

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Define critical region and power function of a test.

2. Let a random sample of size 17 from the normal distribution $n(\mu, \sigma^2)$ yield $\overline{x} = 4.7$ and $s^2 = 5.76$. Determine a 90% confidence interval for μ.

3. State the properties of sufficient statistic.

4. Explain complex sufficient statistic.

5. What is the importance of Cramer-Rao inequality?

6. Let $\overline{X}$ be the mean of a random sample of size n from a distribution which $n(\theta, \sigma^2)$, $-\infty < \theta < \infty$, $\sigma^2 > 0$. Prove that for every $\sigma^2 > 0$, X is an efficient statistic for θ.

7. What is the importance of Likelihood ratio test?

8. Define uniformly most powerful test.

9. Show that the square of a non-central T random variable is a non-central F random variable.

10. Explain the relationship between likelihood ratio and correlation coefficient.

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) A random sample of size 17 from the normal distribution $n(\mu, \sigma^2)$ yield $\overline{x} = 4.7$ and $s^2 = 5.76$. Determine 95% confidence interval for μ.

Or

(b) If 8.6, 7.9, 8.3, 6.4, 8.4, 9.8, 7.2, 7.8, 7.5 are the observed values of a random sample of size 9 from a distribution that is $n(8, \sigma^2)$. Construct a 90% confidence interval for σ^2.

12. (a) Prove that n^{th} order statistic of a random sample of size n from a uniform distribution with p.d.f.

$$f(x;\theta) = \begin{cases} \frac{1}{\theta}, & 0 < x < \theta, \ 0 < \theta < \infty \\ 0, & \text{elsewhere} \end{cases}$$ is a sufficient statistic for θ.

Or

(b) Prove that $\left[Y^{n+1} - (Y-1)^{n+1}\right] / \left[Y^n - (Y-1)^n\right]$ is a unique unbiased minimum variance estimator of θ.

13. (a) Let $X_1, X_2, \ldots X_n$ denote a random sample from the distribution which $b(1, \theta)$, $0 < \theta < 1$. Find the decision function W which is a Baye's solution.

Or

(b) The p.d.f. of Cauchy distribution is

$$f(x;\theta)=\frac{1}{\pi\left[1+(x-\theta)^2\right]}, -\infty<x<\infty, \ -\infty<\theta<\infty$$

Show that the Cramer-Rao lower bound is $\frac{2}{n}$, where n is the sample size.

14. (a) Show that the likelihood ratio test leads to Neyman-Pearson theorem for testing $H_0:\theta=\theta_0$ against $H_1:\theta=\theta_1$, where θ and θ_1 are fixed numbers.

Or

(b) Let $X_1, X_2 \dots X_{25}$ be a random sample of size 25 from a normal distribution $n(\theta, 100)$. Find a uniformly most powerful critical region of size $\alpha=0.10$ for testing $H_0:\theta=75$ against $H_1:\theta>75$.

15. (a) Discuss the role of the distributions of certain quadratic forms in the technique of analysis of variance.

Or

(b) State and prove Boole's inequality.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain the procedures for the construction of confidence intervals for

(a) Mean and

(b) Difference of means.

17. State and prove the Fisher-Neyman theorem for the existence of a sufficient statistic for a parameter.

18. State and establish the Cramer-Rao inequality.

19. Develop the procedure of sequential probability ratio test for testing $H_0 : \theta = \theta_0$ against $H_1 : \theta = \theta_1$ for a distribution with p.d.f. $f(x, \theta)$.

20. Describe the analysis of variance for two-way classification.

F–2932

Sub. Code
7MMA4E3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

Fourth Semester

MATHEMATICS

Elective : NUMERICAL METHODS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A ($10 \times 2 = 20$)

Answer **all** questions.

1. Define order and convergence.

2. Prove that the Regula-Falsi method has linear rate of convergence.

3. No eigenvalue of a matric A exceeds the norm of a matrix, then prove that $\|A\| \geq \rho(A)$.

4. Define similarity transformation.

5. What is Knots?

6. What is Spline?

7. What is meant by error of approximation?

8. Write the truncation error in Trapezoidal method.

9. Define unstable.

10. Define absolutely stable.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Find the number of real and complex roots of the polynomial $P_4(x)=x^4-4x^3+3x^2+4x-4$ using sturm sequence.

Or

(b) Use synthetic division and perform two iterations of the Birge-Vieta method to find the smallest positive root of the polynomial $P_3(x)=2x^3-5x+1=0$. Use the initial approximation $P_0=0.5$. Also obtain the deflated polynomial.

12. (a) Determine the Euclidean and the maximum absolute row sum norms of the matrix

$$A=\begin{bmatrix} 1 & 7 & -4 \\ 4 & -4 & 9 \\ 12 & -1 & 3 \end{bmatrix}.$$

Or

(b) Find the inverse of the matrix $A=\begin{bmatrix} 1 & 1 \\ 1 & 2 \end{bmatrix}$ using the interative method, given that its approximate inverse is $B=\begin{bmatrix} 1.8 & -0.9 \\ -0.9 & 0.9 \end{bmatrix}$. Perform two iterations.

13. (a) The following data for a function $f(x,y)$ is given:

y/x	0	1
0	1	1.414214
1	1.732051	2

Find $f(0.25, 0.75)$, using linear interpolation.

Or

(b) Derive the least Squares straight line and quadratic fits for the discrete data (x_i, f_i), $i=0,1,\ldots N$.

14. (a) The following data for the function $f(x)=x^4$ is given.

x	0.4	0.6	0.8
$f(x)$	0.0256	0.1296	0.4096

Find $f^{11}(0.8)$ using quadratic interpolation. Compare with the exact solution. Obtain the bound on the trunction errors.

Or

(b) Evaluate the integral $I=\int_0^1 \frac{dx}{1+x}$ using Gauss-Legendre three point formula.

15. (a) Compute an approximation to $u(1), u'(1)$ and $u''(1)$ with the Taylor series method of second order and step length $h=1$, for the initial value problem $u'''+2u''+u'-u=\cos t,\ 0\le t\le 1$.

$u(0)=0, u'(0)=1, u''(0)=2$ after reducing it to a system of first order equations.

Or

(b) Given the initial value problem $u'=t^2+u^2$, $u(0)=0$. Determine the first three non-zero terms in the Taylor series for $u(t)$ and hence obtain the value for $u(1)$.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Find all the roots of the polynomial $x^4-x^3+3x^2+x-4=0$ using the Graeffe's root squaring method.

17. Find all the eigen values of the matrix $A=\begin{bmatrix} 1 & 2 & -1 \\ 2 & 1 & 2 \\ -1 & 2 & 1 \end{bmatrix}$ using the Jacobi method. Iterate till the off-diagonal elements, in magnitude, are less than 0.0005.

18. Obtain the Piecewise quadratic interpolating polynomials for the function $f(x)$ defined by the data.

x	-3	-2	-1	1	3	6	7
$f(x)$	369	222	171	165	207	990	1779

Hence, find an approximate value of $f(-2.5)$ *and* $f(6.5)$.

19. Assume that $f(x)$ has a minimum in the interval $x_{n-1} \le x \le x_{n+1}$ where $x_k = x_0 + kh$. Show that the interpolation of $f(x)$ by a polynomial of second degree yields the approximation

$$f_n - \frac{1}{8}\left[\frac{(f_{n+1} - f_{n-1})^2}{f_{n+1} - 2f_n + f_{n-1}}\right] \quad (f_k = f(x_k)).$$

20. Solve the intial value problem $u' = -2tu^2, u(0) = 1$, with $h = 0.2$ on the interval $[0, 0.4]$. Use the second order Runge-Kutta method.

———————