S–2550	Sub. Code
	22MCE1C1

M.Sc. DEGREE EXAMINATION, APRIL 2024

First Semester

Computer Science

OPTIMIZATION TECHNIQUES

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

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

Answer **all** questions.

1. What are the methods used to solve an LPP with artificial variables?

2. Define slack and surplus variables.

3. What is meant by degeneracy in Transportation problem?

4. State the methods available to obtain an initial basic feasible solution of a transportation problem.

5. What is two-person zero-sum game?

6. Define saddle point.

7. Define lead time and Reorder Level.

8. What is the formula for EOQ and TC (Total Annual Cost)?

9. What is Dangling in Network Diagram?

10. What is Fulkerson's Rule?

Part B (5 × 5 = 25)

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

11. (a) Find the minimum value of

$z = -3x_1 + 4x_2$

Subject to : $x_1 + x_2 \leq 4$

$2x_1 + 3x_2 \geq 18$

$x_1, x_2 \geq 0$

Or

(b) Use Simplex method to solve the following LPP.

Maximize : $Z = 20x_1 + 30x_2$

Subject to : $3x_1 + 3x_2 \leq 36$

$5x_1 + 2x_2 \leq 50$

$2x_1 + 6x_2 \leq 60$

$x_1, x_2 \geq 0$

12. (a) Determine an initial basic feasible solution for the following transportation problem using Least Cost Method.

	D_1	D_2	D_3	D_4	Supply
S_1	20	25	28	31	200
S_2	32	28	32	41	180
S_3	18	35	24	32	110
Demand	150	40	180	170	

Or

(b) Determine an initial basic feasible solution for the transportation problem using Vogel's Approximation method

	B_1	B_2	B_3	B_4	Supply
A_1	2	3	11	7	6
A_2	11	0	6	1	1
A_3	5	8	15	9	10
Demand	7	5	3	2	

13. (a) Solve the following 2-person zero sum game.

		Player B		
		B_1	B_2	B_3
Player A	A_1	8	4	1
	A_2	10	6	2
	A_3	12	8	3
	A_4	4	4	4

Or

(b) Solve the following game using dominance principle:

		Firm B			
		B_1	B_2	B_3	B_4
Firm A	A_1	35	65	25	5
	A_2	30	20	15	0
	A_3	40	50	0	10
	A_4	55	60	10	15

14. (a) Given the annual consumption of material is 3600 units, ordering costs are Rs.400 per order. Cost per unit of material is Rs.64 and storage cost or annual carrying cost is 50% of inventory value. Find the Economic Order Quantity in (i) units (ii) rupees.

Or

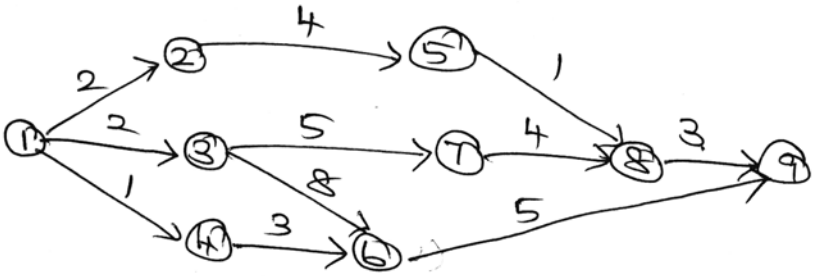
(b) A stockiest purchases on item at the rate of Rs.40 per piece from a manufacturer. 2000 units of the item are required per year. What should be the order quantity per order if the cost per order is Rs.15 and the inventory charges per year is 20 paise?

15. (a) Draw the network diagram for the following activities :

Activity :	A	B	C	D	E	F	G
Predecessor Activity :	None	None	B	B	B	E	A, C, D

Or

(b) A project has the following time schedule:



Find the critical path and its duration.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Two-Phase Simplex Method to

Minimize : $= 4x_1 + x_2$

Subject to : $3x_1 + x_2 = 3$

$4x_1 + 3x_2 \geq 6$

$x_1 + 2x_2 \leq 3$,

$x_1, x_2 \geq 0$.

17. Solve the following assignment problem using Hungarian method.

		Operator				
		O_1	O_2	O_3	O_4	O_5
Job	J_1	20	22	35	22	18
	J_2	4	26	24	24	7
	J_3	23	14	17	19	19
	J_4	17	15	16	18	15
	J_5	16	19	21	19	25

18. Solve the following two-person zero-sum game.

	B_1	B_2	B_3	B_4	B_5
A_1	8	12	14	10	11
A_2	9	11	15	10	13
A_3	7	8	6	11	12
A_4	10	9	7	9	9
A_5	12	13	10	12	10

19. A manufacturer uses Rs.10,00,000 worth of an item during the year. He has estimated the ordering cost as Rs.2,500 per order and carrying cost as 12.5% of average inventory value. Find the optimal order size, number of orders per year, time period per order and total cost.

20. The following optimistic (O) and pessimistic (P) and most likely (M) time estimates for each task have been given for a project.

Task	Predecessors	Activity time (days)		
		O	M	P
A	–	10	12	15
B	–	6	10	16
C	A, B	3	5	10
D	C	8	12	17
E	C	4	7	12
F	C	3	4	6
G	D, E	5	8	13
H	F, G	5	7	10

(a) Construct the network diagram for this project and compute its expected completion time assuming all tasks their expected completion times.

(b) Compute the probability that the project will take more than 50 days to complete.

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S–2551	Sub. Code
	22MCE1C2

M.Sc. DEGREE EXAMINATION, APRIL 2024.

First Semester

Computer Science

DESIGN AND ANALYSIS OF ALGORITHMS

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. What is a program?

2. Define time complexity.

3. What are the features of dynamic programming?

4. What is 0/1 knapsack problem?

5. What is general backtracking method?

6. What is a graph coloring problem?

7. What is sum of subset?

8. Expand FIFO and LIFO.

9. Sate Directcd Hamilton Cycle.

10. What is problem detection?

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

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

11. (a) Explain about the characteristics of an algorithm.

Or

(b) Explain about pseudo code for expressing algorithms.

12. (a) Find an optimal solution to the knapsack instance $n = 7$ objects and the capacity of knapsack $m = 15, (p1, p2, p3 \ldots p7) = (10, 5, 7, 6, 18, 3)$ and $(w1, w2, w3 \ldots w7)\ (2, 3, 5, 7, 1, 4, 1)$.

Or

(b) Explain how solution will be provided for all pairs shortest path problem using dynamic programming.

13. (a) Explain biconnected components and DFS.

Or

(b) Write a recursive algorithm to find all the Hamiltonian cycles of a given graph.

14. (a) Explain 0/1 knapsack problem in Branch and Bound technique.

Or

(b) Explain FIFO Branch and Bound solution.

15. (a) Difference between NP-hard and NP-complete problems.

Or

(b) Write short notes on 'AND/OR graphs'.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. How the performance of an algorithm is analyzed? Explain with an example.

17. Explain multistage graph backward method with algorithm.

18. How 8-Queen's problem can be solved using back tracking? Explain with an example.

19. Explain modular arithmetic with an algorithm.

20. Discuss in detail about the class P, NP, NP-hard and NP-complete problems. Give examples for each class.

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S–2552	Sub. Code
	22MCE1C3

M.Sc. DEGREE EXAMINATION, APRIL 2024

First Semester

Computer Science

ADVANCED JAVA PROGRAMMING

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

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

Answer **all** the questions.

1. Write the types of J2EE container.
2. What is JDBC API?
3. What is a Servlet?
4. How to include other resources in the response?
5. Which attribute is used to specie the encoding of the response?
6. Define custom tag.
7. What is an Enterprise Bean?
8. List out the characteristics of Message-driven beans.
9. What is Hibernation?
10. Define POJO.

Part B (5 × 5 = 25)

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

11. (a) Write about the details of J2EE components.

Or

(b) Discuss about the supported Web services of J2EE.

12. (a) Explain the service methods of Servlet.

Or

(b) How do you manage and implement the sessions?

13. (a) Elucidate the process of creating dynamic content in a JSP page.

Or

(b) Describe the use of function in JSP? Explain it.

14. (a) Explain the details of the session bean.

Or

(b) Discuss about the life cycles of enterprise beans.

15. (a) Write a note on Hibernate Configurations.

Or

(b) How do you create a database table by using hibernate annotations?

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Discuss in detail about the J2EE APIs.

17. Explain in detail about Filtering Requests and Responses.

18. Describe the details of JavaBeans Components.

19. How does the client access the enterprise bean? Explain.

20. How do you create POJO? Explain with example.

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S–2553	Sub. Code
	22MCE2E2

M.Sc. DEGREE EXAMINATION, APRIL 2024

Second Semester

Computer Science

Elective — WAP AND XML

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define XSL.
2. Give examples of WTA 1.2.
3. Definition of Text Formatting.
4. List out the Functions of WAP Gateway.
5. What is meant by Variables?
6. Write about data type Conversions.
7. List out XML Applications.
8. What are Related Technologies?
9. List out the XML Unicode.
10. Define Fonts and Glyphs.

Part B (5 × 5 = 25)

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

11. (a) Write short notes on WAP Resources.

Or

(b) Write short notes on WAP Application architecture.

12. (a) Illustrate the Positions of the Gateway in the Network.

Or

(b) Explain basic WML cards.

13. (a) Write about the Input and Parameter Passing.

Or

(b) Explain Control Constructs Functions.

14. (a) List out the Eagle View of XML.

Or

(b) Explain how you create Style Sheet for document display.

15. (a) Determine Attributes Versus Elements.

Or

(b) Explain about XSL with an example.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Describe the WAP Internal Structure.

17. Discuss Extensible Markup Language with an example.

18. Briefly Explain WML and WML Scripts.

19. Explain the List of an XML Structuring of Data.

20. Explain the Legacy Character sets with Unicode Character Sets.

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S–2554	Sub. Code
	22MCE2N1

M.Sc. DEGREE EXAMINATION, APRIL 2024.

Second Semester

Computer Science

NME – HUMAN COMPUTER INTERFACE

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

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

Answer **all** questions.

1. List out the three types of reasoning.

2. What is Chord keyboard?

3. What is localization of software?

4. Define Design Rationale.

5. What is Ethnography?

6. What is distributed Cognition?

7. What is Mobile platform?

8. Define Web widget.

9. Who are the actors in drag and drop?

10. Define Magic principle.

Part B (5 × 5 = 25)

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

11. (a) Write short notes on Long-term memory.

Or

(b) Explain Agent based interfaces in detail.

12. (a) Write short notes on Iteration and Prototyping.

Or

(b) Write short notes on Cognitive walkthrough.

13. (a) Explain the eight stages of Open-System Task Analysis (OSTA).

Or

(b) Write short notes on Grounding constraints.

14. (a) Explain any two application framework in detail.

Or

(b) Write short note on Mobile 2.0.

15. (a) Compare Paging and Scrolling.

Or

(b) Give a brief description about Input Overlay.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain in detail about Interactivity.

17. Explain the activities of software life cycle with a neat sketch.

18. Describe about Soft System Methodology in detail.

19. Explain in detail about Mobile Information Architecture.

20. Explain any two Contextual tools in detail.

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S–2555	Sub. Code
	22MCE3C1

M.Sc. DEGREE EXAMINATION, APRIL 2024

Third Semester

Computer Science

DISTRIBUTED OPERATING SYSTEM

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define distributed operating system.

2. What is fault tolerance?

3. What are the two types are of inter process communication?

4. List out the types of group communication.

5. What is RPC?

6. What is meant by call buffering approach?

7. Expand NRMB and MMU.

8. What is PCB?

9. What is cache location?

10. What are two types of replication process?

Part B (5 × 5 = 25)

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

11. (a) Write a note on distributed computing system.

Or

(b) Explain distributed computing environment.

12. (a) Discuss about buffering.

Or

(b) Write a note on 'Process Addressing'.

13. (a) Explain about the parameter-passing semantics used in RPC.

Or

(b) Discuss about security issues involved in RPC.

14. (a) Explain about the structure of shared memory.

Or

(b) Write a note on 'Thrashing'.

15. (a) Explain about the file models used in distributed file system.

Or

(b) Discuss about the advantages of Replication.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Discuss about the issues in distributed operating system in detail.

17. How the failure is handled in distributed system? Explain with example.

18. Elucidate about the communication protocols used in RPC.

19. Discuss about deadlock in detail.

20. Explain about the concurrency control of atomic transactions.

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S–2556	Sub. Code
	22MCE3C3

M.Sc. DEGREE EXAMINATION, APRIL 2024

Third Semester

Computer Science

DATA ANALYTICS

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

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

Answer **all** questions.

1. What is data science?
2. What are the assignment operators in R? Write suitable example.
3. What is the use of boxplot?
4. What are four components of layered visualization?
5. What are the two steps in the regression techniques process?
6. What are the approaches for nonparametric regression?
7. What are the different activation functions utilized in SVM?
8. Specify the distance metrics applied to NN classifiers.
9. Write the purpose of tm package.
10. What is the use of show() function?

Part B (5 × 5 = 25)

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

11. (a) Discuss the data types in R with suitable example.

Or

(b) Write a R program to compute the same sum of squares from 1 to 100 using a for loop, repeat loop and while loop.

12. (a) Describe plot function using a relevant example.

Or

(b) How to perform grouping and splitting data by a variable?

13. (a) Explain simple linear regression and how to perform it using R?

Or

(b) Describe kernel regression and write a suitable code to implement in R.

14. (a) Discuss about Naïve Bayes and write a suitable code to implement in R.

Or

(b) Explain method of creating a decision tree with suitable example.

15. (a) How to create term document matrix and state the purpose of it?

Or

(b) Explain the method of text classification.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Write an R program to make a simple calculator that can add, subtract, multiply and divide using switch cases and functions.

17. Discuss about the method of creating different types of graph using ggplot2 package.

18. Discuss about multivariate linear regression with example.

19. Explain Logistic regression with example.

20. Give a brief note on common text preprocessing tasks.

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S–2557	Sub. Code
	22MCE3E2

M.Sc. DEGREE EXAMINATION, APRIL 2024

Third Semester

Computer Science

Elective – MULTIMEDIA TECHNOLOGIES

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

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

Answer **all** questions.

1. Define multimedia and outlines its applications.

2. List the tools used for painting and drawing in multimedia.

3. What is sound and how sound is digitized?

4. Name the different image file formats.

5. What are the types of multimedia servers?

6. Write the principles of animation.

7. What are the different video formats in multimedia?

8. Difference between lossy and lossless compression

9. What is media communication?

10. What is the principle of Huffman coding?

Part B (5 × 5 = 25)

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

11. (a) Discuss the properties of multimedia system.

Or

(b) Write short notes on CDROM and multimedia highway.

12. (a) Difference between digital Audio and MIDI.

Or

(b) What is image editing? Discuss the image editing tools in multimedia.

13. (a) How integrated document management work in multimedia environment? Discuss.

Or

(b) Describe the different methods of controlling animation.

14. (a) Describe the workflow of video editing.

Or

(b) Write short notes on World Wide Web and HTML.

15. (a) Write short notes on Virtual Reality.

Or

(b) Discuss the benefits of Adaptive Huffman Coding.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. What is multimedia authoring? Explain the types of authoring tools.

17. Why MIDI devices are required in multimedia system? Explain different components of MIDI.

18. Explain integrated multimedia message standards in detail.

19. Explain in detail about the different types of optical storage media.

20. Discuss about the Huffman coding in detail.

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S–2558	Sub. Code
	22MCE3N1

M.Sc. DEGREE EXAMINATION, APRIL 2024

Third Semester

Computer Science

NME — R PROGRAMMING

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. List the features of R.
2. What are the four interfaces in R studio?
3. Write the use of ls() in R.
4. Write the use of break and next statement.
5. List some built in functions in R.
6. What is the purpose of rep() in R?
7. Write the use and syntax of rbind() and cbind() in R.
8. List some directory functions in R.
9. Write the syntax for mean() with trim option.
10. What is density plot in R?

Part B (5 × 5 = 25)

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

11. (a) Write a note on help(), library() functions in R.

Or

(b) Explain how to do cleaning process in R with example.

12. (a) Discuss about operators with example.

Or

(b) Write an R program to make a simple calculator that can add, subtract, multiply and divide using switch cases.

13. (a) How to create user defined function? Explain with example?

Or

(b) Discuss about operations on list.

14. (a) Describe data manipulation on data frames. Give suitable example.

Or

(b) Create a list and data frame that stores the marks of any three subjects for 10 students. Find out the total marks, average, maximum marks and minimum marks of every subject.

15. (a) Write a program to illustrate standard deviation and correlation function in R.

Or

(b) Write a program to illustrate pie chart with title, legend, color and labels.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Explain input and output function is R with example.

17. Discuss the Data types with relevant example.

18. Give a brief note on vector manipulation.

19. Design a data frame in R for storing about 20 employee details. Create a CSV file named "input.csv" that defines all the required information about the employee such as id, name, salary, start_date, dept. Import into R and do the following analysis.

    (a) Find the total number rows & columns

    (b) Find the maximum salary

    (c) Retrieve the details of the employee with maximum salary

    (d) Retrieve all the employees working in the IT Department.

    (e) Retrieve the employees in the IT Department whose salary is greater than 20,000 and write these details into another file "output.csv".

20. Explain bar chart. Write a suitable program to illustrate with title, legend, color and labels.

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S–2559	Sub. Code
	22MCE4C1

M.Sc. DEGREE EXAMINATION, APRIL 2024

Fourth Semester

Computer Science

ARTIFICIAL INTELLIGENCE

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define an Agent.
2. What is the application of BFS.
3. Define Backtracking Search.
4. Define Depth limited search.
5. Define Diagnostic rule.
6. What is Predicate in PROLOG?
7. Define conditional Planning.
8. Why does Uncertainty arise?
9. What is the purpose of Learning?
10. Define Expert system.

Part B (5 × 5 = 25)

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

11. (a) Describe problem formulation in detail.

Or

(b) Give a detail description about Uniform cost search.

12. (a) Explain Simulated Annealing algorithm in detail.

Or

(b) Give a brief description about Min-Max search.

13. (a) Differentiate between Propositional and first order predicate logic.

Or

(b) Explain Resolution with example.

14. (a) What are the components of planning? Explain in detail.

Or

(b) Describe Bayes Theorem in detail.

15. (a) Write short note on Inductive Learning.

Or

(b) Describe Explanation Based Learning (EBL) with example.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Explain the steps to solve a problem in Artificial Intelligence.

17. Explain the A* algorithm in detail.

18. Describe the levels of knowledge based agent.

19. How to represent knowledge in an uncertain domain? Explain with example.

20. Explain General learning model with a neat diagram.

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S–2560	Sub. Code
	22MCE4C2

M.Sc. DEGREE EXAMINATION, APRIL 2024

Fourth Semester

Computer Science

CLOUD TECHNOLOGIES

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is virtualization?

2. List the limitations of cloud computing.

3. What are the three different service models?

4. List any two cloud computing sub service models.

5. What are the components of fiber channel SAN?

6. List the benefits of Network Virtualization.

7. What are the different types of testing in cloud software?

8. List out VM security techniques.

9. List the common uses of cloud computing in the manufacturing industry.

10. List two benefits of cloud computing for energy systems.

Part B (5 × 5 = 25)

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

11. (a) Why cloud computing is essential?

Or

(b) Give an explanation of the various cloud computing vendors.

12. (a) Describe the similarities and difference between grid and cloud computing.

Or

(b) Describe the various cloud deployment models.

13. (a) Explain the several types of virtualization.

Or

(b) Describe the need and advantages of server/ compute virtualization.

14. (a) Give an explanation of the cloud security design principles.

Or

(b) Write a note on Bigtable.

15. (a) What are the challenges and benefits of using cloud computing in education?

Or

(b) Describe how to create and operate a cloud-based video streaming app.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Discuss the impact of Cloud Computing on Business Companies.

17. Describe the characteristics of cloud computing.

18. Explain the core elements of cloud data center.

19. Describe the objectives of Cloud Information Security.

20. Explain the significance of cloud computing for healthcare.

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S–2561	Sub. Code
	22MCE4C3

M.Sc. DEGREE EXAMINATION, APRIL 2024.

Fourth Semester

Computer Science

WIRELESS SENSOR NETWORK

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What are the communication protocols available in the Sensor network?

2. Write the four Basic components of the sensor Network.

3. What is chemical and biological measurement?

4. Define small-scale effect.

5. What is a Contention-based MAC-layer protocol?

6. Define flooding.

7. Write the two classifications of TCP.

8. List the two entities of Mobile IP.

9. Write any two functions of Middleware for WSN.

10. Define Date Dissemination.

Part B (5 × 5 = 25)

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

11. (a) Write the challenges and Limitations of the Sensor Network.

Or

(b) Briefly explain the category 2 WSN applications.

12. (a) Mention the basic software subsystems in sensor networks.

Or

(b) What is modulation? List the three types of modulation.

13. (a) Write a note on WSN Routing Techniques.

Or

(b) Explain Data Dissemination and Gathering in detail.

14. (a) Describe the concept of Mobile IP in WSN.

Or

(b) Write the design issues of the Transport protocol.

15. (a) Write the Middleware principles of WSN.

Or

(b) Explain the adaptive middleware framework in detail.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Draw the architecture of the Sensor Network and explain it.

17. Write a note on radio technology primer.

18. Explain the fundamentals of MAC protocols.

19. List the feasibility of using TCP and UDP for WSNs.

20. Draw the Middleware architecture and explain in detail.

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