

R3642

Sub. Code

541301

M.C.A. DEGREE EXAMINATION, NOVEMBER – 2025

Third Semester

Computer Application

DATA SCIENCE AND BIG DATA ANALYTICS

(CBCS – 2022 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. What is the final phase in the data analytics lifecycle?
(CO1, K2)
 - (a) Communicate Results
 - (b) Model Planning
 - (c) Operationalize
 - (d) Model Building

2. Which of the following best defines the Big Data Ecosystem?
(CO1, K2)
 - (a) A collection of internet companies
 - (b) A network of computers used for browsing
 - (c) A storage system only
 - (d) A framework of technologies, tools, and roles that manage and analyze large-scale data

3. Which of the following is not a graphical user interface for R? (CO2, K3)
- (a) RGui (b) RStudio
(c) Tableau (d) R Commander
4. Which R function performs an ANOVA test? (CO2, K3)
- (a) t.test() (b) aov()
(c) wilcox.test() (d) chisq.test()
5. Which parameter must be predefined in K-Means? (CO3, K3)
- (a) Distance formula
(b) Number of clusters (k)
(c) Maximum iterations
(d) Cluster labels
6. What type of algorithm is Apriori? (CO3, K3)
- (a) Regression
(b) Classification
(c) Association Rule Mining
(d) Clustering
7. What does ARIMA stand for? (CO4, K4)
- (a) Auto Resampled Independent Model Architecture
(b) Auto Regressive Integrated Moving Average
(c) Auto Rated Indexed Model Architecture
(d) None

8. Which of the following is the first step in the text analysis process? (CO4, K4)
- (a) Sentiment analysis
 - (b) Tokenization
 - (c) Text collection
 - (d) Categorization
9. The programming model used by Hadoop is: (CO5, K5)
- (a) Procedural
 - (b) MapReduce
 - (c) Object-Oriented
 - (d) Imperative
10. What is MADlib? (CO5, K4)
- (a) An external DB storage engine
 - (b) A data visualization library
 - (c) A library for scalable in-database analytics
 - (d) A SQL window function

Part B

(5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) Differentiate between Business Intelligence (BI) and Data Science. (CO1, K3)

Or

- (b) Explain how the current analytical architecture differs from traditional systems. (CO1, K4)

12. (a) Describe how to import and export data using R. (CO2, K5)

Or

- (b) What is dirty data? How can it be cleaned? (CO2, K3)

13. (a) Differentiate between linear and logistic regression. (CO3, K3)

Or

- (b) What are candidate itemsets in Apriori algorithm? (CO3, K3)

14. (a) Describe the Box-Jenkins methodology. (CO4, K5)

Or

- (b) What is sentiment analysis? Mention its applications. (CO4, K4)

15. (a) Explain SQL grouping extensions: GROUPING SETS, CUBE, and ROLLUP. (CO5, K4)

Or

- (b) Discuss the common tools available for data visualization. (CO5, K5)

Part C (5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Elaborate on the Big Data ecosystem. Mention major tools, roles and technologies. (CO1, K5)

Or

- (b) Explain four V's of big data. Briefly discuss applications of big data. (CO1, K4)

17. (a) Describe the basic structure and syntax of R Programming. Provide examples of variables control Structures and functions (CO2, K5)

Or

- (b) Explain the Wilcoxon Rank-Sum Test. When is it preferred Over parametric methods? (CO2, K4)
18. (a) Explain the K-Means Clustering algorithm with step-by step logic and a real-World example. (CO3, K4)

Or

- (b) Explain the mathematical behavior and properties of sigmoid function. Illustrate how it is applied in logistic regression for binary classification. (CO3, K4)
19. (a) Explain Naïve Bayes Classifier in detail with real-world applications. (CO4, K4)

Or

- (b) Explain the structure of ARIMA model in detail. (CO4, K4)

20. (a) Discuss the roles and applications of Pig, Hive Mahout, and HBase in the Hadoop ecosystem.
(CO5, K5)

Or

- (b) What activities are involved in the final phase of the Data Analytics Life Cycle? Explain how results are communicated and analytics model is operationalized in a production environment.
(CO5, K4)

R3643

Sub. Code

541302

M.C.A. DEGREE EXAMINATION, NOVEMBER – 2025

Third Semester

Computer Applications

PYTHON PROGRAMMING

(CBCS – 2022 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** questions by choosing the correct option.

- How do you insert comments in Python code? (CO1, K1)
 - # This is a comment
 - // This is a comment
 - /* This is a comment */
 - <!-- This is a comment -->
- How do you create a variable in Python? (CO1, K1)
 - var x = 10
 - x := 10
 - int x = 10
 - x = 10
- How can you convert a string to a list of characters? (CO2, K3)
 - list()
 - split()
 - char()
 - array()
- What is the output of the following code? (CO2, K3)

```
print("Python".find("t"))
```

 - 0
 - 2
 - 4
 - 1

5. What is the output of the following code? (CO3, K3)
- ```
x = 5
if x > 3:
 print("True")
else :
 print("False")
```
- (a) True (b) False  
(c) Error (d) None
6. What is the purpose of the break statement in Python? (CO3, K3)
- (a) To exit a function  
(b) To stop a loop from continuing  
(c) To pause the execution of the program  
(d) To break a string
7. How do you define a class variable in Python? (CO4, K3)
- (a) self.variable (b) class.variable  
(c) variable (d) static variable
8. Which of the following is the correct syntax for defining a class in Python? (CO4, K3)
- (a) class MyClass[]: (b) class MyClass() { }  
(c) class MyClass: (d) define MyClass:
9. Which library in Python is commonly used for data manipulation and analysis? (CO5, K3)
- (a) NumPy (b) pandas  
(c) matplotlib (d) scikit-learn
10. Which method is used to write data to a CSV file using the csv module? (CO5, K3)
- (a) csv.write() (b) csv.save()  
(c) csv.writer() (d) csv.append()

**Part B**

(5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) Explain the data types in python. (CO1, K2)

Or

- (b) Illustrate interpreter and interactive mode in python. (CO1, K3)

12. (a) Write a methods that are used in Python Lists. (CO2, K3)

Or

- (b) What is dictionary? Explain the methods available in dictionary. (CO2, K6)

13. (a) Write the syntax of if-else statements. (CO3, K3)

Or

- (b) Explain break and continue statement with the help of for loop with an example. (CO3, K3)

14. (a) Briefly explain data encapsulation. (CO3, K3)

Or

- (b) Write a class with following criteria :

Class name: Car

Objects: X, Y, Z

Properties: price,color, millage

Methods: get( ), display( ) (CO3, K6)

15. (a) Create a program to compute price per unit weight of an item. (CO5, K3)

Or

- (b) Write a small code to illustrate CSV module. (CO5, K3)

**Part C**

(5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Discuss types of operators in python with appropriate example. (CO1, K1)

Or

- (b) Describe features of python. (CO1, K3)

17. (a) Elucidate the string and its methods with example. (CO2, K3)

Or

- (b) What are the differences among lists, tuples and dictionaries? Give an example for their usage. (CO2, K3)

18. (a) With suitable example explain input and output statements. (CO3, K6)

Or

- (b) Explain loop control statements in detail with example. (CO3, K3)

19. (a) How do we achieve code reusability in python? Write a python code to Explain code reusability. (CO4, K3)

Or

- (b) Explain the feature of Inheritance in python with an example. (CO3, K6)

20. (a) Discuss the various methods available in Python for reading and writing CSV files. (CO5, K3)

Or

- (b) Discuss the process of connecting to and interacting with a MySQL database using Python. (CO5, K6)

**R3644**

**Sub. Code**

**541303**

**M.C.A. DEGREE EXAMINATION, NOVEMBER – 2025**

**Third Semester**

**Computer Applications**

**SOFTWARE ENGINEERING**

**(CBCS – 2022 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 1 = 10)

Answer **all** the following objective type questions  
by choosing the correct option.

1. CMMI is most closely associated with improving the following type of processes: (CO1, K2)
  - (a) Marketing and Sales
  - (b) Software Development
  - (c) Human Resources
  - (d) Supply Chain Management
  
2. The Waterfall Model is an example of a: (CO1, K2)
  - (a) Iterative process model
  - (b) Incremental process model
  - (c) Sequential process model
  - (d) Prototyping process model
  
3. Requirement Engineering primarily deals with: (CO2, K4)
  - (a) Designing the architecture
  - (b) Testing software
  - (c) Gathering and analyzing customer requirements
  - (d) Maintaining software

4. Which of the following is not defined in a good SRS document? (CO2, K4)
- (a) Functional Requirement
  - (b) Nonfunctional Requirement
  - (c) Goals of implementation
  - (d) Algorithm for software implementation
5. In design engineering, modularity refers to: (CO3, K4)
- (a) Breaking the system into smaller, manageable components
  - (b) Writing detailed test cases for the system
  - (c) Documenting the system thoroughly
  - (d) Using a database in the system
6. What is the primary goal of User Interface (UI) design? (CO3, K4)
- (a) To create complex software code
  - (b) To make software easy and intuitive for users
  - (c) To develop marketing strategies
  - (d) To design system architecture
7. Bug in software Testing is (CO4, K2)
- (a) A testing method
  - (b) A feature of the software
  - (c) A malfunction or flaw in the software
  - (d) A software update
8. Identify the environment in which we can perform alpha testing? (CO4, K2)
- (a) User's end
  - (b) Developer's end
  - (c) Both (a) and (b) are correct
  - (d) None of the above

9. \_\_\_\_\_ describes a quality assurance in generic terms that can be applied to any business. (CO5, K5)
- (a) ISO 9000 (b) ISO 9001:2000  
(c) ISO 20000 (d) None of the above
10. Risk identification is systematic approach to specify \_\_\_\_\_ to the project plan. (CO5, K5)
- (a) Risk (b) Threats  
(c) Estimates (d) Schedule

**Part B** (5 × 5 = 25)

Answer **all** the questions not more than 500 words each.

11. (a) Analyze CMMI and its advantages. (CO1, K2)
- Or
- (b) What are the prime objectives of software engineering? (CO1, K2)
12. (a) Discuss the data modeling activity. (CO2, K4)
- Or
- (b) Briefly explain scenario based modeling. (CO2, K4)
13. (a) Discuss about Architecture and its importance. (CO3, K4)
- Or
- (b) Classify the user interface design steps. (CO3, K4)
14. (a) What do you understand by software testing and how can you decide that the testing can be stopped. (CO4, K2)
- Or
- (b) Brief on testing strategies for Object Oriented Software. (CO4, K2)
15. (a) What is the need of software reviews? Explain. (CO5, K5)
- Or
- (b) Exemplify software reliability. (CO5, K5)

**Part C**

(5 × 8 = 40)

Answer **all** the questions not more than 1000 words each.

16. (a) List several software process paradigms. Explain how both waterfall model and prototyping model can be accommodated in the spiral process model. (CO1, K2)

Or

- (b) Identify the umbrella activities in software engineering process. (CO1, K2)

17. (a) What are the essential components of SRS document? Explain by taking a simple application of your choice. (CO2, K4)

Or

- (b) Write short note on requirements validation process. (CO2, K4)

18. (a) Identify the roles of Interface design, Content design and Navigation design. (CO3, K4)

Or

- (b) Explain about software architecture design, with emphasize as fan in, fan-out, coupling, cohesion and factoring. (CO3, K4)

19. (a) What is black box testing? Explain the different types of black box testing strategies. (CO4, K2)

Or

- (b) Elaborate on unit testing. How do you develop test suites? (CO4, K2)

20. (a) Define software quality assurance. State various SQA activities. (CO5, K5)

Or

- (b) Deliberate the procedure of formal technical reviews in testing the software. (CO5, K5)

**R3645**

**Sub. Code**

**541304**

**M.C.A DEGREE EXAMINATION, NOVEMBER – 2025**

**Third Semester**

**Computer Applications**

**INFORMATION AND CYBER SECURITY**

**(CBCS – 2022 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 1 = 10)

Answer **all** the following objective type questions  
by choosing the correct option.

1. Public key cryptosystem is used for the encryption of \_\_\_\_\_  
(CO1, K1)
  - (a) Messages
  - (b) Session key
  - (c) Session key and Messages
  - (d) None of the mentioned
  
2. Encryption in Vigenere cipher is done using \_\_\_\_\_  
(CO1, K1)
  - (a) vigenere formula
  - (b) vigenere cycle
  - (c) vigenere square
  - (d) vigenere addition
  
3. Which algorithm among – Jupiter, Blowfish, RC4, and Rijndael was chosen as the AES algorithm?  
(CO2, K6)
  - (a) Jupiter
  - (b) Blowfish
  - (c) RC4
  - (d) Rijndael

4. Which systems use a timestamp? (CO2, K6)
- (i) Public-Key Certificates
  - (ii) Public announcements
  - (iii) Publicly available directories
  - (iv) Public-Key authority
- (a) (i) and (ii)                      (b) (iii) and (iv)
- (c) (i) and (iv)                      (d) (iv) only
5. Which of the following is not a steganography tool? (CO3, K6)
- (a) Crypture                      (b) SteganographX Plus
- (c) rSteg                      (d) Burp Suite
6. Tom discovers that a user suspected of stealing sensitive information is posting many image files to a message board. What technique might the individual be using to hide sensitive information in those images? (CO3, K6)
- (a) Steganography      (b) Homomorphism Encryption
- (c) Replay Attack      (d) Birthday Attack
7. In a multi-factor authentication scheme, a password can be thought of as: (CO4, K3)
- (a) something you know
  - (b) something you have
  - (c) something you use
  - (d) something you are
8. What are some drawbacks to using biometrics for authentication? Check all that apply. (CO4, K3)
- (a) Biometric authentication is much slower than alternatives
  - (b) Biometrics are easy to share
  - (c) There are potential privacy concerns
  - (d) Biometric authentication is difficult or impossible to change if compromised

9. An attacker may use automatic brute forcing tool to compromise your \_\_\_\_\_. (CO5, K6)
- (a) username
  - (b) employee ID
  - (c) system /PC name
  - (d) password
10. An attacker, who is an employee of your firm may \_\_\_\_\_ to know your system password. (CO5, K6)
- (a) do peeping
  - (b) perform network jamming
  - (c) do shoulder surfing
  - (d) steal your laptop

**Part B**

(5 × 5 = 25)

Answer **all** the questions not more than 500 words each.

11. (a) Explain multilevel model of security. (CO1, K1)

Or

- (b) For each of the following ciphers, say whether it is a stream cipher or block cipher. Defend your answers. (CO1, K1)
- (i) Playfair
  - (ii) Auto-key
  - (iii) One-time pad
  - (iv) Rotor
  - (v) Enigma

12. (a) The leftmost bit of a  $4 \times 3$  S-box rotates the other three bits. If the leftmost bit is 0, the three other bits are rotated to the right one bit. If the leftmost bit is 1, the three other bits are rotated to the left one bit. If the input is 1011, what is the output? If the input is 0110, what is the output? (CO2, K6)

Or

- (b) Distinguish between differential and linear cryptanalysis. Describe the efficiency of RSA algorithm. (CO2, K6)
13. (a) Explain Patchwork algorithm. (CO3, K6)

Or

- (b) Illustrate the Birthday paradox attack using appropriate characteristics of Hash Function. (CO3, K6)
14. (a) Enlist the technological issues in Biometric Systems. (CO4, K3)

Or

- (b) Enlist and explain the attacks carried on Hash Function. (CO4, K3)
15. (a) The Broken authentication and session management encompasses several security issues, all of them having to do with establishing and maintaining the identity of a user. Enlist and explain the challenges faced by them. (CO5, K6)

Or

- (b) Suggest a suitable method to use Cybersecurity Framework to prioritize cybersecurity activities? (CO5, K6)

**Part C**

(5 × 8 = 40)

Answer **all** the questions not more than 1000 words each.

16. (a) Encrypt the message “Let us practice more” using one of the following ciphers. Ignore the space between words. Decrypt the message to get the original plaintext. (CO1, K1)
- (i) Affine cipher with key (15, 20)
  - (ii) Vigenere cipher with key: “earn”
  - (iii) Autokey cipher with key = 7
  - (iv) Playfair cipher with the key created in the text

Or

- (b) Apply step-by step process of extended Euclidean algorithm to find the multiplicative inverse of 24140 mod 40902. (CO1, K1)

17. (a) Though no devastating attacks on RSA have been yet discovered. Several attacks have been predicted based on the weak plaintext, weak parameter selection, or inappropriate implementation. Enlist them you are familiar about and prove at least two them are effectively used to compromise them. (CO2, K6)

Or

- (b) Consider the elliptic curve  $E: y^2 = x^3 + 2x + 2$  over the field  $F_{17}$ . (CO2, K6)
- (i) Show that the condition  $4a^3 + 27b^2 \neq 0 \pmod{p}$  is fulfilled for the curve.
  - (ii) Perform the additions  $(2,7) \oplus (5,2)$  and  $(3,6) \oplus (3,6)$  in the group of the curve.
  - (iii) The elliptic curve has the group order 10. Verify Hasse’s theorem for this curve.
  - (iv) Why all the points of this curve are primitive.

18. (a) What do you mean by information hiding? Explain the linguistic and technical steganography. (CO3, K6)

Or

- (b) Describe how a one-way hash function may be used for message authentication. (CO3, K6)

19. (a) Explain the architecture of Automated Multimodal Biometric Identification System. (CO4, K3)

Or

- (b) How do you provide authentication services using TACACS+ Discuss the architecture in detail. (CO4, K3)

20. (a) An ideal password authentication scheme must withstand several attacks. Describe the goals an ideal password authentication scheme should achieve. Explain how access control lists are used to represent access control matrices. Describe the environments in which they are widely used and their advantages and disadvantages. (CO5, K6)

Or

- (b) An online e-commerce web site is suffering distributed denial-of-service (DDOS) attack. The incident response team received a report from users that the e-commerce web site is offline and unreachable. Develop a triage plan and respond to the incident. (CO5, K6)

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**R3646**

**Sub. Code**

**541558**

**M.C.A. DEGREE EXAMINATION, NOVEMBER – 2025**

**Third Semester**

**Computer Applications**

**Elective — VIRTUAL REALITY AND  
AUGMENTED REALITY**

**(CBCS – 2022 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. What is Virtual Reality (VR)? (CO1, K2)
  - (a) A technology that enhances the physical world
  - (b) A simulated environment that can be experienced through sensory stimuli
  - (c) A form of augmented reality
  - (d) A type of holographic projection system
  
2. Which of the following senses does virtual reality primarily aim to stimulate? (CO1, K2)
  - (a) Sight and touch
  - (b) Taste and smell
  - (c) Hearing and balance
  - (d) Sight and sound

3. What is the main purpose of the output interface in VR technology? (CO2, K3)
- (a) To input commands into the virtual environment
  - (b) To render realistic graphics
  - (c) To provide sensory feedback to the user
  - (d) To track user movements
4. Which component of the VR system directly interacts with the user's senses? (CO2, K3)
- (a) VR headset
  - (b) Motion sensor
  - (c) Processor unit
  - (d) Graphics card
5. What is geometric modeling in VR primarily concerned with? (CO3, K3)
- (a) Creating realistic textures
  - (b) Simulating physical interactions
  - (c) Representing 3D shapes and structures
  - (d) Rendering lighting effects
6. Which of the following techniques is commonly used for geometric modeling in VR? (CO3, K3)
- (a) Vector graphics
  - (b) Pixel art
  - (c) Polygonal modeling
  - (d) 2D animations

7. What is the primary purpose of augmented city maps in virtual reality? (CO4, K3)
- (a) Entertainment
  - (b) Navigation and exploration
  - (c) Social networking
  - (d) Virtual shopping experiences
8. Which of the following features might be included in augmented city maps in virtual reality? (CO4, K3)
- (a) Historical landmarks overlay
  - (b) Real-time weather updates
  - (c) Integration with social media platforms
  - (d) All of the above
9. Which of the following is a common application of Virtual Reality (VR) in digital entertainment? (CO5, K5)
- (a) Augmented reality gaming
  - (b) 3D printing simulations
  - (c) Virtual travel experiences
  - (d) Social media platforms
10. What does the X3D standard stand for in the context of Virtual Reality (VR)? (CO5, K5)
- (a) Extensible 3D
  - (b) Extended 3D Graphics
  - (c) Experimental 3D
  - (d) Exceptional 3D

**Part B**

(5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) List the Benefits of Virtual reality. (CO1, K2)

Or

- (b) Describe the challenges of Virtual reality implementation. (CO1, K1)

12. (a) Write a short note on output interface. (CO2, K3)

Or

- (b) Narrate the importance of Digital glove. (CO2, K3)

13. (a) Narrate the behaviour simulation in the context of virtual reality. (CO3, K3)

Or

- (b) Explain the physical based simulation. (CO3, K3)

14. (a) Narrate the applications of AR technology. (CO4, K3)

Or

- (b) Explain augmented city maps and their integration with virtual reality. (CO4, K3)

15. (a) Write a short note on X3D standard. (CO5, K5)

Or

- (b) Discuss how VR technology is employed in the realm of gaming. (CO5, K5)

**Part C**

(5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Discuss the application areas of VR. (CO1, K1)

Or

- (b) Describe the components of VR. (CO1, K2)

17. (a) Define geometric modelling in the context of virtual reality. How does it contribute to creating immersive VR environments? (CO2, K3)

Or

- (b) Elaborate on video based input. (CO2, K3)

18. (a) Discuss the interactive techniques in VR. (CO3, K3)

Or

- (b) Elaborate on geometric modelling technique. (CO3, K4)

19. (a) Discuss the system structure of AR. (CO4, K3)

Or

- (b) Describe Geo location in AR. (CO4, K3)

20. (a) Describe the development tools in VR. (CO5, K5)

Or

(b) Explain framework of VR software in detail.  
(CO5, K5)

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