

(6 pages)

S.No. 6341

P 22 CSCC 11

(For candidates admitted from 2022–2023 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Computer Science

MATHEMATICAL FOUNDATION FOR
COMPUTER SCIENCE

Time : Three hours

Maximum : 75 marks

PART A — (20 Marks)

Answer ALL questions.

I. (A) Multiple choice questions : (5 × 1 = 5)

1. Which of the following is not a possible ordered pair for a matrix with 6 elements?

(a) (2, 3) (b) (3, 2)

(c) (1, 6) (d) (3, 1)

2. Find the values of x, y, z in the following system of equations by Gauss Elimination Method

$$2x + y - 3z = -10, -2y + z = -2, z = 6$$

(a) 2, 4, 6 (b) 2, 7, 6

(c) 3, 4, 6 (d) 2, 4, 5

3. A _____ is an ordered collection of object.

(a) relation (b) set

(c) function (d) proposition

4. The first three terms of a geometric progression are $m - 2, m + 1$ and $m + 7$. Find the value of m .

(a) 5 (b) 6

(c) 8 (d) 7

5. The probability that a card drawn from a pack of 52 cards will be a diamond or a kind is

(a) $2/13$ (b) $4/13$

(c) $1/13$ (d) $1/52$

(B) Fill in the blanks : (5 × 1 = 5)

6. The maximum number of its linearly independent columns (or rows) of a matrix is called the _____ of a matrix.

7. The aim of elimination steps in gauss elimination method is to reduce the coefficient matrix to _____

8. A _____ is a formula which is always true for every value of its propositional variables.

9. _____ series is a series where all terms cancel out except for the first and last one.
10. When we perform an experiment, then the set S of all possible outcomes is called the _____
- II. Answer the following : $(5 \times 2 = 10)$
11. What is an Eigen Vector? Give an example.
12. What is the condition of Jacobi Method?
13. Define void relation.
14. What is a first-order recurrence relation?
15. What is T-test?

PART B — $(5 \times 5 = 25)$

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

16. (a) How to find the determinant of a 3×3 matrix using diagonals? Elaborate.

Or

- (b) Reduce the matrix $\begin{bmatrix} 3 & -1 & 2 \\ -6 & 2 & 4 \\ -3 & 1 & 2 \end{bmatrix}$ to a row-echelon form.

17. (a) Solve Equations $2x + 5y = 21$, $x + 2y = 8$ using Gauss-Jordan Elimination method.

Or

- (b) Solve the given system of equation by Gauss Elimination method.

$$\begin{aligned} 3x + 4y - z &= -6 \\ -2y + 10z &= -8 \\ 4y - 2z &= -2 \end{aligned}$$

18. (a) What is the difference between proof by contradiction and counter example?

Or

- (b) What are the rules of inference for propositional logic? Explain with suitable examples.

19. (a) Find a generating function for 1, 3, 5, 7, 9,

Or

- (b) Use the recurrence relation for the Fibonacci numbers to find the generating function for the Fibonacci sequence.

20. (a) Explain in detail about binomial and Poisson distribution with example.

Or

- (b) A speaks truth in 75% cases and B in 80% of the cases. In what percentage of cases are they likely to contradict each other, narrating the same incident?

PART C — (3 × 10 = 30)

Answer any THREE questions.

21. Find the Eigen values and Eigen Vectors

$$A = \begin{bmatrix} 5 & -10 & -5 \\ 2 & 14 & 2 \\ -4 & -8 & 6 \end{bmatrix}$$

22. Solve equations $2x + 5y = 16$, $3x + y = 11$ using Gauss Jacobi Method.

23. Prove by mathematical induction

$$1 + x + x^2 + \dots + x^n = \frac{1 - x^{n+1}}{1 - x}$$

24. Solve the recurrence relation $a_n = 3a_{n-1} + 2$ subject to $a_0 = 1$.

25. A man and his wife appear in an interview for two vacancies in the same post. The probability of husband's selection is $(1/7)$ and the probability of wife's selection is $(1/5)$. What is the probability that only one of them is selected?

19. (a) Discuss about structured arrays.

Or

(b) Write short notes on correlation and covariant.

20. (a) Compare vector and matrix in R.

Or

(b) Illustrate the structure of package in R.

PART C — (3 × 10 = 30)

Answer any THREE questions.

21. Explain in detail about control statement with example.

22. Write in detail about dictionary and its operations.

23. How to process records in file using loop? Explain.

24. Write the procedure to read and write data in CSV using pandas.

25. Explain about the operations of data frame in detail.

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P 22 CSCC 12

(For candidates admitted from 2022–2023 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Computer Science

PROBLEM SOLVING USING PYTHON AND R

Time : Three hours

Maximum : 75 marks

PART A — (20 Marks)

Answer ALL questions.

I. (A) Multiple Choice Questions (5 × 1 = 5)

1. Which one of the following is not a keyword in Python language?

- (a) pass (b) eval
(c) assert (d) nonlocal

2. Which of the following is a Python tuple?

- (a) {} (b) {1,2,3}
(c) [1,2,3] (d) (1,2,3)

3. Which of the following is not a built in exception in python?
(a) Syntax Error (b) Value Error
(c) ZeroDivision Error (d) Export Error
4. What will be the minimum number of arguments require to pass in pandas series?
(a) 2 (b) 3
(c) 4 (d) None of the above
5. How many atomic vector types does R have?
(a) 3 (b) 4
(c) 5 (d) 6

(B) Fill in the blanks (5 × 1 = 5)

6. _____ and _____ are the two main types of functions in Python.
7. Dictionary makes use of _____
8. A _____ method is used to position the file object at a particular position in a file.
9. _____ code is used to install numpy in the windows system containing python.
10. Functionality of R is divided into a number of _____

II. Answer the following (5 × 2 = 10)

11. List the built-in functions in python.
12. Write the feature of dictionary.
13. What is data hiding?
14. Define Numpy.
15. Compare vector and array.

PART B — (5 × 5 = 25)

Answer ALL questions, Choosing either (a) or (b).

16. (a) What are the string operations available in python? Explain.

Or

- (b) Write a note on Expressions.

17. (a) List and Explain string formatting functions.

Or

- (b) How to traverse a list? Explain.

18. (a) Illustrate the structure of file processing.

Or

- (b) Write a detailed note on multiple inheritance.

17. (a) Write the procedure to create dialog box.
Or
(b) Write short notes on progressive bar.
18. (a) Illustrate the architecture of JDBC.
Or
(b) Write the procedure to run socket programs.
19. (a) How to connect database using servlet?
Or
(b) Write a note on Cookies.
20. (a) Write short notes on functional interface.
Or
(b) Discuss about filter in detail.

SECTION C — (3 × 10 = 30)

Answer any THREE questions.

21. What are the categories of design pattern? Explain
22. Illustrate the life cycle of Applet.
23. Write the procedure to develop socket program using TCP/IP.
24. Illustrate the servlet life cycle with neat sketch.
25. Explain in detail about JShell.

S.No. 6343

P 22 CSCC 1 A

(For candidates admitted from 2022–2023 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023

Computer Science — Core Choice Course

ADVANCED JAVA PROGRAMMING

Time : Three hours

Maximum : 75 marks

SECTION A — (20 marks)

- I. (A) Multiple choice questions : (5 × 1 = 5)
1. Which of the below is not a valid classification of design pattern?
- (a) Creational patterns
 - (b) Structural patterns
 - (c) Behavioural patterns
 - (d) Java patterns
2. Which of these methods is a part of Abstract Window Toolkit (AWT)?
- (a) display() (b) paint()
 - (c) drawString() (d) transient()

3. What are the major components of the JDBC?
- (a) DriverManager, Driver, Connection, Statement and ResultSet
 - (b) DriverManager, Driver, Connection and Statement
 - (c) DriverManager, Statement and ResultSet
 - (d) DriverManager, Connection, Statement and ResultSet
4. Which of the following applications servers do not provide built in support for servlets?
- (a) Tomcat server
 - (b) Glassfish
 - (c) JBoss
 - (d) None of the above.
5. A Static method of an Interface should be accessed with _____ and a DOT operator.
- (a) Class Name
 - (b) Interface Name
 - (c) An object of a concrete class
 - (d) None of the above
- (B) Fill in the blanks : (5 × 1 = 5)
6. MVC pattern stands for _____
7. _____ method is defined in Graphics class, it is used to output a string in an applet.

8. The class used in Java network programming for socket address is the _____ Class.
9. JSP stands for _____
10. _____ keyword is used by a class to use an interface defined previously.
- II. Answer the following : (5 × 2 = 10)
11. List the benefits of using design pattern.
12. Write the components of AWT package.
13. What is UDD?
14. Elucidate the features of JSP.
15. Define API.

SECTION B — (5 × 5 = 25)

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

16. (a) Write a note on
- (i) Proxy Pattern
 - (ii) Command pattern

Or

- (b) Discuss array list versus linked list.

19. (a) Write short notes on customization.

. Or

(b) Discuss about transaction requirements in detail.

20. (a) Write the feature of Axis server.

Or

(b) Write an installation procedure of Tomcat server.

PART C — (3 × 10 = 30)

Answer any THREE questions.

21. What are the standard technologies available in web service? Explain.

22. Write the procedure to exchange information between applications in distributed environment.

23. Write a detailed note on orchestration and refinement in web service.

24. What are the steps necessary to build and deploy web services? Explain.

25. How to deploy web service and applications on Tomcat applications server?

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P 22 CSE 1 A

(For candidates admitted from 2022-2023 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Computer Science – Elective

WEB SERVICES

Time : Three hours

Maximum : 75 marks

PART A — (20 marks)

Answer ALL the questions.

I. (A) Multiple choice questions : (5 × 1 = 5)

1. Which technique is based on compile-time program transformation for accessing remote data in a distributed-memory parallel system

(a) cache coherence scheme

(b) computation migration

(c) remote procedure call

(d) message passing

2. Which of the following component of Web service describes interfaces to web services?

(a) UDDI

(b) WSDL

(c) SOAP

(d) None of the above

3. What are the basic components of workflow?
(a) Input (b) Transformation
(c) Output (d) All of the above
4. What are the web service platform elements?
(a) SOAP, UDDI, XML
(b) HTTP, WSDL
(c) UDDI, XML, SOAP
(d) SOAP, UDDI, WSDL
5. Which element is a single root of every SOAP message?
(a) <envelope> (b) <entity>
(c) <soap> (d) <soapEnvelope>
- (B) Fill in blanks: (5 × 1 = 5)
6. _____ is used to perform remote procedure calls in web services.
7. Web services can be discovered using _____ specification.
8. WSCL specifies to exchange _____ documents.
9. To implement web services in NET, HTTP handlers are used that interrupt requests to _____ files
10. _____ used to convert your application into Web-Application.

- II. Answer the following: (5 × 2 = 10)
11. What is RPC?
12. Write a note on REST.
13. Define bandwidth.
14. List the major steps to built web service.
15. Define Tomcat.

PART B — (5 × 5 = 25)

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

16. (a) What are advantages and disadvantages of web service?
Or
(b) Discuss the latest standard related to web service.
17. (a) Discuss SOAP verse REST web services.
Or
(b) How to locate a remote web services? Explain.
18. (a) What are the security attacks facilitated within web services?
Or
(b) Write short notes on QOS metrics.

20. (a) Write the goals of intrusion detection system.

Or

(b) Discuss the vulnerability in wireless network.

PART C — (3 × 10 = 30)

Answer any THREE questions.

21. Write short notes on

(a) Breaches

(b) Confidentiality

(c) Integrity.

22. Explain in detail about Antiphishing with example.

23. Write a detailed note on security in the design of operating system.

24. What are the security issues available in database creation? Explain.

25. Illustrate the system architecture of cryptography in network security.

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P 22 CSVAC 1

(For candidates admitted from 2022–2023 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Computer Science — Value Added Course

SECURITY IN COMPUTING

Time : Three hours

Maximum : 75 marks

PART A — (20 marks)

Answer ALL questions.

I. (A) Multiple choice questions. (5 × 1 = 5)

1. Which one of the following can be considered as the class of computer threats?

- (a) Dos Attack (b) Phishing
(c) Soliciting (d) Both (a) and (c)

2. Which mechanism is used by worm process?

- (a) Trap door (b) Fake process
(c) Spawn Process (d) VAX process

3. Which one of the following systems cannot be considered as an example of the operating systems?

- (a) Windows 8 (b) Red Hat Linux
(c) BSD Linux (d) Microsoft Office

18. (a) Discuss about applications of NoSQL in detail.

Or

(b) Write in detail about characteristics of MongoDB.

19. (a) Explain about key advantage of Hadoop in detail.

Or

(b) Illustrate RDBMS vs Hadoop.

20. (a) How to work with data serialisation formats? Explain.

Or

(b) Write a note on challenges of YARN.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

21. Write a detailed note on types of digital data

22. Explain in detail about types of data analytics with example.

23. Compare SQL, NoSQL and NewSQL.

24. What are the key aspects and components available in Hadoop? Explain.

25. What are the serialisation formats available in big data? Explain

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P22 CSCC 31

(For candidates admitted from 2022-2023 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Computer Science

BIG DATA ANALYTICS

Time : Three hours

Maximum : 75 marks

PART A — (20 marks)

Answer ALL questions.

- I. (A) Multiple choice questions (5 × 1 = 5)
1. What are the different features of Big data analytics?
- (a) Open source (b) Scalability
(c) Data recovery (d) All the above
2. The data node and name node in HADOOP are
- (a) Worker Node and Master Node respectively
(b) Master Node and Worker Node respectively
(c) Both Worker Nodes
(d) Both Master Nodes

18. (a) Explain about Gaussian mixture models.
Or
(b) Give a short note on boosting.
19. (a) Explain the basics of sampling theory.
Or
(b) What is active Reinforcement Learning?
Given an example.
20. (a) Explain about AI technique.
Or
(b) Write the characteristics of Production Systems.

PART C — (3 × 10 = 30)

Answer any THREE questions.

21. Components of Learning in detail.
22. Illustrate K-Nearest Neighbors in detail.
23. Describe the concept EM Algorithm.
24. Write a detailed note on Binominal Distribution.
25. Write the steps to define the Problem as State Space Search.

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P 22 CSCC 32

(For candidates admitted from 2022–2023 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Computer Science

ARTIFICIAL INTELLIGENCE AND MACHINE
LEARNING

Time : Three hours

Maximum : 75 marks

PART A — (20 Marks)

Answer ALL questions

- I. (A) Multiple choice questions. (5 × 1 = 5)
1. Different learning methods do not include _____
- (a) Memorization
 - (b) Analogy
 - (c) Deduction
 - (d) Introduction
2. What is the primary goal of supervised learning?
- (a) Classification
 - (b) Regression
 - (c) Clustering
 - (d) Reinforcement Learning

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3. In probabilistic learning, what does a probability distribution function (PDF) describe?
- (a) The relationship between Input and Output variables
 - (b) The density of possible outcomes for a random variable
 - (c) The number of data points in a dataset
 - (d) The bias of the machine learning model
4. In reinforcement learning, what is the primary goal of an agent?
- (a) To minimize the reward
 - (b) To
 - (c) Wiener filter
 - (d) Inverse filter
5. The applications of AI are _____
- (a) Expert System
 - (b) Gaming
 - (c) Vision System
 - (d) All of the above
- (B) Fill in the blanks:- (5 × 1 = 5)
6. A computer program which learns from experience is called _____
7. _____ is a method in which patterns inferred from the unlabeled input data.

8. In ensemble methods like random forest, each tree in the forest is trained on a _____ subset of data.
9. In reinforcement learning, an agent interacts with an _____ to learn optimal actions.
10. Machine Learning is a subset of AI that involves training algorithms to learn from _____
11. Answer the following:- (5 × 2 = 10)
11. Define concept learning.
12. What is multilayer perception?
13. What are the distance measures in probabilistic learning?
14. How to estimate error in Reinforcement Learning?
15. Write the advantages of breadth-first search.

PART B — (5 × 5 = 25)

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

16. (a) Discuss Grouping and Grading in detail.
- Or
- (b) Write the steps to design a learning system a learning system.
17. (a) Compare classification and regression with an example.
- Or
- (b) Write a short note on K — means clustering.

19. (a) Explain in brief about Diffie Hell man Key exchange algorithm.

Or

- (b) Write a brief note on Elliptic curve Cryptography.

20. (a) Briefly explain about IEEE.802.services.

Or

- (b) Discuss in brief about the types of WLAN security.

PART C — (3 × 10 = 30)

Answer any THREE questions.

21. What are Security services? Explain in detail with a neat structure.
22. What is Steganography? Discuss in detail about various process involved in it.
23. Elaborate in detail about Block Cipher modes of Operation with a neat structure.
24. Discuss in detail about different approaches enhanced to attack the RSA algorithm.
25. What is electronic mail security? Elaborate in detail about its types.

S.No. 6360

P 22 CSCC 3 B

(For candidates admitted from 2022–2023 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Computer Science – Core Choice Course

CRYPTOGRAPHY AND NETWORK SECURITY

Time : Three hours

Maximum : 75 marks

PART A — (20 marks)

Answer ALL questions.

- I. (A) Multiple choice questions : (5 × 1 = 5)
1. Passwords enable users to _____
 - (a) get into the system quickly
 - (b) make efficient use of time
 - (c) retain confidentiality of files
 - (d) simplify file structures
 2. Which are the ends does cryptography process takes place?
 - (a) Transmitter
 - (b) Receiver
 - (c) Channel
 - (d) Both (a) and (b)
 3. How many rounds does the AES-192 perform?
 - (a) 10
 - (b) 12
 - (c) 14
 - (d) 16

4. Which of the following keys are known only to the owner?
- (a) public key
 - (b) protected key
 - (c) private key
 - (d) unique key

5. Which among them has the strongest wireless security?
- (a) WEP
 - (b) WPA
 - (c) WPA2
 - (d) WPA3

(B) Fill in the blanks : (5 × 1 = 5)

6. VPN technology uses two simultaneous techniques to guarantee privacy for an organization: _____ and _____.

7. Encryption strength is based on _____.

8. The 4 × 4 byte matrices in the AES algorithm are called _____.

9. A communication is said to be insecure when the data is transmitted in a manner that allows for interception is also called _____.

10. _____ is alike as that of Access Point (AP) from 802.11, and the mobile operators uses it for offering signal coverage.

II. Answer the following questions. (5 × 2 = 10)

- 11. Define Masquerade.
- 12. What is deciphering?
- 13. What is the purpose of State array?
- 14. What is secret key?
- 15. Define MAC and CRC.

PART B — (5 × 5 = 25)

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

16. (a) Write a brief note on the Security mechanisms in X.800.
Or
(b) Explain in brief about the network access security model.
17. (a) What are the parameters and design features of Feistel network? Discuss.
Or
(b) Write a short notes on Roster Machines.
18. (a) Discuss in brief about shift rows.
Or
(b) Write a note on Multiple Encryption with a neat structure.

S.No. 6362

P 22 CSE 3 B

(For candidates admitted from 2022-2023 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Computer Science — Elective

BLOCK CHAIN TECHNOLOGY

Time : Three hours

Maximum : 75 marks

PART A — (20 marks)

Answer ALL questions.

I. (A) Multiple choice questions (5 × 1 = 5)

1. Block chain is a peer-to-peer _____ distributed ledger technology that makes the records of any digital asset transparent and unchangeable.

- (a) Decentralized (b) Demanding
(c) Secure (d) Popular

2. What does a block in a Block chain have?

- (a) Header and Digital ledger
(b) Bitcoins and Input
(c) Transactions and Bitcoins
(d) Header and Transaction

3. _____ hosts the software needed for transaction initiation, validation, mining, block creation, and smart contract execution.

- (a) External Account
(b) EVM
(c) Ethereum full node
(d) Smart Contract

4. How does block chain improve supply chains?

- (a) By automatically creating trade agreements between two parties
(b) By creating safe centralized marketplaces to trade goods on
(c) By stabilizing the national currencies of the countries involved
(d) By transferring tokenized ownership through a software system

5. What is the maximum number of bitcoins that can be created?

- (a) 15 million (b) 21 million
(c) 25 million (d) 50 million

(B) Fill in the blanks:-

(5 × 1 = 5)

6. A block chain is a decentralized, distributed, digital ledger consisting of records called _____.
7. In block chain, _____ tree stores all the transactions in a block by producing a digital fingerprint of the entire set of transactions.
8. Block chain has _____ versions.
9. _____ are a popular way to raise funds for products and services usually related to crypto currency.
10. _____ allows App developers to store and distribute data and content to block chain users securely and efficiently.

II. Answer the following:-

(5 × 2 = 10)

11. What is Block chain technology?
12. Define the genesis block.
13. Differentiate between contract security and testing code in blockchain projects.

14. List out the key components of an Initial Coin Offering (ICO) project setup.
15. What is the main advantage of using Swarm and IPFS for distributed storage in blockchain applications?

PART B — (5 × 5 = 25)

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

16. (a) Draw and explain the working of Block chain network.
Or
(b) Describe the Peer-to-Peer network with an example.
17. (a) Explain the operation of Bitcoin Blockchain in detail.

Or

- (b) Differentiate between proof-of work and proof-of-stake in block chain.
18. (a) Discuss smart contract in Ethereum in detail.

Or

- (b) What are the steps involved in setting up ethereum accounts? Explain.

19. (a) Differentiate between permissionless Blockchain and permissioned Blockchain with uses cases for each type.

Or

- (b) Discuss the concept of Blockchain-as-a-Service (BaaS).

20. (a) Discuss the steps involved in serving frontend content with swarm.

Or

- (b) Explain the process of installing and using IPFS for hosting web content.

PART C — (3 × 10 = 30)

Answer any THREE questions.

21. Explain the different types of blockchain in detail.
22. Describe the Proof of Authority (PoA) and Proof of Elapsed Time (PoET) in detail.

23. What is Ethereum? Explain about Elements of the Ethereum block chain.

24. Explain the following

- (a) Wallets
(b) Smart contracts.

25. Illustrate the functioning of the Ethereum Virtual Machine (EVM) in the Ethereum blockchain ecosystem.

18. (a) What are the challenges faced by export oriented companies in the Indian service sector?

Or

- (b) State the growth of advisory services in India's export.

19. (a) Demonstrate the utility of marginal cost approach in international pricing decisions.

Or

- (b) Discuss the ways and means of overcoming exchange rate fluctuations

20. (a) Summarize the role of Indian Institute of Packaging.

Or

- (b) Outline the functions of ITPO.

SECTION C — (3 × 10 = 30)

Answer any THREE questions.

21. Evaluate the role of exports in India's economic development.
22. Assess the objectives of export planning.
23. Examine the role and functions of EXIM bank in India's exports.
24. Discuss the pros and cons of various pricing strategies adopted by exporters.
25. Evaluate the performance of India's export sector since the economic reforms in 1990.

S.No. 9030

P 22 MBA NME 2

(For candidates admitted from 2022–2023 onwards)

P.G. DEGREE EXAMINATION, NOVEMBER 2023

Business Administration – Non Major Elective

EXPORT MANAGEMENT

Time : Three hours

Maximum : 75 marks

SECTION — A (20 marks)

Answer ALL questions.

- I (A) Multiple choice question (5 × 1 = 5)
1. Which one of the following can be categorized as the principal export item for India in 2021-22?
- (a) Statues
- (b) Precious Grass
- (c) Toys
- (d) Oil and Petroleum products
2. Which managerial skill is vital for overseeing and adjusting the various elements of an export plan to meet objectives?
- (a) Product planning
- (b) Organization
- (c) Management control
- (d) Designing products for exports

19. (a) Explain the OOD axioms and corollaries.
Or
(b) Describe briefly about macro level processes.
20. (a) Explain what are the steps followed in continuous testing.

Or

- (b) What are the different types of test cases? Explain in detail.

PART C — (3 × 10 = 30)

Answer any THREE questions.

21. Write different stages of software development process.
22. Explain the types of UML diagrams.
23. What are steps to be followed for effective documentation? Explain in detail.
24. Explain distributed database and client server computing.
25. Explain different type of system testing.

S.No. 6787

P 22 ITCC 11

(For candidates admitted from 2022–2023 onwards)
M.Sc. DEGREE EXAMINATION, NOVEMBER 2023

Information Technology

OBJECT ORIENTED SYSTEMS DEVELOPMENT

Time : Three hours

Maximum : 75 marks

PART A — (20 marks)

Answer ALL questions.

- I. (A) Choose the correct answer : (5 × 1 = 5)
1. The process of compartmentalizing the elements of an abstraction that constitute its structure and behavior is called as
- (a) Hierarchy (b) Encapsulation
(c) Modularity (d) Entity Abstraction
2. Booch methodology is criticized for its _____
- (a) Analysis phase
(b) Design phase
(c) Development phase
(d) A large set of symbols

3. When one use case elaborates its functionality with others, such relationship is called
- (a) is a (b) extend
(c) include (d) exclude
4. The recurring aspects of designs are called design
- (a) patterns (b) documents
(c) structures (d) methods
5. The main concern of _____ testing is how users interact with the system.
- (a) Usability (b) Software
(c) Quality (d) Object oriented
- (B) Fill in the blanks : (5 × 1 = 5)
6. _____ type of function among the following shows polymorphism.
7. _____ UML diagrams has a static view.
8. Aggregation is _____.
9. _____, _____ and _____ are the three layers in the layered approach to software development.
10. Non-conformance to software requirements is known as _____.

- II. Answer ALL questions : (5 × 2 = 10)
11. What is attributes and methods in OOSD?
12. What do you mean by framework?
13. What is collaboration?
14. What is access layer storage and persistence?
15. What is block box testing?

PART B — (5 × 5 = 25)

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

16. (a) What is polymorphism? Give an example of it.
Or
(b) Explain the concepts of Encapsulation with suitable example.
17. (a) Explain Booth methodology activities.
Or
(b) Explain in detail generative and non-generative patterns.
18. (a) Write the few advantages and disadvantages of object oriented analysis.
Or
(b) Explain different approaches to identify classes.

19. (a) Give a short note on hierarchical data model with an example.

Or

- (b) What are the structured data and unstructured data in XML?

20. (a) Write the difference between packing and unpacking relations.

Or

- (b) Illustrate the applications of multimedia database.

PART C — (3 × 10 = 30)

Answer any THREE questions.

21. Distinguish between Interquery Parallelism and Intraquery Parallelism.
22. Describe about the commit protocols in distributed databases.
23. Elucidate recursive query processing.
24. Explain in detail about XML schema.
25. Write a note on multimedia database queries.

S.No. 6788

P 22 ITCC 12

(For candidates admitted from 2022–2023 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Information Technology

ADVANCED DATABASE MANAGEMENT SYSTEMS

Time : Three hours

Maximum : 75 marks

PART A — (20 marks)

Answer ALL questions.

- I. (A) Choose the correct answer. (5 × 1 = 5)
1. What is DBMS?
- (a) DBMS is a collection of queries
- (b) DBMS is a high-level language
- (c) DBMS is a programming language
- (d) DBMS stores, modifies and retrieves data
2. Which forms have a relation that contains information about a single entity?
- (a) 4NF (b) 2NF
- (c) 5NF (d) 3NF

3. SPATIAL indexes cannot be created on NOT NULL spatial columns.
 (a) True (b) ~~False~~
 (c) Moderate (d) None of the above
4. The relationship between DEPARTMENT and EMPLOYEE is a _____.
 (a) One to one relationship
 (b) One to many relationship
 (c) ~~Many to many relationship~~
 (d) Many to one relationship
5. Domain integrity also called _____ integrity.
 (a) Attribute (b) Row
 (c) Data (d) Complex
 (B) Fill in the blanks. (5 × 1 = 5)
6. _____ key is an attribute that serves as the primary key of another relation.
7. _____ is required to process a query in a distributed database.
8. In _____ formats data is stored in the database management system.
9. In a _____ schema, data organized into a structure that appears as a tree.
10. _____ is the subset of SQL commands used to manipulate Oracle Structures, including tables

- II. Answer ALL the questions. (5 × 2 = 10)
11. Write a note on relationship types.
12. Define inheritance.
13. List out the techniques of spatial database query.
14. Mention the three main types of XML document.
15. What is Integrity constraints?

PART B — (5 × 5 = 25)

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

16. (a) List out the types of relationship in database systems.
 Or
 (b) Define normalization and Explain about 1NF, 2NF and 3NF.
17. (a) Briefly discuss about distributed data storage with a technique of data replication.
 Or
 (b) Elucidate object and reference types.
18. (a) Mention the characteristics of spatial database.
 Or
 (b) Explain propositional calculus with an example.

19. (a) What is the difference between LAN and WAN?

Or

- (b) What is meant by layers of networking? Explain.
20. (a) Explain abstraction in programming with example.

Or

- (b) Explain media composition with example.

SECTION C — (3 × 10 = 30)

Answer any THREE questions.

21. Explain Applications of Multimedia in detail with examples.
22. Explain in detail about 3D animation modeling.
23. Explain in detail Multimedia Operating System.
24. What is multimedia communication? Explain Multimedia networks in detail.
25. Explain in detail about multimedia applications with suitable examples.

S.No. 6794

P 22 ITVAC 1

(For candidates admitted from 2022–2023 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Information Technology — Value Added Course

MULTIMEDIA AND ANIMATION

Time : Three hours

Maximum : 75 marks

SECTION A — (20 marks)

Answer ALL questions.

- I. (A) Choose the correct answer: (5 × 1 = 5)
1. Which of the following is a component of multimedia?
- (a) Text (b) Images
- (c) Audio (d) All of these
2. Which of the following is audio file format?
- (a) mpeg-3 (b) tiff
- (c) jpeg (d) gif

3. Data compression means to _____ the file size.
- Increase
 - Decrease
 - Increase and decrease
 - None of the above
4. Which type of topology is best suited for large businesses which must carefully control and coordinate the operation of distributed branch outlets?
- Ring
 - Local area
 - Hierarchical
 - Star
5. Which of the following is not a user interface design process?
- User, task, and environment analysis and modeling
 - Interface design
 - Knowledgeable, frequent users
 - Interface validation
- (B) Fill in the blanks: (5 × 1 = 5)
6. MPEG stands for _____.
7. Audio that represented as a series of binary numbers is called _____.
8. _____ is the collection of multimedia elements displayed on a computer screen for user interaction.

9. A computer that connects to the internet is called _____.
10. A wired network that is found in a single building is called _____.
- II. Answer ALL questions: (5 × 2 = 10)
- What are the main uses of multimedia?
 - What is animation software?
 - Why is the importance of data compression?
 - What is the purpose of networking?
 - Define user interface.

SECTION B — (5 × 5 = 25)

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

16. (a) Explain the components of Multimedia.
Or
(b) Explain the function of multimedia resources in global communication.
17. (a) What are the components of sound?
Or
(b) What is video and explain its types?
18. (a) What is data compression and its types?
Or
(b) Explain JPEG compression in multimedia.

(6 pages)

S.No. 6793

P 22 ITE 1 C

(For candidates admitted from 2022–2023 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Information Technology – Elective

GREEN COMPUTING

Time : Three hours

Maximum : 75 marks

PART A — (20 marks)

Answer ALL questions.

- I. (A) Multiple choice questions : (5 × 1 = 5)
1. Green computing is otherwise known as _____
 - (a) Green technology
 - (b) Eco-friendly
 - (c) Eco-favoured
 - (d) Green calculating
 2. Where is India's first green building located?
 - (a) ITC Green Centre, Gurgaon
 - (b) CII – Sohrabji Green Business Centre, Hyderabad
 - (c) Wipro Technologies, Gurgaon
 - (d) Suzlon one Earth, Pune

3. This program or an operating system feature allows user to connect to a computer in another location
 - (a) Remote Desktop
 - (b) Intranet
 - (c) EDI
 - (d) E-Commerce
4. _____ includes tools for process modeling and many of the process-enabling technologies such as business rules, policies, and metrics
 - (a) Green ICT
 - (b) Green IT
 - (c) Green Computing
 - (d) Green Policy
5. WEEE stands for _____
 - (a) Wastern Electrical and Electronic Equipment
 - (b) Waste Electrical and Electronic Equipment
 - (c) Wifi Electrical and Electronic Equipment
 - (d) World Electrical and Electronic Equipment

(B) Fill in the blanks : (5 × 1 = 5)

6. _____ refers to the environmentally responsible and eco-friendly use of computers and their resources.
7. _____ plays an important role in overall platform energy efficiency.
8. _____ the cost of production by retrieving returned and recycled material from IT equipment.
9. A _____ describes how an organization creates, delivers, and captures value, in economic, social, cultural or other contexts.
10. Green IT-based software applications also have _____ in that they help reduce GHG emissions associated with social and organizational processes, products and services.

II. Answer the following. (5 × 2 = 10)

11. Define Green IT.
12. What is Data Efficiency?
13. What are the major categories of information systems within an organization?
14. What is the role of technology architecture?
15. What are greenhouse gases?

PART B — (5 × 5 = 25)

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

16. (a) Discuss in detail about Green IT fundamentals.
Or
(b) Write in detail about Green IT strategies.
17. (a) Give a few examples to illustrate how context awareness leads to 'smarter' devices.
Or
(b) How do processors C-states save energy? Explain.

18. (a) Identify and discuss the four major ways in which organizations can gain value by greening an enterprise.

Or

- (b) How can green inter-organizational activities be supported with IT and IS activities? Elaborate.

19. (a) Describe the components necessary for successfully managing green IT.

Or

- (b) Discuss information assurance and risk management as part of the process of implementation of green IT.

20. (a) Explores the complex web of regulatory, business and other forces acting on all organizations to adopt green IT strategies.

Or

- (b) Differentiate between RoHS and REACH.

PART C — (3 × 10 = 30)

Answer any THREE questions.

21. Discuss the philosophy, pros and cons of carbon trading.
22. Briefly discuss in detail about various energy-saving software methodologies.
23. With neat diagram, explain typical ERP system with modules and relationships.
24. Elucidates how to demonstrate a strong return on investment on green IT implementation and techniques of a successful metrics programme.
25. Write a brief note on the following
- (a) Green building standards
 - (b) Green data centers

(For candidates admitted from 2022–2023 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Information Technology–Core Choice Course

ADVANCED DATA STRUCTURES

Time : Three hours

Maximum : 75 marks

PART A — (20 marks)

Answer ALL questions

- I. (A) Choose the Correct Answer (5 × 1 = 5)
1. The data structure required to check whether an expression contains a balanced parenthesis is _____
 - (a) Stack
 - (b) Queue
 - (c) Array
 - (d) Tree
 2. Which scheme uses a randomization approach?
 - (a) hashing by division
 - (b) hashing by multiplication
 - (c) universal hashing
 - (d) open addressing
 3. In a binary max heap, worst case complexity will be
 - (a) $O(n)$
 - (b) $O(\log n)$
 - (c) $O(\log \log n)$
 - (d) $O(1)$
 4. What are the operations that could be performed in $O(\log n)$ time complexity by red-black tree?
 - (a) insertion, deletion, finding predecessor, successor
 - (b) only insertion
 - (c) only finding predecessor, successor
 - (d) for sorting
 5. Floyd Warshall algorithm is used for solving _____
 - (a) all pair shortest path problem
 - (b) single source shortest path problem
 - (c) network flow problem
 - (d) sorting problem
- (B) Fill in the Blanks (5 × 1 = 5)
6. Process of inserting an element in stack is called _____
 7. _____ Steps are involved in creating a hash function using a multiplication method.

8. _____ can be used as priority queue.
9. Double rotation is also called as _____
10. The general method to solve the single-source shortest-path problem is known as _____
- II. Answer ALL questions (5 × 2 = 10)
11. Write the Difference between stack and queue.
12. What is hash function?
13. Define percolate down.
14. What is double rotation?
15. Determine topological Sort.

PART B — (5 × 5 = 25)

Answer ALL the questions choosing either (a) or (b)

16. (a) Define circularly list and explain its types.
Or
(b) Write a short note on merge sort with an example.
17. (a) Explain about separate chaining.
Or
(b) Illustrate the following:
 - (i) Universal hashing
 - (ii) Extendible hashing

18. (a) Elucidate Maxheap.

Or

- (b) Give a short note on basic heap operations.
19. (a) Explain how to insert and delete an element in a tree.

Or

- (b) Mention the properties of red-black tree.
20. (a) Discuss about Bellman Ford algorithm.

Or

- (b) Illustrate Floyd Warshall algorithm.

PART C — (3 × 10 = 30)

Answer any THREE questions

21. Discuss about quick sort algorithm with an example.
22. Elucidate Hash Tables without Linked Lists.
23. Write a detailed note on Binary Heap.
24. Explain how to perform insertion and deletion of an element in red-black tree with suitable example.
25. Demonstrate Shortest-Path Algorithms with example.

18. (a) What is Master pages in ASP.NET? Explain.
Or
(b) Explain about the web parts in ASP.NET.
19. (a) Write about the security features available in ASP.NET.
Or
(b) Write the different build in facility available for mobile application development in ASP.NET.
20. (a) Explain the role web services in distributed computing.
Or
(b) Write short notes on UDDI.

PART C — (3 × 10 = 30)

Answer any THREE questions.

21. Describe about the strategies involved in remote computations.
22. Explain about the Forms view control in ADO.NET with examples.
23. How Multiview control is working in ASP.NET? Write an example.
24. Describe about the state management in ASP.NET.
25. How to access web service through ASP.NET? Explain.

S.No. 6804

P 22 ITCC 3 A

(For candidates admitted from 2022-2023 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Information Technology — Core Choice Course

DISTRIBUTED TECHNOLOGIES (Theory)

Time : Three hours

Maximum : 75 marks

PART A — (20 marks)

Answer ALL the questions.

- I (A) Choose the correct answer. (5 × 1 = 5)
1. Which of the following are models of middleware that are belong to distributed object technology.
(a) RPC and RMI (b) RPC and CORBA
(c) MOM and RMI (d) RMI and CORBA
2. If you are using the Data Set and you have to display the data in sorted order what will you do?
(a) Use Sort method of DataTable
(b) Use Sort method of Dataset
(c) Use DataView object with each sort
(d) Use datapaging and sort the data

3. What is the file extension of web service in ASP.NET?

- (a) .ascx (b) .asmx
(c) .aspx (d) .docx

4. Difference between Response.Write() and Response.output.write().

- (a) Response.Output.Write() allows you to buffer output
(b) Response.output.Write() allows you to write formatted output
(c) Response.output.write() allows you to flush output
(d) Response.output.write() allows you to stream output

5. Which of the following layer in Web Service Protocol Stack is responsible for describing the public interface to a specific web service?

- (a) Service Description (b) XML Messaging
(c) Service Transport (d) Service Discovery

(B) Fill in the blanks: (5 × 1 = 5)

6. _____ is a physical clock synchronization Algorithm

7. _____ object is used to fill a DataSet/Data Table with query results in ADO.net.

8. _____ validation control in ASP.NET can be used to determine if data that is entered into a TextBox control is of type Currency.

9. Cookies can store data up to _____.

10. SOAP is a format for sending messages and is also called as _____ protocol.

II Answer ALL questions. (5 × 2 = 10)

11. What is NET?

12. What is the use of Form Viewcontrol?

13. What is AdRotator?

14. How to Build a Mobile App with NET?

15. What is the purpose of WSDL?

PART B — (5 × 5 = 25)

Answer ALL the questions either (a) or (b).

16. (a) What are types of Communication in Distributed computing?

Or

(b) Write the challenge involved in establishing remote connection.

17. (a) Describe about the grid view in ADO.NET.

Or

(b) Explain about the crystal reports in ADO.NET.

20. (a) Explain reading files in R Programming.

Or

(b) How to create a dataset in R?

PART C — (3 × 10 = 30)

Answer any THREE questions.

21. How to prevent scientific notation in R? Explain with example code.
22. Elaborate Subsetting in R Programming with suitable examples.
23. Detail about Operations on String Matching with suitable examples.
24. Describe in detail about the three special values NA, NaN, and NULL.
25. Explain the Graphical Parameters in R with suitable examples.

S.No. 6803

P 22 ITCC 32

(For candidates admitted from 2022–2023 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Information Technology

PROBLEM SOLVING USING R

Time : Three hours

Maximum : 75 marks

PART A — (20 Marks)

- I. (A) Choose the Correct Answer (5 × 1 = 5)
1. R functionality is divided into a number of _____
 - (a) Packages
 - (b) Functions
 - (c) Domains
 - (d) Classes
2. Which function is used to combine the elements into a vector?
 - (a) C()
 - (b) D()
 - (c) E()
 - (d) F()
3. Numbers in R are generally treated as _____ precision real numbers.
 - (a) single
 - (b) double
 - (c) real
 - (d) imaginary

19. (a) What is a Low-Level Virtual Machine? Explain.

Or

(b) Detail about Static Single Assignment Form with example.

20. (a) Explain the importance of Code Hoisting.

Or

(b) Write out the Peephole Optimization Techniques.

PART C — (3 × 10 = 30)

Answer any THREE questions.

21. Elaborate the six phases of a compiler in detail with examples.
22. Explain LR Parser in detail with a neat diagram.
23. Detail about Types of AST with its structure and suitable examples.
24. Describe in detail about Control Flow Graph with a suitable example.
25. Explain in detail about Code Generation Functions with suitable examples.

S.No. 6802

P 22 ITCC 31

(For candidates admitted from 2022–2023 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Information Technology

PRINCIPLES OF COMPILER DESIGN

Time : Three hours

Maximum : 75 marks

PART A — (20 marks)

Answer ALL questions.

- I. (A) Choose the correct answer : (5 × 1 = 5)
1. Which of the following errors can be a compiler check?
 - (a) Syntax Error
 - (b) Logical Error
 - (c) Both Logical and Syntax Error
 - (d) The compiler cannot check errors
2. A grammar that produces more than one parse tree for some sentence is called _____
 - (a) Ambiguous
 - (b) Unambiguous
 - (c) Regular
 - (d) None of the mentioned

3. Which tool is used for grouping of characters in tokens in the compiler?
 - (a) Parser
 - (b) Code optimizer
 - (c) Code generator
 - (d) Scanner
 4. Which of the following parsers is the most powerful?
 - (a) SLR
 - (b) LALR
 - (c) Canonical LR
 - (d) Operator-precedence
 5. Code generation can be considered as the?
 - (a) first phase of compilation
 - (b) second phase of compilation
 - (c) third phase of compilation
 - (d) final phase of compilation
- (B) Fill in the Blanks (5 × 1 = 5)
6. Characters are grouped into tokens in _____ phase.
 7. Shift reduce parsers are _____.
 8. Parsing is categorized into _____ types.
 9. The _____ phase attempts to improve the intermediate code so that it runs faster and consumes fewer resources.

10. _____ descriptor are used to keep track of memory locations where the values of identifiers are stored
- II. Answer ALL questions. (5 × 2 = 10)
11. What is compiler design?
 12. Define Parsing.
 13. What is the purpose of a syntax tree?
 14. Brief about Stack Machine IR.
 15. Why code generation is important?

PART B — (5 × 5 = 25)

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

16. (a) Explain various types of compilers.

Or

 (b) Differentiate Tokens, Patterns, and Lexeme.
17. (a) Detail about the need for Top-down parsing.

Or

 (b) Write the advantages of using a compiler to translate high-level programming languages into machine code.
18. (a) Explain AST Declarations with examples.

Or

 (b) Write about AST Statements with their structure.

18. (a) Explain the command-line interface for programming.

Or

(b) Describe about the infrastructure as code.

19. (a) Describe about Ops works in detail.

Or

(b) How to develop an application in a flexible cloud environment?

20. (a) Describe about the AWS identity and Access Manager.

Or

(b) How to allow ICMP traffic?

SECTION C — (3 × 10 = 30)

Answer any THREE questions.

21. Explain the benefits of using ASW in detail.
22. Describe the optimizing costs for virtual machines in detail.
23. Explain the blue print to start a virtual machine.
24. How to deploying a simple web applications with AWS Elastic Beanstalk? Explain.
25. Describe about the Amazon Virtual Private Cloud.

S.No. 6806

P 22 ITE 3 A

(For candidates admitted from 2022–2023 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023

Information Technology — Elective

WEB SERVICES

Time : Three hours

Maximum : 75 marks

SECTION A — (20 marks)

- I. (A) Choose the correct answer : (5 × 1 = 5)
1. Amazon Web Services falls into which of the following cloud-computing category?
 - (a) Software as a Service
 - (b) Back-end as a Service
 - (c) Platform as a Service
 - (d) Infrastructure as a Service
 2. What are the different types of instances in Amazon Web Services?
 - (a) General Purpose, Computer Optimized
 - (b) Memory Optimized, Storage Optimized
 - (c) Instance Features, Measuring Instance Performance
 - (d) All of The Above

3. EC2 stands for?
 - (a) Elastic Compute Cloud
 - (b) Elastic Cloud Compute
 - (c) Elastic Configuration Cloud
 - (d) Elastic Cloud Configuration
4. _____ is the virtual disk in a cloud?
 - (a) Elastic compute cloud
 - (b) Elastic block storage
 - (c) Elastic byte storage
 - (d) Simple storage service
5. Which is a correct API Endpoint type in AWS?
 - (a) Edge-optimized API endpoint
 - (b) Private API endpoint
 - (c) Regional API endpoint
 - (d) All of these

(B) Fill in the blanks : (5 × 1 = 5)
6. The connection between API Gateway and backend integrations such as Lambda functions is:
7. _____ is a system for creating block-level storage devices that can be used for Amazon Machine Instances in EC2.
8. A virtual CloudFront user is called an OAI. This stands for _____.

9. _____ are used to grant permissions to your IAM Users to access AWS resources within your own or different account.
 10. There are _____ types of VPC endpoints.
- II. Answer ALL questions : (5 × 2 = 10)
11. What is AWS Console?
 12. What is virtual machine?
 13. What is AWS Command Line Interface?
 14. What is AWS OpsWorks Stack?
 15. What is the use of IAM?

SECTION B — (5 × 5 = 25)

Answer ALL the questions, either (a) or (b)

16. (a) How to interact with AWS? Explain.

Or

 (b) Compare AWS services with any other cloud service.
17. (a) How to change the size of a virtual machine? Explain.

Or

 (b) Write the steps to add an additional network interface to a virtual machine.

18. (a) What are the challenges faced by export oriented companies in the Indian service sector?

Or

- (b) State the growth of advisory services in India's export.
19. (a) Demonstrate the utility of marginal cost approach in international pricing decisions.

Or

- (b) Discuss the ways and means of overcoming exchange rate fluctuations
20. (a) Summarize the role of Indian Institute of Packaging.

Or

- (b) Outline the functions of ITPO.

SECTION C — (3 × 10 = 30)

Answer any THREE questions.

21. Evaluate the role of exports in India's economic development.
22. Assess the objectives of export planning.
23. Examine the role and functions of EXIM bank in India's exports.
24. Discuss the pros and cons of various pricing strategies adopted by exporters.
25. Evaluate the performance of India's export sector since the economic reforms in 1990.

S.No. 9030

P 22 MBA NME 2

(For candidates admitted from 2022–2023 onwards)

P.G. DEGREE EXAMINATION, NOVEMBER 2023

Business Administration – Non Major Elective

EXPORT MANAGEMENT

Time : Three hours

Maximum : 75 marks

SECTION — A (20 marks)

Answer ALL questions.

- I (A) Multiple choice question (5 × 1 = 5)
1. Which one of the following can be categorized as the principal export item for India in 2021-22?
- (a) Statues
(b) Precious Grass
(c) Toys
(d) Oil and Petroleum products
2. Which managerial skill is vital for overseeing and adjusting the various elements of an export plan to meet objectives?
- (a) Product planning
(b) Organization
(c) Management control
(d) Designing products for exports

