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BT-4/M-22 **44218**

INTERNET & WEB TECHNOLOGY

Paper – PC-CS-AIDS-208A/ES-SC-SYS-208A/
PC-SC-A-ML-208-A

Time : Three Hours] [Maximum Marks : 75

Note : Students will be required to attempt *five* questions in all selecting at least *one* question from each Unit-I to Unit-IV. All questions carry equal marks.

UNIT–I

1. (a) Discuss the role of information architect in web engineering. Discuss organizational challenges for managing organizational information.

   (b) What are the different types of navigation systems and its integrated elements? How do you design an elegant navigation system? (8+7=15)

2. (a) Elaborate the steps for designing search interface for searching your web site. How do you search group content?

   (b) Draw a neat sketch and explore the components of high level architecture blueprint. (8+7=15)

UNIT–II

3. (a) How is XHTML better than HTML? Why would you want to use XHTML? How to create table and design forms?

   (b) What do you understand by HTML tags? How many tags are required to create a web page in HTML5? (8+7=15)

4. (a) What is Box model in Cascading Style Sheet (CSS)? Discuss the limitations and advantages of CSS. Explain different types of selectors in CSS.

   (b) Discuss CSS font properties, alignment of text and conflict resolution. (8+7=15)

UNIT–III

5. (a) Explain the difference between :

   (i) Undefined and not defined in JavaScript.

   (ii) The await keyword and the yield keyword.

   (b) What do you understand by host objects and native objects? How objects are created and modified? (8+7=15)

6. (a) What is regular expression in JavaScript and how it can be used for pattern? Explain with suitable example.

   (b) What is meant by control statements? Discuss different kind of loops with suitable illustration. (8+7=15)

UNIT–IV

7. (a) Why do we use slicing in strings? State any eight built in functions on Strings in Python.

   (b) Give a comparison between lists, tuples, dictionaries and sets. (8+7=15)

8. (a) Discuss int(), float(), str(), float() and complex() type conversion functions with examples.

   (b) What do you mean by an operand and an operator? Illustrate your answer with relevant example. (8+7=15)

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BT-4/M-22 **44219**

DATA BASE MANAGEMENT SYSTEMS

Paper – PC-CS-AIDS-210A/PC-CS-CYS-206A/
PC-CS-A/M/-206A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, selecting at least *one* question from each unit. All questions carry equal marks.

UNIT–I

1. Describe the main characteristics of the database approach and discuss how it differs from traditional file systems. Also sketch the three-Schema architecture of the DBMS and explain.

2. Answer the following questions in brief :

(a) What are the responsibilities of a DBA?

(b) Explain the basic E-R model concepts of entities and their attributes with the help of an example.

(c) What additional modelling concepts are included in the EER model apart from the ones that already exist in the ER model?

UNIT–II

3. (a) Define relation, tuples, attributes and domain in the context of Relational Data base management system.
   (b) Describe the PROJECT and JOIN operations of Relational Algebra with example.

4. Answer the following questions in brief :
   (a) Describe Referential Integrity constraints using an appropriate example.
   (b) Give an example of a query in SQL.
   (c) How is a view described in SQL?

UNIT–III

5. Discuss insertion, deletion and modification anomalies and describe the normalization process up to third normal form and also including Boyce-codd normal form. Highlight the concept of functional dependency and transitive dependency wherever applicable in the normalization process.

6. (a) What is multi-valued dependency and how is it related to fourth normal form (4NF)?
   (b) Define join dependencies and fifth normal form. Why is 5NF also called project-join normal form (PJNF)?

UNIT–IV

7. (a) Describe the properties of transactions that are used to maintain consistency in a database, before and after the transaction.

(b) Why and how is the concept of serializability of schedules used?

8. Answer any *two* of the following :

(a) Distinguish between binary locks and two phase locking.

(b) Discuss the time stamp ordering protocol for concurrency control.

(c) What is a deadlock? How can it be resolved?

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BT-4/M-22 **44227**

MATHEMATICS FOR MACHINE LEARNING

Course No. : BS-CS-AIML-202M

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all by selecting at least *one* question from each unit. All questions carry equal marks.

UNIT–I

1. (a) Explain the history of Data Science. 7½

(b) Explain the history of Machine Learning. 7½

2. (a) Explain the types of Data. 7½

(b) Explain the application of Machine Learning in the modern context. 7½

UNIT–II

3. (a) An urn contains 10 black and 10 white balls. Find the probability of drawing two balls of the same colour. 7½

(b) An urn I contains 3 white and 4 red balls and an urn II contains 5 white and 6 red balls. One ball is drawn at random from one of the urns and is found to be white. Find the probability that it was drawn from urn I. 7½

4. (a) Assuming that 20% of the population of a city are literate, so that the chances of an individual being literate is 1/5, and assuming that 100 investigators each take 10 individuals to see whether they are literate, how many investigators would you expect to report 3 or less were literate. 7½

(b) The 9 items of a sample have the following values 45, 47, 50, 52, 48, 47, 49, 53, 51. Does the mean of these values differ significantly from the assumed mean 47.5 ? The tabular value of t at 5% level for 8 d.f. is 2.31. 7½

UNIT–III

5. (a) If $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$, determine two non-singular matrices P and Q such that PAQ = 1. 7½

(b) Define eigen value and eigen vector of a matrix. Prove that eigen values of an idempotent matrix are either zero or unity. 7½

6. (a) Find the eigen values and eigen vectors of the matrix

$$A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}.$$ 7½

(b) State Cayley-Hamilton theorem. By using this theorem compute A^{-1} for the matrix. 7½

$$A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}.$$

UNIT–IV

7. Diagonalise the matrix $A = \begin{bmatrix} 11 & -4 & -7 \\ 7 & -2 & -5 \\ 10 & -4 & -6 \end{bmatrix}$. 15

8. Compute the singular value decomposition (SVD) of the matrix $A = \begin{bmatrix} 1 & 0 & 1 \\ -2 & 1 & 0 \end{bmatrix}$. 15

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BT-4/M-22 **44228**

INTELLIGENT SYSTEMS

Paper–PC-CS-AIML-204A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, selecting at least *one* question from each unit.

UNIT–I

1. (a) What are NP problems? What are NP-complete problems? Why do we categorize AI problems in NP?

(b) Differentiate between propositional and symbolic logic. Define the terms tautology and satisfiability with example for each. (8, 7)

2. (a) What do you mean by knowledge base? Explain the processes involved in knowledge engineering.

(b) What is the use of symbolic logic? Give two example notations and explain how AI approaches will be benefitted by symbolic and sub-symbolic logic? (6, 9)

UNIT–II

3. (a) What is hill climbing problem? Describe it. Why is it categorized as an optimization problem? What kind of problems can it solve?

   (b) What is the paradigm behind ant colony. Is ant colony optimization a swarm intelligence technique? Describe probability decision rule and pheromone trail updation rule in ACO. (8, 7)

4. (a) Why do we say that PCA is dimensionality reduction technique? Describe the need for covariance matrix computation and eigenvector computation here.

   (b) Illustrate parameters of Gaussian mixture functions. Describe in detail the expectation- maximization method used in GMM. (7, 8)

UNIT–III

5. (a) What characteristics do intelligent system possess? What are rule based systems?

   (b) Why do we apply conflict resolution strategies? Discuss two such methods. (9, 6)

6. (a) What are the features of forward chaining and backward chaining as applied to intelligent systems.

   (b) Explain challenges and phases involved in knowledge acquisition. (9, 6)

UNIT–IV

7. (a) Explain the importance of membership functions in fuzzy systems. Give different fuzzy set operations.

   (b) What are expert systems? What are decision support systems? Explain how AI will be applied in these systems. (7, 8)

8. (a) Why natural language processing is an AI application area? What different technologies are used in NLP?

   (b) How semantic web works? Discuss different available technologies. (7, 8)

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BT-4/M-22 **44232**

SOFTWARE ENGINEERING

Paper–PC-CS-AIML-212A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, selecting at least *one* question from each unit. All questions carry equal marks.

UNIT–I

1. (a) What are the problems with waterfall model? Also give an example to illustrate your point of view.

(b) What is rapid application development? Evaluate its advantages. (8,7)

2. (a) What is spiral model? Explain.

(b) Tabulate various software development life cycle models. Illustrate strength and weakness of each approach. (6,9)

UNIT–II

3. (a) What do you mean by software quality? Explain some metrics related to software quality.

(b) What are components of IEEE standard for SRS? Describe in detail. (8,7)

4. (a) What is requirements engineering? How to specify a requirement?

(b) Define software quality assurance. What are different SQA activities? (7,8)

UNIT–III

5. (a) Describe function point and COCOMO model with examples.

(b) What are Halstead metrics? Describe in detail. (9,6)

6. (a) Justify the use of measurement in software engineering. Explain those collection of metrics that provide an indication of cohesiveness.

(b) How are function points derived? What are the manners in which information domain values are defined? (9,6)

UNIT–IV

7. (a) Explain the need for testing. Describe the steps involved in testing before a product launch.

(b) What are the general guidelines recommended in software design and coding standards? Discuss. (7,8)

8. (a) Explain software maintenance principles. What are different issues involved during software maintenance?

(b) What are the unique characteristics of errors encountered in a successful application testing? Explain the testing and debugging process that should be adopted here. (7,8)
