

END TERM EXAMINATION

THIRD SEMESTER [MCA] JANUARY-FEBRUARY 2023

Paper Code: MCA201

Subject: Design and Analysis of Algorithms

Time: 3 Hours

Maximum Marks: 75

Note: Attempt five questions in all including Q.No.1 which is compulsory.

Select one question from each Unit.

Q1 Attempt all parts:

[2.5x10=25]

- a) Define "Optimal Substructure" in dynamic programming
- b) Can we get more than one minimum spanning trees for a given weighted undirected connected graph?
- c) Write your comments on the implications of knowing an exact relationship that is "equality" or "Non-equality" in between P and NP complexity classes.
- d) Show that the number of vertices with odd degree in a graph is always even
- e) Why Minimum tree spanning is tractable (Solvable in polynomial time), whereas travelling salesman problem is in NP?
- f) Whether this statement is true or false "**Some problems in NP complete can not be transformed into satisfiability problem in Polynomial time**"
- g) Mention the complexity of the quick sort algorithm for best and worst case. $O(n \log n)$ $O(n^2)$
- h) What is a randomized algorithm?
- i) What is the complexity of Floyd-warshall algorithm? $O(n^2)$ $O(n^3)$
- j) Write an Optimal Huffman Code for the following Set of Frequencies based on the first 8 fibonacci numbers?
a:1 b:1 c:2 d:3 e:5 f:8 g:13 h:21

UNIT-I

- Q2 Comment on the Tradeoff in between the Time and Space Complexity of an Algorithm. State Masters theorem. What is the regulatory condition? (12.5)
- Q3 Find the Solution of the following recurrence equations (12.5)
 - (a) $T(n) = 2T(n/2) + \log n$
 - (b) $T(n) = 8 T(n/2) + n^2$
 - (c) $T(n) = T(n-1) + T(n-2)$

UNIT-II

- Q4 Explain Divide and conquer. How Strassen applied it to the matrix problem? Compare the asymptotic time complexity of the classical matrix multiplication algorithm to Strassen's algorithm? (12.5)
- Q5 Explain KMP Algorithm for String Matching. Illustrate its working when the text is aaabaadaabaaa and the pattern is aabaa? Repeat the process for Naive string pattern matching algorithm (12.5)

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UNIT-III

- Q6. What does Dynamic Programming have common with Divide and conquer and what are the differences? Write a function that takes two parameters n and k and returns the value of Binomial Coefficient $C(n, k)$ using dynamic programming (12.5)
- Q7. Define the basic ingredients of Greedy Method in the Context of Kruskal's Algorithms and Explain and analyze it's time Complexity (12.5)

UNIT-IV

- Q8. What would be the characteristics of problems that are harder than NP complete problems? Prove that vertex cover problem is poly-time reducible to clique problem. (12.5)
- Q9. Prove that CNF satisfiability problem is NP Complete (12.5)

END TERM EXAMINATION

THIRD SEMESTER [MCA] JANUARY-FEBRUARY 2023

Paper Code: MCA203

Subject: Artificial Intelligence
and Machine Learning

Time: 3 Hours

Maximum Marks: 75

Note: Attempt five questions in all including Q.No.1 which is compulsory.
Select one question from each unit.

- Q1 Attempt **any five** from the following: (5x5=25)
- a) Difference between Boosting and Bagging?
 - b) Compare Over fitting and Under fitting?
 - c) Compare Depth First Search with Breath First Search?
 - d) What is difference between informed and uninformed search?
 - e) What is AI? Mention application of AI.
 - f) What is constraint satisfaction Algorithm?
 - g) What is Heuristic Search?
 - h) What are the various types of Neural Network?

UNIT-I

- Q2 a) Explain the following search algorithms with example: (3x2=6)
- i) MEA
 - ii) AO*
- b) Difference between AI, ML and Deep Learning? Give Suitable Example (6.5)
- Q3 a) Define States Spaces in AI? Why they are useful? Write state spaces for any suitable problem? (6)
- b) Discuss various problems in Hill Climbing Algorithm and how they can be prevented? (6.5)

UNIT-II

- Q4 a) What are the various Inferences rule? Explain. (6.5)
- b) Difference between Predicate and Propositional Logic? Provide example (6)
- Q5 a) What are the importance of Knowledge Representation? Explain with Example? (6.5)
- b) Explain the difference between Forward and Backward Reasoning? (6)

UNIT-III

- Q6 a) Difference between Bias and Variance? (6)
- b) What are various types of Machine Learning's Problems? (6.5)

Supervised
unsupervised
reinforcement
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MCA-203
P_{1/2}

- Q7 a) How Least Square, Total sum of squares and sum of square of residuals are different from each other give example? (6.5)
b) What is confusion matrix? Explain with suitable example? (6)

UNIT-IV

- Q8 a) Why Dimensionality Reduction is important? Explain with suitable example? (6)
b) What is activation function? Why it is important in Machine Learning? (6.5)
- Q9 a) Difference between Feed Forward and Back Propagation Algorithm? (6)
b) Explain Recommender system? With Suitable example? (6.5)

(Please write your Exam Roll No.)

Exam Roll No. 04714004421

END TERM EXAMINATION

THIRD SEMESTER [MCA] JANUARY-FEBRUARY 2023

Paper Code: MCA-239

Subject: Software Quality Management

Time: 3 Hours

Maximum Marks: 75

Note: Attempt five questions in all including Q. No.1 which is compulsory. Select one question from each unit.

- Q1 Answer the following briefly:- (2.5x10=25)
- (a) Briefly discuss the difference between quality control and quality assurance?
 - (b) List and briefly describe different characteristics of SQA environment?
 - (c) List Mc Call's quality metrics?
 - (d) Name any two generic ISO standards. Why it is called generic standard?
 - (e) Compare software quality assurance versus control?
 - (f) Enlist the pre-project components in SQA architecture?
 - (g) State the primary objectives of Six Sigma?
 - (h) What is the need for ISO?
 - (i) Mention the different types of quality audits?
 - (j) Differentiate between classic and extended model of cost of software quality?

UNIT-I

- Q2 (a) Explain about software Quality with its Challenge? (6.5)
(b) Explain components of Software Quality Assurance system with its characteristics? (6)

OR

- Q3 (a) Discuss the benefits of preparing development and quality plans for internal projects. (6.5)
(b) Elaborate the importance of software quality with respect to the software development life cycle? (6)

UNIT-II

- Q4 (a) Elucidate the implementation of quality audit in a textile industry? (6.5)
(b) What are the two stages of Contract Review? Why Contract Review is important? (6)

OR

- Q5 (a) What is review methodology? What are its types? (6.5)
(b) Classify SQA system components and explain at least two major components in detail. (6)

UNIT-III

- Q6 (a) What is a CASE tool? What is the contribution of case tools to software maintenance quality and improved project management? (6.5)
(b) Elaborate the varied process quality metrics available? (6)

OR

- Q7 (a) Explain the objectives of software quality metrics. List the requirements for successful software quality metrics? (6.5)
(b) Elaborate the varied product quality metrics available? (6)

UNIT-IV

- Q8 (a) Explain in detail the principles of ISO 9000:2000 software quality standard? (6.5)
(b) Discuss CMM and how to attain the different levels. (6)

OR

- Q9 (a) Bring out the methodologies adopted in six sigma practices? (6.5)
(b) Elaborate the different IEEE standards for software quality? (6)

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END TERM EXAMINATION

THIRD SEMESTER [MCA] JANUARY-FEBRUARY 2023

Paper Code: MCA253

Subject: Cyber Security & Cyber Laws

Time: 3 Hours

Maximum Marks: 75

Note: Attempt five questions in all including Q.No.1 which is compulsory.

- Q1 Attempt the following in brief: (10x2.5=25)
- a) What is digital media forensics?
 - b) Differentiate among Worms, Viruses, and Trojan Horses.
 - c) Is there a difference between "cybercrime" and "cyberfraud"? Explain.
 - d) Differentiate between passive and active attacks with examples.
 - e) What is a Blind SQL injection attack?
 - f) Define digital media forensics?
 - g) What do you understand by the salient features of the Indian IT Act?
 - h) What is a virus hoax?
 - i) Describe the main principles of information security?
 - j) What is the work of WIPO?
- Q2
- a) What is the cyber threat? How it is different from cybercrime? How do we classify cybercrimes? Explain each one briefly. (6.5)
 - b) Explain the working of email spoofing. Discuss the preventive measures to protect from email spoofing. (6)
- Q3
- a) Discuss the various type of deliberate software attacks designed to damage, destroy or deny service to target systems? (6.5)
 - b) What are the various essential challenges in mobile security? (6)
- Q4
- a) What are Cyber Security Vulnerabilities and what are the common types of Cyber Security Vulnerabilities? (6.5)
 - b) How to Prevent an SQL Injection and How is an SQL Injection attack performed? (6)
- Q5
- a) Suppose that you have a message consisting of 1024 bits. Design a method that will extend a key that is 64 bits long into a string of 1024 bits, so that the resulting 1024 bits can be XORed with the message, just like a one-time pad. Is the resulting cipher as secure as a one-time pad? Is it possible for any such cipher to be as secure as a one-time pad? (6)
 - b) What is cryptography and also explain Symmetric-key cryptography and Asymmetric cryptography? (6.5)
- Q6
- a) Explain in detail Digital Signatures and the Indian IT ACT. (6.5)
 - b) What are some essential parts of the Information Technology ACT that are used to record cyber-crimes? (6)

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MCA-253
P_{1/2}

- Q7 a) What are the steps of the forensic life cycle? (6.5)
b) What are the challenges in Computer Forensics? (6)

Q8 Compare and contrast between IDS(Intrusion Detection System) and IPS(Intrusion Prevention System). What are the various intrusion detection methodologies? Also, explain any three types of threats. (12.5)

MCA-253
P2/2