

[Duration: 3 hrs]

[Max Marks: 80]

- NB: (1) Question No. 1 is compulsory.  
(2) Attempt any three questions out of the remaining five.  
(3) All questions carry equal marks.  
(4) Assume suitable data, if required and state it clearly.

- Q1. ATTEMPT ANY FOUR [20]
- a. Differentiate between Generative Adversarial Network and Variational Auto Encoder.
  - b. Explain Sparse autoencoders.
  - c. What are the benefits of pre-trained models?
  - d. Explain Random Forest algorithm.
  - e. Explain the limitations of 2D learning environments.
- Q2. a. Elaborate on the architecture and challenges of training GANs, particularly focusing on issues like training instability and mode collapse. [10]
- b. A patient goes to the doctor for a medical condition, the doctor suspects three diseases as the cause of the condition. The three diseases are D1, D2, D3, which are marginally independent from each other. There are four symptoms S1, S2, S3, S4 which the doctor wants to check for presence in order to find the most probable cause of the condition. The symptoms are conditionally dependent to the three diseases as follows; S1 depends only on D1, S2 depends on D1 and D2. S3 is depends on D1 and D3, whereas S4 depends only on D3. Assume all random variables are Boolean, they are either 'true' or 'false'. [10]
- i. Draw the Bayesian network for this problem.
  - ii. Write the expression for the joint probability distribution as a product of conditional probabilities.
  - iii. What is the number of independent parameters required to describe this joint distribution?
- Q3. a. Explain transfer learning. Describe different types of transfer learning. [10]
- b. Explain WGAN in detail. [10]
- Q4. a. Explain Variational Auto Encoders in detail. [10]
- b. Explain AdaBoost in detail. [10]
- Q5. a. Explain Gaussian Mixture Models. [10]
- b. Explain Conditional GAN in detail. [10]
- Q6. a. What is metaverse? Explain the characteristics and components of the metaverse. [10]
- b. Explain Hidden Markov Models. [10]

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- Q1**
- a Explain types of reinforcement learning. **5**
  - b What are the methods used for policy evaluation? **5**
  - c How does TD prediction differ from Monte Carlo prediction? **5**
  - d Describe the main components of an elevator dispatching system. **5**
- Q2.**
- a You are playing a slot machine with three arms. Each time you pull an arm, you either win \$1 or lose \$1 with equal probability. You decide to randomly choose an arm to pull each time. If you play the slot machine 100 times, how much money do you expect to win or lose on average? **10**
  - b Explain with an example scenario where Monte Carlo control might be applied. **10**
- Q3**
- a Imagine you're designing a simple game where a player controls a character to navigate through a maze to reach a treasure chest. The player receives a reward of +10 points upon reaching the treasure chest and -1 point for each move taken. Assume the player starts at the entrance of the maze. **10**
    1. If the player reaches the treasure chest in 15 moves, what is their total reward?
    2. If the player reaches the treasure chest in 20 moves, what is their total reward?
    3. What is the maximum possible reward the player can achieve in this game?
    4. What would be the reward if the player gets stuck in the maze indefinitely?
  - b Explain the advantages and disadvantages of asynchronous updates in dynamic programming. **10**
- Q4**
- a Describe the Q-learning algorithm for TD control **10**
  - b Explain the exploration-exploitation trade-off and its significance in reinforcement learning. **10**
- Q5**
- a Explain the difference between first-visit and every-visit Monte Carlo policy evaluation methods. **10**
  - b Explain how scheduling algorithms optimize routes, minimize delivery times, and allocate resources effectively to meet customer demands while reducing operational costs. **10**

- Q6** a Describe the components of an MDP, including states, actions, transition probabilities, and rewards. **10**
- b What are the advantages and disadvantages of action-value methods compared to other reinforcement learning techniques? **10**
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 3. Assume suitable data if **necessary** and justify the assumptions  
 4. Figures to the **right** indicate full marks

- Q1 Answer the Following. 20**
- A How do recommendation systems handle the cold-start problem? **05**  
 B Explain bandwagon attack with an example. **05**  
 C Explain issues in the Hybridization method of the recommendation system. **05**  
 D Show a scenario where Knowledge based recommender would be useful rather than collaborative and content RS. **05**  
 E How are knowledge-based recommender systems different from collaborative and content based recommender system? **05**
- Q2 A Summarize eleven popular tasks that are normally associated with a Recommendation System. 10**  
 B Explain User-based nearest-neighbor with an example? **10**
- Q3 A Demonstrate Architecture of content-based systems along with an example. 10**  
 B State and explain various similarity based retrieval methods for content based recommendation. **10**
- Q4 A Describe Feature combination hybrid recommendation system with an example. 10**  
 B Demonstrate constraint based recommendation problem with respect to how it is represented and solved. **10**
- Q5 A Explain different evaluation design goals for the recommender system. 10**  
 B Explain error metrics and decision support metrics in the recommendation system. **10**
- Q6 Write Short Notes. (any 4) 20**
- A Covariance matrix. **5**  
 B Conversational Recommendation with help of an example. **5**  
 C Advantages and Disadvantages of Content based recommendation. **5**  
 D Matrix factorization and latent factors. **5**  
 E Pipelined hybridization design **5**

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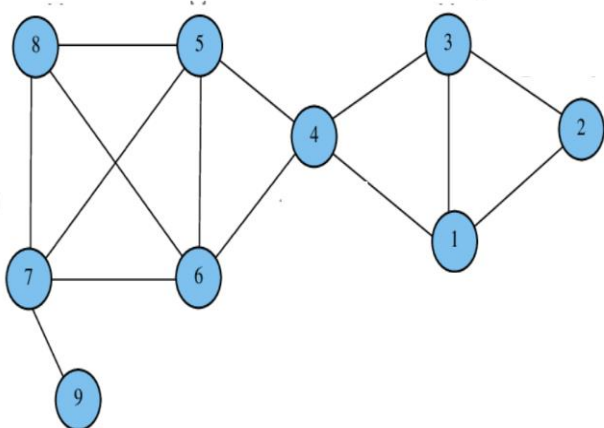
**Q. 1 Answer any 4**

- (a) Differentiate between social media analytics and Traditional Business Analytics. **05**
- (b) Explain the core characteristics of Social Media. **05**
- (c) Explain how social media is the beneficial for the business growth. **05**
- (d) Explain Tie-Strength in social media network structure. **05**
- (e) Explain the four steps in social media risk management. **05**

Q. 2 a) What are different social media KPIs. **10**

b) Explain in detail seven layers of social media analytics. **10**

Q.3 a) Social media network structure is given below. Answer the given questions. **10**



- i) Create an adjacency matrix and adjacency list for this graph.
- ii) Find the degree centrality of each node of the network. Find the Central node of the network.
- iii) Draw the 1.5 egocentric network for node 4.
- iv) Find the density of the graph.
- v) What is the length of the shortest path from node 2 to 7.
- vi) What is the largest clique in this network? How many cliques of that size are there?

b) Explain steps for Text Analytics. Explain static and dynamic text analytics. **10**

- Q.4 a) Compare Traditional recommendation system and Social Recommendation System. **10**
- b) Explain different Challenges for Social Media Analytics. **10**
- Q. 5 a) Elaborate on Social media issues and privacy policies. **10**
- b) What is social media Hyperlink analytics. Explain different types of hyperlink analytics. **10**
- Q.6 Write short notes on **any 4**. **20**
- a) Types of Search engines
  - b) Sources of Location data
  - c) Applications of Social Media Analytics
  - d) Collaborative Filtering for recommendation
  - e) Social media text analytics tools
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(3 Hours)

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**Q1.** Write short notes on the following (Any Four) **20**

- i. Triple constraints in Project Management
- ii. Project charter and Project sponsor
- iii. Project Management Information system
- iv. Goldratt's critical chain methods
- v. Project audits

**Q.2 (a)** Explain stages of team development and growth. What are the advantages of effective team and barriers to team effectiveness? **10**

**(b)** A project is composed of 8 activities, the time estimate for which are given below. **10**

Activity	Predecessor	Duration		
		$t_o$	$t_m$	$t_p$
A	-	2	4	12
B	-	10	12	26
C	A	8	9	10
D	A	10	15	20
E	A	7	7.5	11
F	B, C	9	9	9
G	D	3	3.5	7
H	E, F, G	5	5	5

Z	Probability (P)
0	0.5
0.5	0.6950
1	0.843

- (i) Draw the network diagram.
- (ii) Find the critical path and expected projected duration.
- (iii) Calculate the standard deviation and variance of the project.
- (iv) What is the probability of completing the project on 30-week deadline?

**Q.3 (a)** Explain work breakdown structure and Gantt chart with example. **10**

**(b)** A project requires an initial investment of Rs. 200000 and it is expected to generate a cash flow of Rs. 10000 for 3 years. The target rate of return of the project is 12% per annum. Calculate the net present value of the project. **05**

**(c)** Explain non numeric project selection models. **05**

- Q.4** (a) Explain top down and bottom-up budgeting. **05**  
(b) What is the difference between resource loading and resource leveling? **05**  
(c) Describe probability and impact matrix. Explain risk response strategies for positive and negative risks. **10**
- Q.5** (a) A project in its 20<sup>th</sup> week has an actual cost of Rs. 250,000. It was scheduled to have spent Rs. 241,000. For the work performed to date, the budgeted value is Rs. 252,000. What are the cost and schedule variances for the project? What are the SPI and CPI? **05**  
(b) Describe Earned value management technique in Project Management. **05**  
(c) Explain Project Procurement Management. What is the difference between contracting and outsourcing? **10**
- Q.6** (a) Explain multicultural and virtual projects. **05**  
(b) Why is ethics important in Project management? **05**  
(c) What is project termination? Explain different types of project terminations. **10**

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Note:

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2. Attempt any **three** out of the remaining **Five** questions.
3. Assume suitable data if necessary.

- Q. 1.** Answer **any FOUR** of the following: (20)
- (a) Define Environmental Objective as per ISO 14001
  - (b) What are the challenges in implementation of ISO 14000 standards?
  - (c) Unawareness or ignorance of environmental protection will lead to detrimental consequence comment. Justify the statement.
  - (d) Write short note on Global Warming as a Global Environmental Concern.
  - (e) Discuss on Applications of Environmental Management System..
  - (f) Discuss the key success factors for applied to almost all the operation for EMS implementation.
- Q. 2.** (a) What is Water (P & CP) Act? Give its objectives. (10)
- (b) Discuss in short about Environment Protection Act. (10)
- Q. 3.** (a) Discuss roles of Government as regulatory agency for Environmental Management. Enlist 3 points. (10)
- (b) Explain limiting factors and carrying capacity as related to Ecosystems. (10)
- Q. 4.** (a) What is Total Quality Environment Management Concept? (10)
- (b) How is CSR related to Environmental Management? Explain with an example. (10)
- Q. 5.** (a) Elaborate the ISO 14001 EMS Model for Municipalities. (10)
- (b) Discuss in short about EMS certification. (10)
- Q. 6.** Answer the following (20)
- (a) Discuss on Wildlife protection Act.
  - (b) What are the guidelines to conduct and Environmental audit?

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- 1 Attempt any FOUR [20]
- a Explain the use of mobile computing as digital driver of digital economy
  - b What is the primary goal of the digital application or digital infrastructure?
  - c What are the pillars of e-commerce network?
  - d State and Explain opportunities & Challenges in Digital Business
  - e Explain digital signature.
- 2 a Explain key business processes that the ERP system will support? [10]
- b Explain how B2B-E-commerce-selling and buying in private e-markets. [10]
- 3 a What do you mean by digital business infrastructure? Name the different hardware and software that are used in the e-infrastructure. [10]
- b Explain legal societal and ethics impact of E commerce. [10]
- 4 a Explain in detail what are the most prevalent security threats to e-businesses today? [10]
- b Explain digital certificate in detail. [10]
- 5 a Explain how does the e-business strategy align with the overall business vision and mission? [10]
- b Describe how Amazon used data analytics to enhance its business: [10]
- 6 a Explain what is the key action steps required to implement our e-business strategy? [10]
- b What is business plan? Why it is required in any business organization? [10]

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