Duration: 3hrs **[Max Marks:80]**

N.B. : (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.

1		Attempt any **FOUR**	[20]
	a	What is the role of stemming , lemmatization and stop word removal in text preprocessing? Briefly explain each technique.	5
	b	Explain the HMM model in detail and state its limitations.	5
	c	Discuss two common hiding techniques employed by spammers to conceal their activities from users and search engine crawlers.	5
	d	Define link spamming and describe common techniques used in it.	5
	e	How is behavior analytics used in the context of social media data?	5
2	a	Explain the concept of an inverted index and Latent Semantic Indexing (LSI) in web mining. How do these techniques facilitate efficient web search?	[10]
	b	Explain how spammers manipulate website content and links to unfairly boost search rankings, and discuss methods to detect and prevent such web spam.	[10]
3	a	Describe different approaches to model and integrate social context into recommendation algorithms. Explain evaluation metrics used to assess recommendation system performance.	[10]
	b	Discuss the various relation extraction and NER extraction techniques from unstructured text.	[10]
4	a	Explain distance based clustering algorithm in detail.	[10]
	b	Explain web usage mining possess in detail. How association and correlation analysis is performed in web usage mining?	[10]
5	a	Explain behavior analytics in the context of social media.	[10]
	b	Explain any two text classification algorithms	[10]
6	a	Discuss unsupervised methods of document sentiment classification.	[10]
	b	Explain text mining applications and challenges.	[10]

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(3 Hours) **Total Marks: 80**

N.B.: (1) Question No.1 is compulsory.
(2) Attempt any three questions from the remaining five questions.
(3) Assume suitable data if required and mention it clearly
(4) Figures to right indicate full marks

1. **Solve any four**
   (a) What are the different phases of web application reconnaissance? **05**
   (b) What are some key differences between black-box and white-box vulnerability testing? **05**
   (c) Why should HTTPS be used everywhere in modern web applications? **05**
   (d) Explain the importance of encryption in maintaining the confidentiality and integrity of data in web applications. **05**
   (e) What are the benefits of integrating security in the SDLC? **05**
   (f) What are the key components of web application profiling? **05**

2. (a) What is Cross-Site Scripting (XSS), and what are its types? **10**
   (b) What are the benefits of using open-source security tools over commercial ones? **10**

3. (a) Discuss the security best practices for API development to prevent unauthorized access. **10**
   (b) Compare the impact of design flaws and security bugs in large-scale enterprise applications **10**

4. (a) Discuss the Secure Coding Practices. **10**
   (b) Explain how automation can improve application security in a DevSecOps environment. **10**

5. (a) Describe the importance of penetration testing in cybersecurity. **10**
   (b) Describe the role of CVSS in identifying and prioritizing vulnerabilities. **10**

6. Write a short note on **(Any Two)** **20**
   a) SAST and DAST.
   b) Threat modelling in different types of SDLC
   c)Secure hardware architecture.

Time: 3-hour **Max. Marks: 80**

N.B.: (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.
(5) Notations carry the usual meaning.

Q. 1 Answer any **FOUR.** **20**

a. Explain the necessity of project management in achieving organizational goals.

b. What is Goldratt's critical chain method?

c. What are the numeric and non-numeric models of project selection?

d. What is concurrent engineering?

e. Explain various Reasons for project termination.

f. Define scope creep. What are two ways to control it in a project?

Q.2 a. Describe the typical and atypical project life cycles, highlighting the stages in the stage-gate process. **10**

b. Assume that ABC Inc. is considering two projects, namely Project X and Project Y, and wants to calculate the NPV for each project. Both project X and project Y are four-year projects, and the cash flows of both projects for four years are given below: **10**

Year	Project A Cash Flows in Rs.	Project B Cash Flows in Rs.
1	5000	1000
2	4000	3000
3	3000	4000
4	1000	6750

The firm's cost of capital is 10% for each project, and the initial investment amount is Rs.10,000. Calculate the NPV of each project and determine in which project the firm should invest.

Q.3 a. What are the advantages and risks of outsourcing in project management? **05**

b. List the key components of a project communication plan. **05**

c. Describe the methods of project cost estimation and differentiate between top-down and bottom-up budgeting approaches. **10**

Q.4 a. What are the different types of contracts? Draw the graph showing risk exposure to the buyer and seller in various contract types. **10**

10

b. A small project consisting of ten activities has the following characteristics:

Activity	Preceding Activity	Time Estimate weeks		
		Optimistic	Most likely	Pessimestic
A	–	4	5	12
B	–	1	1.5	5
C	A	2	3	4
D	A	3	4	11
E	A	2	3	4
F	C	1.5	2	2.5
G	D	1.5	3	4.5
H	B,E	2.5	3.5	7.5
I	H	1.5	2	2.5
J	F,G,I	1	2	3

Determine the critical path.

Q.5 a. Explain the Probability and impact matrix. What are the risk response strategies for negative risks(threats) and positive risks(opportunities). **10**

b. Explain the four stages of team development and growth. **10**

Q.6 a. Discuss the various reasons for project termination and explain different types of project termination. **10**

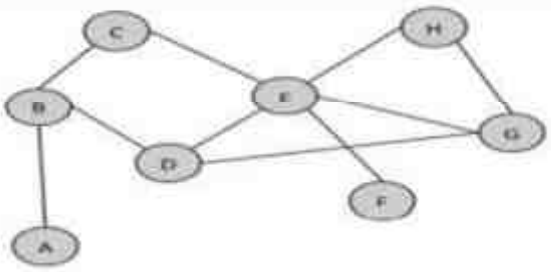
b. Explain the importance of ethics in projects. **05**

c. Explain the Triple constraint of project management in brief. **05**

Duration: 3hrs **[Max Marks:80]**

N.B. : (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.

1		Attempt any FOUR	[20]
	a	Draw and explain the Social Media Analytics Cycle with a detailed description of each stage.	5
	b	Explain Tie strength and trust. What is significance of weak ties in a social network?	5
	c	What is mobile analytics? Explain characteristics of mobile Apps.	5
	d	Explain types of search engines.	5
	e	Explain data privacy, privacy policies and settings, issues related to data ownership on social media in the context of social media platforms. How can individuals protect their personal data when using digital platforms?	5
2	a	Explain in detail the "Seven Layers of Social Media Analytics." Also, discuss the tools commonly used for each layer with suitable examples.	[10]
	b		[10]



Answer the following questions about this graph.

a. What is the degree distribution for this graph? [2mark]
b. What is the density of this graph? [1 mark]
c. Which node(s) have the highest degree? What is the degree? [1 mark]
d. Which node(s) have the lowest degree? What is the degree? [1 mark]
e. Which node has the highest closeness centrality? Calculate it. [2 mark]
f. Which node has the highest degree centrality? [1 mark]
g. Draw the 1.5 egocentric network of node D. [1 mark]
h. Draw 1 egocentric network of node D. [1 mark]

3	a	Explain types of social media text.What are text analytics and explain text analytics steps.	[10]
	b	Explain Social Media Hyperlink Analytics by discussing the types of hyperlinks, types of hyperlink analytics, and commonly used hyperlink analytics tools.	[5]
	c	Explain what action analytics is. Identify some of the existing social media and types of actions used in them.	[5]
4	a	Explain categories of location analytics. What are applications of each category of location analytics?	[10]
	b	Explain Search Engine Analytics. Also, discuss the concepts of Search Engine Optimization (SEO) and Search Trend Analytics. Further, describe the different types of analytics provided by Google Trends with examples.	[10]
5	a	Describe Automated Recommendation Systems and compare Traditional Recommendation Systems with Social Recommendation Systems.	[8]
	b	Discuss the key steps involved in Formulating a Social Media Strategy and highlight how organizations can Manage Social Media Risks effectively.	[6]
	c	Explain the importance of Understanding Social Media and Business Alignment, and describe key Social Media KPIs used to measure performance.	[6]
6	a	Discuss a case study highlighting effective use of social media in the public sector.	[10]
	b	Discuss how businesses can measure the success of their social media initiatives. Explain the importance of interaction and monitoring in business social media strategies.	[10]

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Paper / Subject Code: 50016 / Recommendation Systems

(3 hrs.) **Maximum Marks = 80**

N.B. 1. Question No. 1 is compulsory
2. Attempt any three questions from remaining five questions
3. Assume suitable data if necessary and justify the assumptions
4. Figures to the right indicate full marks.

			Marks
Q1.		Attempt any four	
	A.	Discuss few of the Evaluation design goals of Recommender Systems	5
	B.	Compare User-based nearest neighbour recommendations and Item-based nearest neighbour recommendations.	5
	C.	Explain the various attacks on Collaborative filtering-based RS.	5
	D.	Explain bandwagon attack with an example.	5
	E.	Discuss the basic types of knowledge-based Recommendation Systems.	5
Q2.	A.	Describe various methods for learning user profiles in content-based filtering.	10
	B.	Discuss the advantages and drawbacks of collaborative filtering.	10
Q3.	A.	Explain various Similarity based retrieval methods for content based recommendation	10
	B	Discuss the various recommendation system properties to be considered while evaluating it.	10
Q4	A.	Explain Regression based recommendation system.	10
	B.	Describe high level architecture of content-based recommendation system.	10
Q5	A.	Discuss the comparative analysis between different types of Recommendation Systems	10
	B.	Explain various types of Parallelized hybridization design methodologies in detail.	10
Q6	A.	Briefly discuss Search based recommendations	10
	B.	Describe monolithic hybridization design?	10

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83021

Duration 3 hours **Total marks 80**

N.B: (1) Question No. 1 is compulsory.
(2) Attempt any three questions out of the remaining five questions

Q 1. Attempt any four question **20 marks**

a. Define reinforcement learning and explain the key components involved in the RL framework. 5
b. Explain exploration approach and exploitation approach in multi armed bandit problem? 5
c. Enlist components of MDP model and explain in detail?5
d. What is the Bellman equation, and how does it relate to value iteration and policy iteration?5
e. Define Temporal Difference and explain parameters of TD in detail? 5

Q 2. A. **20 marks**

i. Discuss the difference between on-policy and off-policy learning. Provide examples of algorithms that fall into each category. 6
ii. What is optimal policies and explain optimal value function (q*)? 4

B.

i. Compare between value iteration and Policy iteration? 5
ii. Write gradient bandit algorithm and explain its steps? 5

Q. 3 **20 marks**

a. Define Offpolicy algorithm and onpolicy algorithm and identify SARSA is which type of algorithm and why? Write SARSA algorithm in detail? 10
b. Write Epsilon Greedy algorithm in detail with any one example? 10

Q. 4 **20 marks**

a. Explain the concept of Monte Carlo Prediction in reinforcement learning and describe the main steps involved in a Monte Carlo prediction algorithm. 10
b. Explain the concept of Deep Q-Networks (DQN) and discuss how deep learning can be integrated with Q-learning to solve complex problems. 10

Q. 5 **20 marks**

a. Write and explain off policy TD control using Q-learning? 5
b. Explain Generalised policy iteration of policy evaluation and policy improvement? 5
c. Define Agent and Environment and explain Agent Environment interface with diagram? 5
d. After 12 iterations of the UCB 1 algorithm applied on a 4-arm bandit problem, we have n1 = 3, n2 = 4, n3 = 3, n4 = 2 and Q12(1) = 0.55, Q12(2) = 0.63, Q12(3) = 0.61, Q12(4) = 0.40. Which arm should be played next? 5

Q. 6 **20 marks**

a. Explain the differences between TD learning and Monte Carlo methods. Also, describe the main components and key steps involved in TD prediction algorithms. 10
b. Explain the concept of Elevator Dispatching in a multi-floor building with diagram. Discuss the objectives and challenges of an elevator dispatching system. 10

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Duration:(3 hrs.) **[Maximum 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 Contractive autoencoders.
c. What are the benefits of pre-trained models?
d. Explain XGBoost regression.
e. Explain the limitations of 2D learning environments.

Q2. a. Explain WGAN in detail. [10]
b. Explain the MinMax loss function used in GAN, along with the components of GAN. [10]

Q3. a. Explain transfer learning. Describe different types of transfer learning. [10]
b Explain DCGAN in detail. [10]

Q4. a. Explain Sparse autoencoders in detail. [10]
b. Explain AdaBoost in detail. [10]

Q5. a. Explain Gaussian Mixture Models. [10]
b. Explain CycleGAN in detail. [10]

Q6. a. What is metaverse? Explain the characteristics and components of the metaverse. [10]
b. Explain Markov Random Field in detail. [10]

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