SEM - 5

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(2 ½ Hours) [Total Marks: 75]

N.B. 1) All questions are compulsory.
2) Figures to the right indicate marks.
3) Illustrations, in-depth answers and diagrams will be appreciated.
4) Mixing of sub-questions is not allowed.

Q. 1 Attempt ANY FOUR from the following: (20M)
(a) Define computer security. What are the objectives of computer security?
(b) What is an active attack in security? State various types of active attacks.
(c) Write a note on Steganography.
(d) Encrypt the following message using Rail Fence Algorithm with key size = 4.
Plaintext = they are attacking from the north.
(e) Explain Electronic Code Book(ECB) mode in cryptography.
(f) Differentiate substitution and transposition techniques.

Q. 2 Attempt ANY FOUR from the following: (20M)
(a) Write a note on public key cryptosystem.
(b) Describe X.509 certificate format.
(c) Assume Alice and Bob wish to communicate secretly. Compute the shared secret key using Diffie Hellman Key Exchange.
[Prime number $p = 7$, generator $g = 3$, Alice's private key = 2, Bob's private key = 4]
(d) How does HMAC algorithm work?
(e) Discuss the concept of a digital signature. Explain its types.
(f) Explain kerberos processing in detail.

Q. 3 Attempt ANY FOUR from the following: (20M)
(a) What is a firewall? State and explain various types of firewall.
(b) Explain the importance of web security.
(c) What is S/MIME (Secure/Multipurpose Internet Mail Extensions)? Define its key features.
(d) Describe IP security architecture.
(e) State and explain any 5 types of virus.
(f) Write a note on honeypots.

Q. 4 Attempt ANY FIVE from the following: (15M)
(a) Define terms :
i. Cryptanalysis
ii. Brute Force Attack
(b) What is message authentication code?
(c) State any two common forms of malicious code.
(d) Using Caesar cipher with key size = 3, encrypt the message "hide the gold and defend east wall"
(e) What are the three properties of Hash function?
(f) Explain the life cycle of viruses.

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Q. 1 Attempt ANY FOUR from the following: (20M)

(a) What is an error? Explain Types of Errors.
(b) What is quality in software development? Explain software quality factors.
(c) What is Quality Assurance? Define the purpose of QA in software development.
(d) Explain the role of testing in each phase of SDLC.
(e) What is a V-Model in software testing?.
(f) Explain the concepts of Software Review, Inspection and walkthrough

Q. 2 Attempt ANY FOUR from the following: (20M)

(a) What are software Testing metrics? Explain different types of metrics.
(b) What is Black Box testing and its types? Explain state transition testing.
(c) Explain top-down integration testing.
(d) What is White Box testing and its types? Explain flow graph notation.
(e) What is System Testing? Explain different types of testing.
(f) Explain testing documentation in detail.

Q. 3 Attempt ANY FOUR from the following: (20M)

(a) Explain the defect management process in detail with a neat diagram.
(b) Explain cause and effect diagram.
(c) Explain about software metrics and its importance.
(d) What is a Pareto diagram? Explain steps of drawing a Pareto chart.
(e) List various methodologies of quality improvement. Explain any four.
(f) Explain scatter diagram in detail.

Q. 4 Attempt ANY FIVE from the following: (15M)

(a) Explain objectives of SQA.
(b) Discuss Cyclomatic Complexity with an example.
(c) How to use a defect for process improvement.
(d) State the principles of software testing.
(e) Explain metric lifecycle.
(f) How to measure quality cost?

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Q. 1 **Attempt <u>ANY FOUR</u> from the following:** **(20M)**

(a) Explain about project management process.
(b) Write a short note on stakeholder analysis.
(c) Explain about project cost management process
(d) Write a short note on earned value management.
(e) Project X HAS a budget at completion of $50,000. After one month of work the project manager assess the progress and determine that 30% of work has been completed. Calculate the earned value.
(f) What is control schedule? Explain its output.

Q. 2 **Attempt <u>ANY FOUR</u> from the following:** **(20M)**

(a) What is relationship building? Explain the same
(b) Explain key steps of risk identification.
(c) Discuss the concept of six sigma.
(d) Explain the key roles of project management.
(e) Write a short note on activities of contract administration.
(f) What is communication management? Explain.

Q. 3 **Attempt <u>ANY FOUR</u> from the following:** **(20M)**

(a) Explain leadership style in Project management.
(b) What are the factors to look for in a Agile Project Tool?
(c) Write a short note on Stress in Project.
(d) Describe any Five ways in which Managers deal with Conflict.
(e) Explain the basic communication strategy adopted with stakeholders in a Project.
(f) What are the four basic principles of Project governance?

Q. 4 **Attempt <u>ANY FIVE</u> from the following:** **(15M)**

(a) Mention the various selection Criteria for Project Selection
(b) What are the key steps in Quality Assurance?
(c) Explain the steps adopted in the Staffing process in a Project?
(d) Describe the role of Project Manager in a Project.
(e) State the major activities involved in Change Management of a Project.
(f) Differentiate between Business Risk and Project Risk.

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Q. 1 **Attempt ANY FOUR from the following:** **(20M)**

(a) Explain in detail the different 2D transformations.
(b) Discuss the concept of Shader Models.
(c) Explain in detail Dot or Scalar product with suitable example.
(d) A point has coordinates in the x, y, z direction i.e., (5, 6, 7). The translation is done in the x-direction by 3 coordinate and y direction 3 coordinates and in the z- direction by 2 coordinates. Shift the object. Find coordinates of the new position.
(e) Define Quaternion. Explain addition and subtraction of two Quaternions.
(f) Explain in detail culling and clipping.

Q. 2 **Attempt ANY FOUR from the following:** **(20M)**

(a) Explain game engine architecture.
(b) Write a short note on multisampling theory.
(c) Discuss the pygame.int() and pygame.display.set_caption() functions in pygame with example
(d) Explain the significance of texture and resource formats in DirectX.
(e) Discuss 2D and 3D game development with MordenGL.
(f) Describe Resource processing and File system in game engine.

Q. 3 **Attempt ANY FOUR from the following:** **(20M)**

(a) Explain the concept of sprites.
(b) Define game engine strategies when working with unity.
(c) How Rigid body components are essential for creating realistic physics simulation in unity? Explain?
(d) Explain about scripting collision events in unity.
(e) Describe the overview of animation in unity.
(f) Explain unity software interface in detail.

Q. 4 **Attempt ANY FIVE from the following:** **(15M)**

(a) How to calculate 2D areas.
(b) Write a short note on depth buffering.
(c) Define class in unity with example.
(d) Describe the steps in perspective projection.
(e) Write advantages and disadvantages of game engine.
(f) Explain conditional statement in unity.

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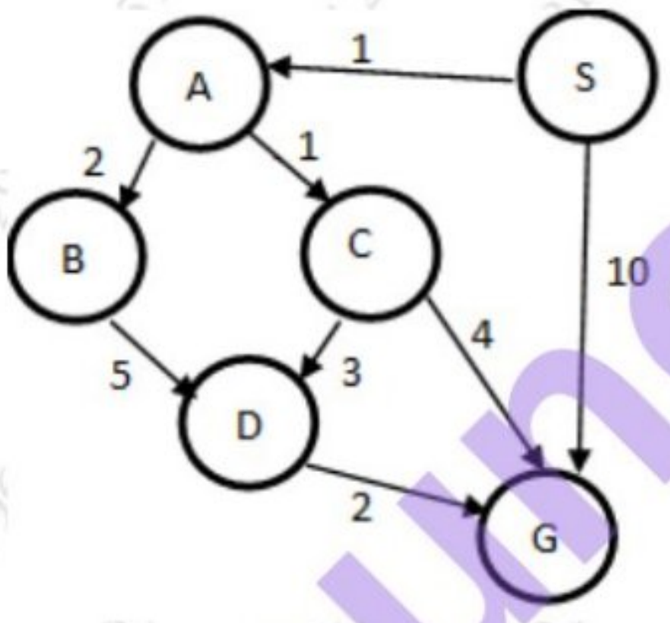
Q. 1 Attempt <u>ANY FOUR</u> from the following: **(20M)**

(a) What is PEAS? Give a PEAS description for playing a tennis match and vacuum cleaner problem.
(b) Define AI? Explain any 2 foundations of AI
(c) Explain the 8-Queens Problem and write the States, Initial state, Actions, Transition Model, Goal state & Path cost to formulate it.
(d) Explain Depth First Strategy along with pseudocode.
(e) Write a short note on model based agent.
(f) Find the optimal path & path cost for the following graph using A* search algorithm. (S is a Start state & G is a Goal State)



State	h(n)
S	5
A	3
B	4
C	2
D	6
G	0

Q. 2 Attempt <u>ANY FOUR</u> from the following: **(20M)**

(a) Describe knowledge representation. Explain frame representation technique of knowledge representation in detail.
(b) Write a note on Multilayer Feed Forward Neural Network.
(c) Explain the concept of Overfitting and Underfitting of model.
(d) What is Regression? Explain Simple Linear Regression with example.
(e) Define Ensemble Learning. Explain Boosting technique in detail.
(f) Explain KNN classifier with example.

Q. 3 Attempt ANY FOUR from the following: **(20M)**

(a) Write a short note on Q learning.

(b) Differentiate between reinforcement and unsupervised learning.

(c) For the given transaction dataset-

TID	Items Bought
100	Bread, Cheese
200	Bread, Cheese, Juice
300	Bread, Milk
400	Cheese, Juice, Milk

Calculate the following :-

i) Support(bread)
ii) Support(bread->milk)
iii) Confidence(bread->cheese)
iv) Confidence(bread->milk)
v) Lift(bread->cheese)

(d) Explain Hidden Markov Model in detail.

(e) What is Clustering? Explain with example.

(f) Write a short note on association rule mining.

Q. 4 Attempt ANY FIVE from the following: **(15M)**

(a) Explain Turing Test Approach in AI.

(b) Explain Deterministic vs Stochastic Task Environment with suitable example.

(c) Write a note on Active Reinforcement learning.

(d) Explain Bellman Equation in detail.

(e) What is the role of Reasoning in AI?

(f) Explain the concept of gradient descent.

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SEM - 6

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(2 ½ Hours) **[Total Marks: 75]**

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4) Mixing of sub-questions is not allowed.

Q. 1 Attempt ANY FOUR from the following: **(20M)**

(a) Define Data Science. Discuss in detail applications of Data Science.
(b) Explain Data Warehousing (DW) and Data Mining (DM) in detail.
(c) Explain in detail different Data Sources.
(d) Describe in detail Data Transformation.
(e) Define Data Wrangling. Discuss Data Wrangling Techniques.
(f) Discuss about Feature Engineering and Time Series Data.

Q. 2 Attempt ANY FOUR from the following: **(20M)**

(a) Explain Data Visualization techniques in detail.
(b) Define Descriptive Statistics. Explain Mean, Median, Mode and Standard Deviation in detail.
(c) Explain in detail Classification and Regression analysis.
(d) Define bias, variance and discuss about bias-variance tradeoff.
(e) Discuss different techniques for evaluating model performance.
(f) Explain Ensemble Learning with Bagging and Boosting.

Q. 3 Attempt ANY FOUR from the following: **(20M)**

(a) Explain storytelling in analysis in detail.
(b) Discuss visualization tools in detail
(c) List and Discuss Data Management Activities.
(d) Elaborate the concept of Data Governance.
(e) Illustrate Extraction, Transformation and Load (ETL) in detail.
(f) Give the importance of Data Quality.

Q. 4 Attempt ANY FIVE from the following: **(15M)**

(a) Differentiate between structured and unstructured data.
(b) Explain Hyperparameter Tuning.
(c) Define Accuracy and Explain in brief.
(d) Discuss any three libraries of Data Science.
(e) Differentiate between underfitting and overfitting.
(f) Define Precision, Recall and F1-Score.

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(2 ½ Hours) **[Total Marks: 75]**

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4) Mixing of sub-questions is not allowed.

Q. 1 Attempt ANY FOUR from the following: **(20M)**

(a) Explain the structure of SOAP message.
(b) Write a web service method that accepts two numbers as parameters and returns the largest of those numbers using JAX-WS. (Write only the Webservice method block)
(c) Differentiate between Parallel Computing and Distributed Computing.
(d) List and explain the various Http methods required for creating RESTful Web Services.
(e) Explain the different characteristics of Virtualized environment.
(f) Explain virtualization using KVM.

Q. 2 Attempt ANY FOUR from the following: **(20M)**

(a) Explain the advantages of Cloud Computing.
(b) Describe the Cloud Computing Reference Model in detail
(c) Explain open challenges of Cloud Computing.
(d) Write about various Security Services of Cloud.
(e) Explain the cloud security design principles.
(f) Explain Cloud Security Policy Implementation.

Q. 3 Attempt ANY FOUR from the following: **(20M)**

(a) Explain CloudSim architecture in detail. Also draw the necessary diagram for the same.
(b) Explain different features of CloudSim.
(c) Write about the working platform for CloudSim.
(d) Explain the key components of OpenStack?
(e) What is DevStack? Explain the installation steps.
(f) Explain Components and services of AWS.

Q. 4 Attempt ANY FIVE from the following: **(15M)**

(a) Write in short about JAX-WS.
(b) What are the type of Cloud? Write in short about any one
(c) Write a short note on GridSim.
(d) Describe oVirt in short.
(e) What are the security best practices for AWS.
(f) What is an OpenStack.

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Paper / Subject Code: 87011 / Information Retrieval (R-2023-24)

(2½ Hours) **[Total Marks: 75]**

N.B. 1) All questions are compulsory.
2) Figures to the right indicate marks.
3) Illustrations, in-depth answers and diagrams will be appreciated.
4) Mixing of sub-questions is not allowed.

1. Attempt *any four* of the following: **20**

a. What is information retrieval example? What are the characteristics of information retrieval.
b. What are the components and What are the major challenges faced in Information Retrieval.
c. What is edit distance, and how is it used in measuring string similarity with suitable example.
d. Explain the process of constructing an inverted index. How does it facilitate efficient information retrieval?
e. What is relevance feedback in the context of retrieval models.
f. Explain Vector space model. Discuss TF-IDF, cosine similarity.

2. Attempt *any four* of the following : **20**

a. Define text categorization and explain its importance in information retrieval systems.
b. How can clustering be utilized for query expansion and result grouping in information retrieval systems.
c. Explain the effectiveness of K-means and hierarchical clustering in text data analysis.
d. Explain the architecture of a web search engine. What are the components involved in crawling and indexing web pages.
e. What is the role of supervised learning techniques in learning to rank and their impact on search engine result quality.
f. Discuss the difference between the PageRank and HITS algorithms.

3. Attempt *any four* of the following : **20**

a. Explain breadth-first and depth-first Web page crawling Techniques?
b. Define near-duplicate page detection and its significance in web search. Explain the challenges associated with identifying near-duplicate pages.
c. Describe common techniques used in extractive text summarization.
d. What are Challenges associated with question answering.
e. Define collaborative filtering and content-based filtering in recommender systems.
f. Explain different approaches to machine translation, including rule-based, statistical, and neural machine translation models.

4. **Attempt *any five* of the following :** **15**

a Discuss the steps involved in the Soundex Algorithm for phonetic matching.

b Construct 2-gram, 3-gram and 4-gram index for the following terms:
a. banana
b. pineapple
c. computer

c Discuss the Naive Bayes algorithm for text classification. How does it work, and what are its assumptions.

d Discuss how link analysis can be used in social network analysis and recommendation systems.

e Discuss challenges in abstractive text summarization.

f Describe the role of test collections and benchmarking datasets in evaluating IR systems.

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Q. 1 Attempt ANY FOUR from the following: **(20M)**

(a) Explain the Types of Ethical Hacking
(b) Explain Hacking Technology and its types in detail
(c) Define Hacktivism and explain ways to manifest it
(d) Explain any 5 Hacker Classes
(e) What are the ways to conduct Ethical Hacking
(f) Write a short note on foot printing

Q. 2 Attempt ANY FOUR from the following: **(20M)**

(a) Ex[plain Active and Passive Sniffing
(b) Explain ARP Poisoning in Detail
(c) Explain DNS Spoofing Techniques in detail
(d) Explain the working of DOS attack in detail
(e) Explain Smurf attack in detail
(f) Explain types of Session Hijacking

Q. 3 Attempt ANY FOUR from the following: **(20M)**

(a) Explain methods involved in Google Hacking
(b) Define the term Authentication and its types
(c) Define SQL injection and names its types
(d) Explain Buffer –Overflow and its types.
(e) Explain WEP in detail
(f) Explain the working of wireless sniffing

Q. 4 Attempt ANY FIVE from the following: **(15M)**

(a) Explain the methods to perform information Gathering
(b) Define Password and its types
(c) Explain Mutation Techniques
(d) Define the terms (i)Scanning (ii)Enumeration
(e) What is Web Server Hardening?
(f) Write a short note on Rogue Access Point

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Q. 1 Attempt ANY FOUR from the following: **(20M)**

(a) Define CRM and state its Significance in Industry.
(b) Explain IDIC Model of CRM.
(c) State and explain key performance indicators of Customer Acquisition Program.
(d) What is TQM? Explain how it can be integrated with CRM .
(e) HowCRM is implemented in different Commercial Situations?
(f) List some of the features of Analytical CRM .

Q. 2 Attempt ANY FOUR from the following: **(20M)**

(a) Define Customer Portfolio Management and enlist its Key Components.
(b) State and explain Key Components of Market Segmentation in CRM.
(c) Explain with diagram Bivariate CPM Model.
(d) Enlist and explain Key features of Sales Force Automation.
(e) "Activity based Costing helps in identifying costs in various Customer Segments" Justify the statement giving examples.
(f) What is Service Automation? Explain how it is beneficial to Industry.

Q. 3 Attempt ANY FOUR from the following: **(20M)**

(a) Explain with diagram the process of building Customer Related Database.
(b) Write short note on Structured and Unstructured Data.
(c) Explain the role of AI in Analytical CRM.
(d) With neat labelled diagram explain the key phases of CRM project design.
(e) State and explain how foundations of CRM can be build.
(f) An Company named XYZ faced challenges in managing Customer Interactions and Sales across its global operations , it has experienced an increased drop out rate in past few years, explain how Sales Force Automation can help the Company in increasing its Sales globally ,retain customers and decrease drop out rate.

Q. 4 Attempt ANY FIVE from the following: **(15M)**

(a) Write short note on Customer Experience(CX).
(b) Mention the role of SEO in CRM.
(c) Define Data Warehouse and explain its basic characteristics.
(d) Explain PESTEL/PESTE Analysis.
(e) Write short note on internet and Event Marketing.
(f) Enlist steps of Data Mining Procedure.

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