



INSTITUTE OF AERONAUTICAL ENGINEERING

Dundigal, Hyderabad -500 043

INFORMATION TECHNOLOGY

ASSIGNMENT– I AND II QUESTIONS

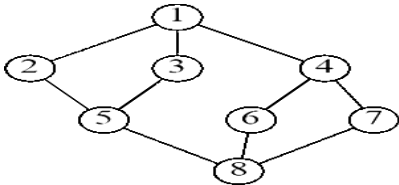
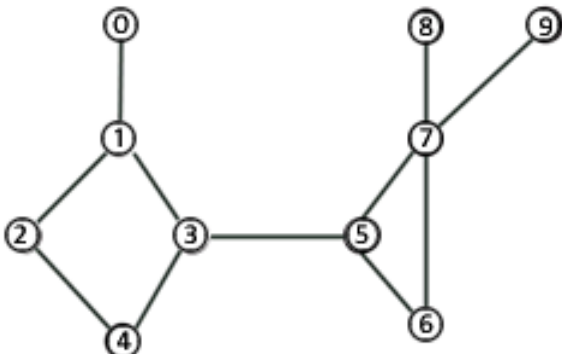
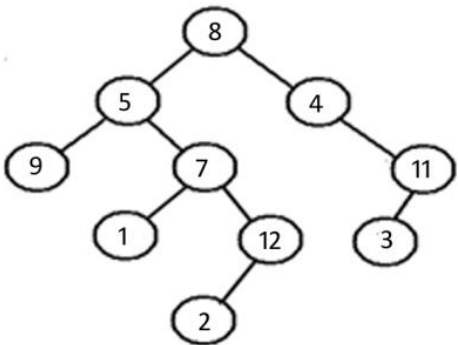
Course Name	:	DESIGN AND ANALYSIS OF ALGORITHMS
Course Code	:	A40508
Class	:	II B. Tech II Semester
Branch	:	Information Technology
Year	:	2016 – 2017
Course Faculty	:	Mr. T Vishnu Vardhan Reddy Assistant Professor

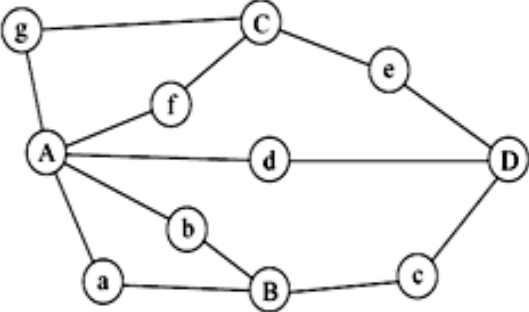
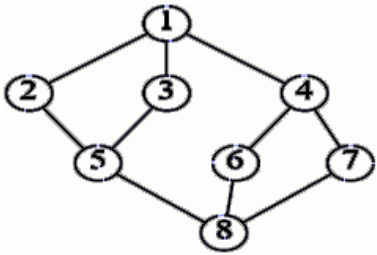
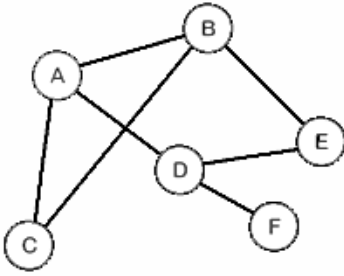
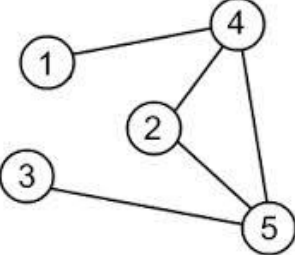
OBJECTIVES

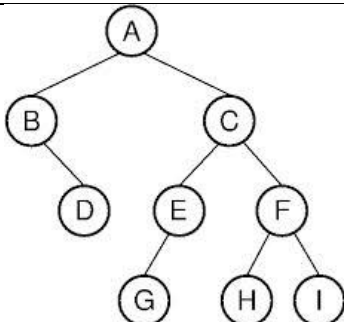
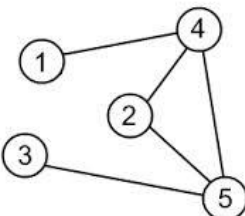
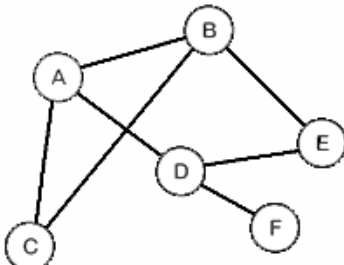
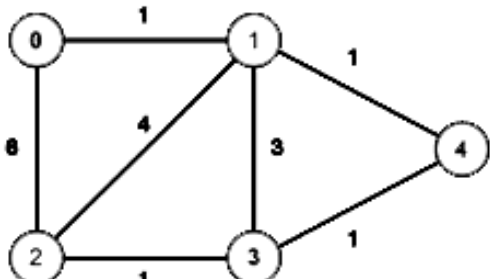
To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated and taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education. The major emphasis of accreditation process is to measure the outcomes of the program that is being accredited.

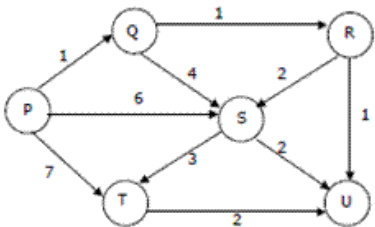
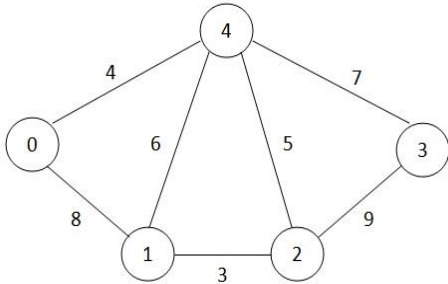
In line with this, Faculty of Institute of Aeronautical Engineering, Hyderabad has taken a lead in incorporating philosophy of outcome based education in the process of problem solving and career development. So, all students of the institute should understand the depth and approach of course to be taught through this question bank, which will enhance learner's learning process.

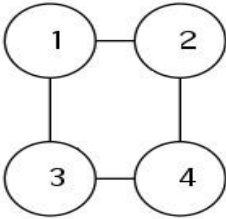
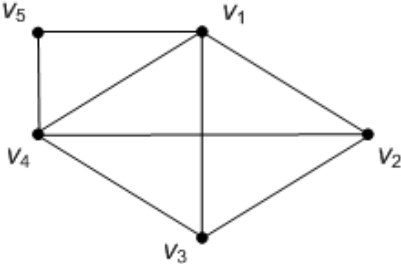
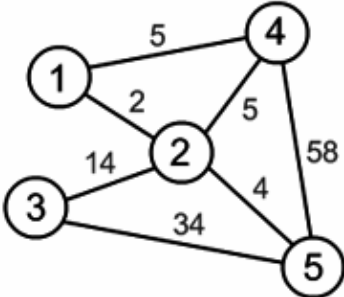
S. NO.	QUESTION	BLOOMS TAXONOMY LEVEL	PROGRAM OUTCOME
UNIT – I			
1	Solve the following recurrence relation $T(n) = \left\{ 2T\left(\frac{n}{2}\right) + n, \quad \text{and } T(1) = 2 \right.$	Understand	4
2	Solve the following recurrence relation $T(n) = 7T(n/2) + cn^2$	Understand	4
3	Solve the recurrence relation $T(n) = \begin{cases} k, & n = 1 \\ 3T\left(\frac{n}{2}\right) + kn, & n > 1, \quad n \text{ is power of } 2 \end{cases}$	Understand	4
4	Explain quick sort algorithm and trace the algorithm for following data sequence: 3, 5, 9, 7, 1, 4, 6, 8, 2	Understand	7
5	Sort the list of numbers using merge sort 33, 44, 2, 10, 25, 79, 86, 47, 14, 36	Understand	7
6	Show that the average case time complexity of quick sort is $O(n \log n)$	Understand	7
7	Understand merge sort on letters H, K, P, C, S, K, R, A, B, L	Understand	7
8	Understand strassen's matrix multiplication on following matrices	Understand	7

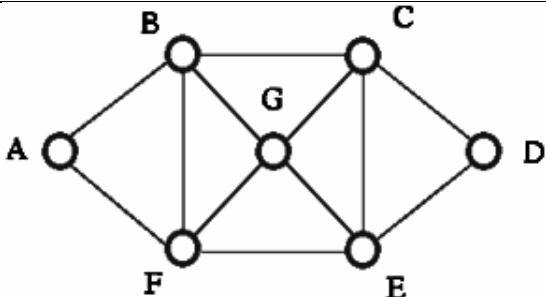
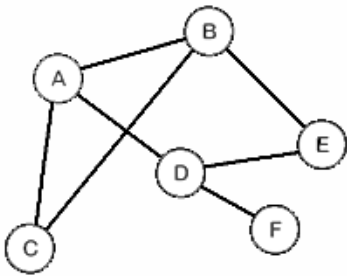
S. NO.	QUESTION	BLOOMS TAXONOMY LEVEL	PROGRAM OUTCOME
	$\begin{bmatrix} 4 & 5 \\ 5 & 9 \end{bmatrix}, \begin{bmatrix} 2 & 10 \\ 1 & 6 \end{bmatrix}$		
9	Write and solve recurrence relation for strassen's matrix multiplication	Understand	7
10	Solve the following recurrence relation $T(n) = \left\{ 2T\left(\frac{n}{2}\right) + 1, \quad \text{and } T(1) = 2 \right.$	Understand	4
UNIT - II			
1	Illustrate BFS traversal of following graph 	Understand	5
2	List the articulation points from the following graph 	Understand	5
3	Write in order, pre order, post order traversal of the following tree 	Understand	5
4	Illustrate DFS and BFS traversals of following graph	Understand	5

S. NO.	QUESTION	BLOOMS TAXONOMY LEVEL	PROGRAM OUTCOME
			
5	Illustrate DFS traversal of following graph 	Understand	5
6	Illustrate BFS traversal of following graph 	Understand	5
7	List the articulation points from the following graph 	Understand	5
8	Write in order, pre order, post order traversal of the following tree	Understand	5

S. NO.	QUESTION	BLOOMS TAXONOMY LEVEL	PROGRAM OUTCOME
			
9	Illustrate BFS and DFS traversals of following graph 	Understand	5
10	Illustrate DFS traversal of following graph 	Understand	5
UNIT - III			
1	Compute the optimal solution for Job Sequencing with Deadlines using greedy method for $N=4$, profits: $(p_1, p_2, p_3, p_4) = (100, 10, 15, 27)$ Deadlines: $(d_1, d_2, d_3, d_4) = (2, 1, 2, 1)$	Understand	8
2	Compute the optimal solution for Knapsack problem using greedy method for $N=3$, $M=20$, $(p_1, p_2, p_3) = (25, 24, 15)$, $(w_1, w_2, w_3) = (18, 15, 10)$	Understand	8
3	Construct minimum cost spanning tree using a) Prims algorithm b) Kruskal algorithm 	Understand	8

S. NO.	QUESTION	BLOOMS TAXONOMY LEVEL	PROGRAM OUTCOME
4	Understand single source shortest path algorithm for the following graph 	Understand	8
5	Use optimal binary search tree algorithm and compute w_{ij}, c_{ij}, r_{ij}, $0 \leq i \leq j \leq 4$, $p_1=1/10$, $p_2=1/5$, $p_3=1/10$, $p_4=1/120$, $q_0=1/5$, $q_1=1/10$, $q_2=1/5$, $q_3=1/20$, $q_4=1/20$.	Understand	8
6	Construct optimal binary search for $(a_1, a_2, a_3, a_4) = (\text{do}, \text{if}, \text{int}, \text{while})$ $p(1:4) = (3, 3, 1, 1)$, $q(0:4) = (2, 3, 1, 1, 1)$	Understand	8
7	Solve the solution for 0/1 knapsack problem using dynamic programming $(p_1, p_2, p_3, p_4) = (11, 21, 31, 33)$, $(w_1, w_2, w_3, w_4) = (2, 11, 22, 15)$ $M=40$, $n=4$.	Understand	8
8	Solve the solution for 0/1 knapsack problem using dynamic programming $N=3$, $m=6$ profits: $(p_1, p_2, p_3) = (1, 2, 5)$ and weights: $(w_1, w_2, w_3) = (2, 3, 4)$	Understand	8
9	Find the shortest tour of traveling sales person for the following cost matrix using dynamic Programming $\begin{bmatrix} \infty & 12 & 5 & 7 \\ 11 & \infty & 13 & 6 \\ 4 & 9 & \infty & 18 \\ 10 & 3 & 2 & \infty \end{bmatrix}$	Understand	8
10	Calculate shortest distances using all pairs shortest path algorithm 	Understand	9
UNIT – IV			
1	Sketch the state space tree degenerated by 4 queens problem	Understand	10
2	Understand the backtracking algorithm to solve the following instance of the sum of subsets problem $S=\{5,10,12,13,15,18\}$ and $d=30$	Understand	10
3	Sketch the state space tree generated all possible 3-color,4-node graph	Understand	10

S. NO.	QUESTION	BLOOMS TAXONOMY LEVEL	PROGRAM OUTCOME
			
4	Identify Hamiltonian cycle from the following graph 	Understand	10
5	Solve the following instance of travelling sales person problem using Least Cost Branch Bound $\begin{bmatrix} \infty & 12 & 5 & 7 \\ 11 & \infty & 13 & 6 \\ 4 & 9 & \infty & 18 \\ 10 & 3 & 2 & \infty \end{bmatrix}$	Understand	10
6	Draw the portion of state space tree generated by LCBB by the following knapsack problem for $n=5$ $(p_1, p_2, p_3, p_4, p_5) = (10, 15, 6, 8, 4)$ $(w_1, w_2, w_3, w_4, w_5) = (4, 6, 3, 4, 2)$ and $m=12$	Understand	11
7	Draw the portion of state space tree generated by FIFO knapsack instance : $N=4$, $(P_1, P_2, P_3, P_4) = (10, 10, 12, 18)$, $(W_1, W_2, W_3, W_4) = (2, 4, 6, 9)$, $M=15$	Understand	11
8	Solve the following instance of travelling sales person problem using Least Cost Branch Bound 	Understand	11
9	Identify Hamiltonian cycle from the following graph	Understand	10

S. NO.	QUESTION	BLOOMS TAXONOMY LEVEL	PROGRAM OUTCOME
			
10	Understand the backtracking algorithm to color the following graph 	Understand	10
UNIT - V			
1	State and prove cook's theorem	Remember	12
2	Explain deterministic and non-deterministic algorithms	Remember	12
3	Write non deterministic algorithm for sorting and searching	Understand	12
4	Write a non-deterministic knapsack algorithm	Understand	12
5	Explain P and NP problems are related	Remember	12
6	Distinguish NP-hard and NP-complete problems	Understand	12
7	Explain decision problem with an example	Remember	12
8	Explain chromatic number decision problem and clique decision problem	Remember	12
9	Explain the strategy to prove that a problem is NP-hard	Remember	12
10	Explain intractable problems with examples	Remember	12

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