Reg.No. ____________

Karunya UNIVERSITY

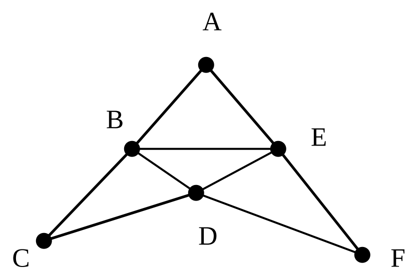
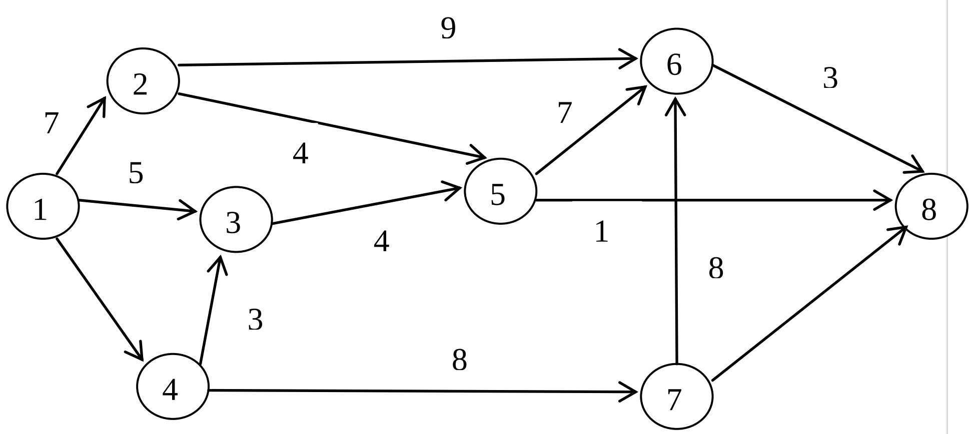
(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

End Semester Examination – Nov/Dec – 2016

			Semester	**:**	**2016-17 ODD**
Code	**:**	**14MA3006**	**Duration**	**:**	**3hrs**
Sub. Name	**:**	**GRAPH THEORY, RANDOM PROCESSES AND QUEUES**	**Max. marks**	**:**	**100**

ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)

Q. No.	Sub Div.	Questions	Course Outcome	Marks
1.	a.	State and prove Euler’s Theorem	CO1	10
	b.	Use Fleury's algorithm to produce an Euler circuit for the following graph. 	CO1	10
		(OR)		
2.	a.	State and prove max flow and min cut theorem.	CO1	5
	b.	Define (i) Degree of a vertex (ii) Path in a graph (iii) Circuit	CO1	5
	c.	Find the maximum flow in the following network 	CO1	10
3.		Define the following: a. Rooted tree b. Level of a tree c. parent in a tree d. Offspring of a node e. height of a tree f. leaf of a tree g. binary tree h. complete binary tree i. weighted graph j. Subtree	CO1	20
		(OR)		
4.	a.	Construct the tree of the algebraic expression $(x \div y) \div ((x \times 3) - (z \div 4))$ and perform the preorder, postorder and inorder search and find its respective notations.	CO1	12
	b.	Explain Prims algorithm for finding a spanning tree for a symmetric connected relation R with an example.	CO1	8
5.	a.	The chances of A, B and C becoming General manager of a certain	CO2	10

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<tr><td></td><td></td><td>company are in the ratio 4:2:3. The probabilities that the bonus scheme will be introduced in the company if A , B and C become general manager are 0.3, 0.7 and 0.8 respectively. If the bonus scheme has been introduced what is the probability that A has been appointed as general manager.</td><td></td><td></td></tr>
<tr><td></td><td>b.</td><td>A continuous random variable X that can assume any value between x=2 and x=5 has a density function given by f(x) = k(1+x). Find P(X <4).</td><td>CO2</td><td>5</td></tr>
<tr><td></td><td>c.</td><td>The distribution function of a RV X is given by F(x) = 1- (1+x)e^{-x}, x>0. Find the density function. Mean and variance of X.</td><td>CO2</td><td>5</td></tr>
<tr><td colspan="4">(OR)</td><td></td></tr>
<tr><td>6.</td><td>a.</td><td>A lot consists of 10 good articles, 4 with minor defects and 2 with the major defects. Two articles are choosen at random. Find the probability that (i) both are good (ii) both have major defects (iii) atleast one is good (iv) atmost one is good (v) exactly one is good.</td><td>CO2</td><td>10</td></tr>
<tr><td></td><td>b.</td><td>A random variable X has the following probability distribution
<table>
<tr><td>X</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr>
<tr><td>P(x)</td><td>0</td><td>k</td><td>2k</td><td>2k</td><td>3k</td><td>k^2</td><td>2 k^2</td><td>7 k^2 +k</td></tr>
</table>
Find (i) k (ii) P(1.5 < X < 4.5 / X > 2) (iii) mean (iv) variance</td><td>CO2</td><td>10</td></tr>
<tr><td>7.</td><td>a.</td><td>If X(t) = A cos t + B sin t and Y(t) = B cos t + A sint where A and B are independent random variables such that E(A) = 0= E(B), E(A^2) = E(B^2) = 1. Show that {X(t)} and {Y(t)} are individually stationary in wide sense but they are not jointly WSS</td><td>CO2</td><td>20</td></tr>
<tr><td colspan="4">(OR)</td><td></td></tr>
<tr><td>8.</td><td>a.</td><td>Find the mean and variance of the stationary random process {X(t)} whose ACF is given by $R(\tau) = 16 + \dfrac{9}{1+6\tau^2}$</td><td>CO2</td><td>6</td></tr>
<tr><td></td><td>b.</td><td>If the WSS process {X(t)} us given by X(t) = 10 cos (100t+θ) where θ is uniformly distributed over (-π, π). Prove that {X(t)} is correlation ergodic</td><td>CO2</td><td>14</td></tr>
<tr><td colspan="2"></td><td><u>Compulsory:</u></td><td></td><td></td></tr>
<tr><td>9.</td><td></td><td>At a port there are 6 unloading berths and 4 unloading crews. When all the berths are full, arriving ships are diverted to an overflow facility 20kms down the river. Tankers arrive according to a Poisson process with a mean of 1 every 2 h. It takes for an unloading crew, on the average, 10 h to unload a tanker, the unloading time following an exponential distribution. Find
a. How many tankers are at the port on the average?
b. How long does a tanker spend at the port on the average?
c. What is the average arrival rate at the overflow facility?</td><td>CO3</td><td>20</td></tr>
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ALL THE BEST