Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

FIRST SEMESTER M C A

END SEMESTER MAKE-UP EXAMINATIONS, DEC/JAN- 2019

SUBJECT: COMPUTATIONAL MATHEMATICS [MAT-4150]

Time: 3 Hours 21-12-2018 MAX. MARKS:

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitable assumed.

6

1A.	Show that the set A ={ 0,1,2,3,4 } is an abelian group under addition modulo 5.	**3**
1B.	From a group of 8 children,5 boys and 3 girls, three are selected at random. Find the probability that the selected group contains (i) No girl (ii) Only one girl (iii) At least one girl .	**3**
1C.	Derive an expression for mean and standard deviation of Binomial distribution.	4
2A.	(i) Define subgroup of a group G with an example. (ii)Prove that in a group (G,*), the identity and inverse elements are unique.	**3**
2B.	Verify the vectors [1, 1, 0] , [3, 0, 1] and [5, 2, 2] are linearly independent and also express [1, 2, 3] in terms of the given vectors.	**3**
2C.	An executive is in a hurry to reach airport to catch flight scheduled at 6 am. The probability of getting a taxi at such an early hour is 0.23. However, if he gets a taxi he would catch the flight with probability 0.85. If he doesn't get a taxi, the probability of catching the flight is 0.43, by some other mode of transportation. In that situation what is the probability that he catches the flight? If he catches the flight what is the probability that he came by taxi?	4

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3A.	Find the rank of a matrix $\begin{bmatrix} 4 & -2 & 6 & 8 \\ 1 & 1 & -3 & -1 \\ 15 & -3 & 9 & 21 \end{bmatrix}$	3
3B.	Define planar graph. If G is a connected planar graph with V, E, R are the number of vertices, edges and regions respectively, then prove that $\lvert V\rvert - \lvert E\rvert + \lvert R\rvert = 2$	3
3C.	i. Find the inner product of the vectors X= (1,-1, 5,1) and Y= (-1,2,4,6) ii. Show that the given vectors A= (1,-1, 1) and B = (2, 3, 1) orthogonal iii. Show that the given set of vectors $(\frac{1}{\sqrt{2}}, 0, -\frac{1}{\sqrt{2}}), (\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}), (\frac{1}{\sqrt{6}}, \frac{-2}{\sqrt{6}}, \frac{1}{\sqrt{6}})$ form an orthonormal system.	4
4A.	1. Define the following i) K- regular graph. Give an example of a 4-regular graph. ii) A subgraph with an example. 2. K_n is called a ------- regular graph with exactly ------------ edges.	3
4B.	The marks of 1000 students in Mathematics examination forms a normal distribution with mean 70 and standard deviation 5.Find the number of students whose marks will be (i) < 65 (ii) > 75 (iii) between 65 and 75.	3
4C.	Find the value of k such that the following distribution represents a finite probability distribution. Hence find its (i) mean (ii) standard deviation (iii) $P(X \leq 1)$.	4

X	-3	-2	-1	0	1	2	3
$P(X = x)$	k	$2k$	$3k$	$4k$	$3k$	$2k$	k

5A.	Find all the Eigen values and Eigen vectors of $\begin{bmatrix} 2 & -2 & 2 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$	4
5B.	3 balls are drawn at random without replacement from a box containing 2white, 3 red and 4 black balls. Let X denote the number of white balls drawn and Y denote the number of red balls drawn. Determine the following i) Marginal distributions of X and Y ii) Joint distributions of X and Y iii) E(X), E(Y) and E(XY) iv) Covariance and correlation of X and Y	6

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