Reg. No.

MANIPAL INSTITUTE OF TECHNOLOGY

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A Constituent Institution of Manipal University

FIRST SEMESTER M C A

END SEMESTER EXAMINATIONS, NOV/DEC- 2017

SUBJECT: COMPUTATIONAL MATHEMATICS [MAT-4150]

Date of Exam: 16-11-2017

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer All the questions.
- Missing data may be suitable assumed.

1A.	Show that the set B = {2, 4, 6, 8; x mod 10} is an abelian group	**3**
1B.	From 8 positive and 6 negative integers, 4 integers are chosen at random and are multiplied. i) What is the probability that the product is positive? ii) What is the probability that the product is negative?	**3**
1C.	Test for consistency and solve: $x + y + z = 6$, $x - y + 2z = 5$, $3x + y + z = 8$	**4**
2A.	Show that H = {1, 2, 4} is a sub group of G = {1, 2, 3, 4, 5, 6} under multiplication modulo 7.	**3**
2B.	If A and B are any two events of sample space S which are not mutually exclusive events then prove that $P(A \cup B) = P(A) + P(B) - P(A \cap B)$	**3**
2C.	Derive an expression for mean and standard deviation of Poisson distribution.	**4**
3A.	2% of the fuses manufactured by a firm are found to be defective. Find the probability that a box containing 200 fuses contains i) No defective fuses ii) at least one defective fuse iii) exactly 3 defective fuses.	**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 $\|V\| - \|E\| + \|R\| = 2$	**3**

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3C.	Define the following i) Complete graph & give an example of complete graph with 5 vertices. ii) Edge connectivity and vertex connectivity. iii)Complete bipartite graph and give an example of $K_{3,3}$ and $K_{3,6}$ iii) Give an example of Hamiltonian graph but not an Eulerian graph.	4
4A.	The probability density function of a discrete random variable X is given by $f(x)=\begin{cases} Cx^2, & 0<x<3 \\ 0, & \text{otherwise} \end{cases}$ i) Find the constant C ii) Compute $P(1<x<2)$ iii) Find the mean of X	3
4B.	In a test on electric bulbs, it was found that the life time of a particular brand was distributed normally with an average life of 2000 hrs & S.D of 60 hours. If a firm purchases 2500 bulbs. Find the number of bulbs that are likely to last for i) more than 2000 hrs ii) less than1950 hrs iii) between 1900 to 2100 hrs.	3
4C.	A fair coin is tossed three times the two random variables X and Y defined as follows, X = 0 or 1 according as head or tail occurs on the first toss. Y denote the total number of heads. Determine the following i) Marginal distributions of X and Y ii) Joint distributions of X and Y iii) E(X) and E(Y)	4
5A.	Reduce the quadratic form $3x^2-2y^2-z^2+12yz+8zx-4xy$ into the Canonical form by an orthogonal reduction and indicate the nature. And also find the following i) rank ii) index iii) signature of the canonical form.	5
5B.	Find the modal and spectral matrices of $A=\begin{bmatrix} 1 & 0 & 0 \\ 0 & 3 & -1 \\ 0 & -1 & 3 \end{bmatrix}$	5

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