Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

FIRST SEMESTER M C A

END SEMESTER EXAMINATIONS, November- 2018

SUBJECT: COMPUTATIONAL MATHEMATICS [MAT-4150]

Date of Exam: 19-11-2018

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** the questions.
- Missing data may be suitable assumed.

1A.	On the set of rational numbers Q_1 the operation * is defined by $a*b=a+b-ab$ Show that $\{Q_1 ; *\}$ is an abelian group and hence solve for x given $2*x = 3^{-1}$ in Q_1	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.	Box-I contains 1white, 2 red and 3green balls, Box-II contains 2 white, 3 red and 1 green balls, Box-III contains 3 white, 1 red and 2 green balls, two balls are drawn from box chosen at random. There are found to be 1 white and 1 red. Find the probability that the balls so drawn come from Box-II.	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.	Derive an expression for mean and standard deviation of Poisson distribution.	3
2C.	State Baye's theorem. 2% of the population has a certain blood disease in serious form, 10% have it in a mild form and 88% do not have it at all. A new blood test is developed. The prob. that test is positive is 0.9 if the subject has the serious form; 0.6 if the subject has the mild form and 0.1 if the subject does not have the disease. A subject has tested positive. What is the probability that the subject has the serious form of the disease?	4
3A.	If G is a simple graph with n vertices and k components then prove that G can have at most $\frac{(n-k)(n-k+1)}{2}$ edges	3
3B.	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 $K_{3,6}$	3

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	v)Give an example of Hamiltonian graph but not an Eulerian graph	
3C.	Test for consistency and solve: $x + 2y + 2z = 2$, $3x - 2y - z = 5$, $2x - 5y + 3z = -4$ and $x + 4y + 6z = 0$.	**4**
4A.	The probability density function of a continuous random variable X is given by $f(x) = \begin{cases} Kx^2, & 0 < x < 3 \\ 0 & , \text{otherwise} \end{cases}$ i) Find the constant K ii) Compute $P(1 < x < 2)$ iii) Find the distribution function F(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.	Define Ring. Verify the set of matrices of the form $A = \begin{pmatrix} 0 & a \\ -a & 0 \end{pmatrix}$, where 'a' is rational number is a ring with respect to addition and multiplication of matrices.	**4**
5A.	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), E(Y) and E(XY) iv) Covariance and correlation of X and Y	**4**
5B.	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	**6**

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