Reg. No.



MANIPAL INSTITUTE OF TECHNOLOGY

FIRST SEMESTER M C A

END SEMESTER MAKE UP EXAMINATIONS, DEC/JAN- 2018

SUBJECT: COMPUTATIONAL MATHEMATICS [MAT- 4150]

Date of Exam: 20-12-2017

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:]									
Answer ANY FIVE FULL the questions.										
 Missing data may be suitable assumed. 										
On the set of rational numbers Q ₁ the binary operation * is defined by $a * b = \frac{ab}{5}$ show that {Q ₁ ; *} is an abelian group										
A class consists of 6 girls and 10 boys. If a committee of 3 is chosen at random from the class, find the probability that i) 3 boys are selected. ii) exactly two boys are selected iii) at least one boy selected	3									
Prove that a non-empty set H of a group is a sub group of G if and only if <i>i</i>) for any $a, b \in H \Rightarrow a^*b \in H$ <i>ii</i>) for any $a \in H \Rightarrow a^{-1} \in H$	4									
Define linearly independent and linearly dependent vectors. Verify whether the following vectors are linearly independent or not [1, 2, -3], [1, -3, 2], [2, -1, 5]	3									
If $P(A) = 1/3$, $P(B) = 1/4$, $P(A \cap B) = 1/6$, then find the following probabilities $P(\overline{A})$, $P(\overline{A} \cap B)$, $P(\overline{A} \cup B)$ $P(A \cup \overline{B})$, $P(A \cap \overline{B})$, $P(\overline{A} \cup \overline{B})$	3									
Derive an expression for mean and standard deviation of Binomial distribution.	4									
Find the rank of a matrix $ \begin{bmatrix} 2 & 1 & 3 & 1 \\ 4 & 0 & 2 & 6 \\ 0 & 1 & 2 & -2 \end{bmatrix} $	3									
	Instructions to Candidates: \diamond Answer ANY FIVE FULL the questions. \diamond Missing data may be suitable assumed.On the set of rational numbers Q1 the binary operation * is defined by $a * b = \frac{ab}{5}$ show that {Q1; *} is an abelian groupA class consists of 6 girls and 10 boys. If a committee of 3 is chosen at random from the class, find the probability that i) 3 boys are selected. ii) exactly two boys are selected iii) at least one boy selectedProve that a non-empty set H of a group is a sub group of G if and only if i) for any $a, b \in H \Rightarrow a^{-1} \in H$ Define linearly independent and linearly dependent vectors. Verify whether the following vectors are linearly independent or not $[1, 2, -3], [1, -3, 2], [2, -1, 5]$ If P(A) =1/3, P(B) = 1/4, P(A \cap B) = 1/6, then find the following probabilities $P(\overline{A}), P(\overline{A} \cap B), P(\overline{A} \cap B), P(A \cap B), P(A \cap B), P(\overline{A} \cap B)Derive an expression for mean and standard deviation of Binomial distribution.Find the rank of a matrix\begin{bmatrix} 2 & 1 & 3 & 1 \\ 4 & 0 & 2 & 6 \\ 0 & 1 & 2 & -2 \end{bmatrix}$									

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3B.	• 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										ıt	3	
3C.	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?										s s 6 A s	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.	Define the following i) Ring ii) Hamiltonian circuit with example. iii) Complete bipartite graph with example											3	
4C.	 Box contains 10 mobile sets out of which 4 sets are defective. A sample of two items is selected from the box. Let X denotes the number of defective sets in the sample. Find the probability distribution of X and also find the following i) Distribution of X, ii)E(X), iii) Standard Deviation of X 										S	4	
5A.	Find all the Eigen values and 1	Eigen vectors o	of [1 0 0	0 3 -1	0 -1 3							4
5B.	The joint density function of two f(x, y) = $\begin{cases} \frac{1}{8}(6 - x - y) \\ 0, \end{cases}$ Find: i) E(X), ii) P(X < 1, Y < 1)	vo random vari f), $0 < x < 2$, othe 3), iii) P(X+Y	iable , 2 erwi 7 < 3	s X a < y se), v	and ` < 4 7) P(2	Y is X+Y	given $T \ge 3$	n by)					6