Reg. No.



MANIPAL INSTITUTE OF TECHNOLOGY MANIPAL

A Constituent Institution of Manipal University

IV SEMESTER B.TECH. (AERONAUTICAL ENGINEERING) END SEMESTER MAKEUP EXAMINATIONS, JUNE/JULY 2017

SUBJECT: ENGINEERING MATHEMATICS [MAT 2201]

REVISED CREDIT SYSTEM (14/06/2017)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ALL the questions.
- ✤ Missing data may be suitably assumed.

1A.	If X_1 and X_2 are 2 independent random variables having standard normal distributions, then find p.d.f of $Y = \frac{X_1}{X_2}$.	4		
1B.	In a certain factory turning out of optical lenses, there is a small chance of $1/_{500}$ for any lens to be defective. The lenses are supplied in a packet of 10. Calculate the approximate number of packets containing (i) no defective, (ii) one defective, (iii) two defective lenses in a consignment of 10,000 packets.	3		
1C.	Diameter of an electric cable is assumed to be a continuous random variable with pdf $f(x) = \begin{cases} kx^2; & 0 \le x \le 3\\ 0 & elsewhere \end{cases}$ (i) Obtain the value of k (iii) Find variance. (ii) Compute P(1 < X < 2)	3		
2A.	Show that $\frac{d}{dx}[J_n^2(x) + J_{n+1}^2(x)] = 2\left[\frac{n}{x}J_n^2(x) - \frac{n+1}{x}J_{n+1}^2(x)\right].$			
2B.	Find the moment generating function of the random variable X which is uniformly distributed over $(-a, a)$. Evaluate $E(X^{2n})$.			
2C.	A bag contains 3 coins, one of which is coined with 2 heads and other two are normal and not biased. A coin is chosen at random from the bag and tossed 4 times in succession. If head turns up each time, what is the probability that this coin is a 2 headed coin?	3		

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3A.	Let \overline{X} and S^2 be the mean and variance of a random sample of size 25 from the distribution $N(3,100)$. Evaluate $Pr\{0 < \overline{X} < 6, 55.2 < S^2 < 145.6\}$.						
3B.	Given $x = 19.3 - 0.87y$ and $y = 11.64 - 0.50x$ are the two regression lines. Find \overline{x} , \overline{y} and correlation coefficient.						
3C.	Two independent random variables X_1 and X_2 have mean (5,10) and variance (4,9) respectively. Find covariance between $u = 3X_1 + 4X_2$, $v = 3X_1 - X_2$.						
4A.	Suppose that joint pdf of the two dimensional r. v. (X, Y) is given by $f(x,y) = \begin{cases} x^2 + \frac{xy}{3}, & 0 \le x \le 1, \ 0 \le y \le 2 \\ 0, & \text{elsewhere} \end{cases}$ compute (i) Pr(X > 1/2) (ii) Variance of X.						
4B.	Find the Karl Pearson's cMarks60No. of students	coefficier 0-62 5	nt of skew 63-65 18	ness for th 66-68 42	e table given 69 – 71 27	below: 72-74 8	3
4C.	Solve the following equation in series method; $(1 + x^2)\frac{d^2y}{dx^2} + x\frac{dy}{dx} - y = 0.$						
5A.	Prove that $P_n(x) = \sum_{r=0}^{N} \frac{(-1)^r (2n-2r)! x^{n-2r}}{2^n r! (n-r)! (n-2r)!}$, where $N = \frac{n}{2}$, if n is even and $N = \frac{n-1}{2}$, if n is odd.						4
5B.	Fit a straight line for the x 123 y 809092	given dat 4 5 83 94	ta. 6 7 99 9	7 92			3
5C.	 Urn A contains 10 white and 8 black balls. Urn B contains 6 black and 5 white balls. A ball is randomly drawn from Urn A and placed in B and then a ball is transferred from Urn B to A. Finally, a ball is selected from Urn A. What is the probability that this ball is white? 						3