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IV SEMESTER B.TECH. (AERONAUTICAL ENGINEERING)

END SEMESTER MAKEUP EXAMINATIONS, JUNE 2018

SUBJECT: ENGINEERING MATHEMATICS-IV [MAT 2201]

REVISED CREDIT SYSTEM
(14-06-18)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A.	State Bayes's Thereom. Urn A contains 9 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?	**4**
1B.	A five digit number is formed by the digits 0, 1, 2, 3, 4 without repetition. Find the probability that the number is divisible by 4.	**3**
1C.	Given $f(x) = \begin{cases} kx^3 ; 0 < x < 1 \\ 0 \quad ; elsewhere \end{cases}$ i) Find k such that $f(x)$ is a valid pdf ii) Find the cdf of X. iii) Find $P\left(X < \frac{1}{2}\right)$	**3**
2A.	Suppose that 3 balls are randomly selected from an urn containing 3 red, 4 white and 5 black balls. If we let X, Y respectively denote the number of red balls and number of white balls chosen, then find the joint probability mass function of X and Y.	**4**
2B.	If X_1, X_2, X_3 are uncorrelated random variables having same standard deviation, find the correlation coefficient between $X_1 + X_2$ and $X_2 + X_3$.	**3**
2C.	In a bombing actions, there is 50% chance that any bomb will strike the target. Two direct hits are needed to destroy the target completely. How many bombs are required to be dropped to give a 99% chance or better to completely destroying the target.	**3**
3A.	In a normal distribution 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation.	**4**
3B.	Find the variance of chi-square distribution.	**3**

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3C.	Show that for the random variable X having normal distribution with mean μ and variance σ^2, $E(X-\mu)^{2n} = 1.3.5.....(2n-1)\sigma^{2n}$.	**3**
4A.	Let X be a continuous random variable with pdf $f(x) = \begin{cases} 1; & 0 < x < 1 \\ 0\,; & \text{elsewhere} \end{cases}$. Let X_1 and X_2 be a random sample from X. Let $Y_1 = X_1 + X_2, Y_2 = X_1 - X_2$. Find the pdf of Y_1.	**4**
4B.	Express $J_5(x)$ in terms of $J_0(x)$ and $J_1(x)$	**3**
4C.	Suppose that $X_j, j = 1,2, \ldots 50$ are independent random variables each having a poisson distribution with $m = 0.03$. Let $S = X_1 + X_2 + \cdots + X_{50}$. Find $P(S \geq 3)$.	**3**
5A.	An incomplete frequency distribution for the weights of 120 boys is given below. Find the missing frequencies, given that the mode is 51.25 and $\sum f = 120$.	**4**

Weight(In kgs)	30-40	40-50	50-60	60-70	70-80
No. of boys	12	-	35	-	11

5B.	For the following data given below, find the equation to the best fitting curve of the form $y = ab^x$				**3**

x	1	2	3	4	5
y	130	152.2	177.3	190.2	244.7

5C.	Solve the following equation in series $(1-x^2)y'' + xy' - y = 0$	**3**

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