Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY
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A Constituent Institution of Manipal University

IV SEMESTER B.TECH. (EEE/ICE)

END SEMESTER EXAMINATIONS, APR/MAY 2017

SUBJECT: ENGINEERING MATHEMATICS [MAT 2208]

REVISED CREDIT SYSTEM
19/04/2017

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A.	If $P(A)=\frac{1}{3}$, $P(AUB)=\frac{1}{2}$, find $P(\overline{B})$ and $P(\overline{A}/\overline{B})$ in the following cases. (i) A and B are mutually exclusive (ii) A and B are independent.	**4**
1B.	If X has the pdf $f(x,y)=\begin{cases}1 & 0\le x\le 1\\ 0 & elsewhere\end{cases}$. Find the pdf of $Y=-2\log X$.	**3**
1C.	Solve $y''+8y\sin^2\pi x=0$ with $y(0)=y(1)=1$ for n=3.	**3**
2A.	If the joint pdf of X and Y is given by $f(x,y)=\begin{cases}k(x^2+\frac{xy}{3}), & 0<x<1 \quad 0<y<2\\ 0, & elsewhere\end{cases}$. Find the (i) the value of k (ii) $P\{Y<X\}$ (iii) $P\{Y<\frac{1}{2}/X<\frac{1}{2}\}$	**4**
2B.	Solve by Explicit method for four time steps: $32\frac{\partial u}{\partial t}=\frac{\partial^2 u}{\partial x^2}$, 0<x<1, $t\ge 0$, $u(x,0)=0$, $u(0,t)=0$, $u(1,t)=t$ with $h=\frac{1}{4}$ and $\lambda=\frac{1}{3}$	**3**
2C.	From a bag of 10 items containing 3 defectives, a sample of 4 is drawn at random, without replacement. If X denotes the random variable of the number of defective items in the sample, find (i) cdf of X (ii) $P\{X\le 1\}$.	**3**

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3A.	In a bombing action, 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 of completely to destroy the target?	**4**
3B.	Find the Z transform of the following: (i) ne^{-an} (ii) $\sin^3 n\theta$.	**3**
3C.	Solve the difference equation $y_{n+2} - 4y_{n+1} + 4y_n = \frac{n^2 2^n}{3}$.	**3**
4A.	Solve $\frac{\partial^2 u}{\partial t^2} = \frac{\partial^2 u}{\partial x^2}$, 0<x<1, $t \geq 0$, $u(x,0) = 100\sin \pi x$, $u(0,t) = 0 = u(1,t)$, $\frac{\partial u}{\partial t}(x,0) = 0$. Compute u for four time steps with $h = \frac{1}{4}$.	**4**
4B.	For a certain binary communication channel, the probability that a transmitted zero is received as zero is 0.95 and the probability that a transmitted one is received as one is 0.90. If the probability that a zero is transmitted is 0.4, find the probability that a one was transmitted given that a one was received.	**3**
4C.	An electronic device has a life length T which is exponentially distributed with parameter $\alpha = 0.001$. Suppose that 100 such devices are tested yielding $T_1, T_2, T_3, \ldots, T_{100}$. What is the probability that $950 < \overline{T} < 1100$?	**3**
5A.	Using Z transforms solve the system of difference equations, $x_{n+1} - y_n = 1$ and $y_{n+1} + x_n = 0$ with $x_0 = 0, y_0 = -1$.	**4**
5B.	Find the mgf of uniform distribution in (-a, a) and hence find $E(X^{2n})$.	**3**
5C.	With usual notation, prove that $\rho_{ZW} = \pm\rho_{XY}$ if $Z = aX + b$ and $W = cY + d$, where a, b, c, d are constants.	**3**

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