Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
A Constituent Institution of Manipal University

IV SEMESTER B.TECH. (Printing & Media)

END SEMESTER EXAMINATIONS, APRIL 2016

SUBJECT: ENGINEERING MATHEMATICS IV [MAT 2212]

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.	Solve $\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}=-1, \lvert x\rvert<1, \lvert y\rvert<1$ subjected to $u(\pm 1, y)=0,\ u(x, \pm 1)=0$ by taking $h=\frac{1}{2}$.	**04**
1B.	Solve $\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}=0, 0<x<1, 0<y<1$ subjected to $u(x,1)=u(0,y)=0$, $u(1,y)=9(y-y^2), u(x,0)=9(x-x^2)$ by taking $h=\frac{1}{3}$.	**03**
1C.	What is the probability that in a group of n people at least two of them having same birth day$(n<365)$?.	**03**
2A.	Solve $xy''+y=0, y(1)=1, y(2)=2$ by taking $h=0.25$.	**04**
2B.	The daily consumption of electric power (in million of KW-hours) is a random variable having the pdf $f(x)=\begin{cases}\frac{1}{9}xe^{-\frac{x}{3}}, x>0\\ 0 \quad\quad x\le 0\end{cases}$ If the total production is 12 million KW-hours, determine the probability that there is power cut (shortage) on any given day.	**03**
2C.	Determine the discrete probability distribution, expectation and variance of a discrete random variable X which denote the minimum of the two numbers that appear when a pair of fair dice is thrown once.	**03**
3A.	Two factories produce identical cloths, the products of the first factory consists of 10,000 cloths, out of these 100 are defective. The second factory consists of 20,000 cloths out of which 300 are defective. If a defective cloth is selected then what is the probability that it comes from first factory?	**04**
3B.	Find the mean and variance of Gamma distribution.	**03**
3C.	If a two dimensional random variable (X, Y) is uniformly distributed in the region $R=\{(x,y),\ 0<x<y<1\}$,then find ρ_{xy}.	**03**

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4A.	If X and Y are two discrete random variable, having joint PDF $f(x,y) = k(2x+y), x = 0, 1, 2 \; ; y = 0, 1, 2, 3$ then find i) k (ii) E(X) and E(Y)	**04**
4B.	Suppose life length of two electronic devices denoted by X_1, X_2 are normally distributed with $N(40, 36)$, $N(45, 9)$ respectively. If the electric device is used for at least 45 hour period, which device has to be preferred?	**03**
4C.	Solve the following transportation problem: Destination A B C D I 11 13 17 14 — 250 Source II 16 18 14 10 — 300 Availability III 21 24 13 10 — 400 Requirement 200 225 275 250	**03**
5A.	Using graphical method find the maximum value of $Z = 5x_1 + 3x_2$ subjected to the constraints $4x_1 + 5x_2 \leq 1000$ $5x_1 + 2x_2 \leq 1000$ $3x_1 + 8x_2 \leq 1200, \quad x_1 \geq 0, x_2 \geq 0$	**04**
5B.	A firm manufactures 3 products A, B, C. The profit are Rs. 3, Rs. 2, Rs. 4 respectively. The firm has two machines M_1 and M_2 and below is the required capacity processing time in minutes for each machine on each product. Machine | A B C M_1 | 4 3 5 M_2 | 2 2 4 Machines M_1 and M_2 have 2000 and 2500 machine-minutes respectively. The firm must manufacture 100 A`s , 200 B`s and 50 C`s but not more than 150 A`s. Set up an L. P. P to maximize profit.	**03**
5C.	Using simplex method maximize $Z = 4x_1 + 3x_2 + 6x_3$ subjected to the constraints $2x_1 + 3x_2 + 2x_3 \leq 440$ $4x_1 + 3x_3 \leq 470$ $2x_1 + 5x_2 \leq 430, \quad x_1 \geq 0, x_2 \geq 0, x_3 \geq 0$	**03**