Reg. No.										

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III SEMESTER B.TECH. (CIVIL ENGINEERING)

END SEMESTER EXAMINATIONS, APRIL/MAY 2018

SUBJECT: ENGINEERING MATHEMATICS-IV [MAT 2205]

REVISED CREDIT SYSTEM
(25/04/2018)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A.	With $h=0.25$, solve $\frac{\partial^2 u}{\partial t^2}=\frac{\partial^2 u}{\partial x^2}, 0<x<1 \ and \ t>0$ $u(x,0)=1-x^3,\ u(0,t)=1-t^3,\ u(1,t)=0, \frac{\delta u}{\delta t}(x,0)=0$ for 4 time levels.	**4**
1B.	An airline knows that 5% of the people making reservation on a certain flight will not turn up. Consequently, their policy is to sell 52 tickets for a flight that hold only 50 passengers. What is the probability that there will be a seat available for every passenger who turns up?	**3**
1C.	Solve the given LPP by simplex method $Max\,Z=5x_1+3x_2$ *subjected to* $x_1+x_2\le 2$ $5x_1+2x_2\le 10$ $3x_1+8x_2\le 12$ $x_1,x_2\ge 0$	**3**
2A.	The income of group of 1000 members is normally distributed with mean 750 and standard deviation 50. i. How many people have the income between 668 and 838? ii. Find the lowest income among the richest 100.	**4**
2B.	Find the curves on which the functional $\int_0^1 [(y')^2+12xy]dx$ with $y(0)=0, y(1)=1$ can be extremized.	**3**

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2C. Derive mean and variance of Gamma distribution. **3**

3A. A company has to transport certain items from three plants to four distribution centers. The supply and the demand of its units, with unit cost of transportation is given below. **4**

PLANTS	DISTRIBUTION CENTRES				AVAILABILITY
	D1	D2	D3	D4	
P1	19	30	50	12	7
P2	70	30	40	60	10
P3	40	10	60	20	18
REQUIREMENTS	5	8	7	15	

Determine the optimal transportation schedule.

3B. Use Crank Nicolson's method to solve $\frac{\delta u}{\delta t}=\frac{1}{16}\frac{\partial^2 u}{\partial x^2}, 0<x<1, t>0$ $u(x,0)=100\sin(\pi x), u(0,t)=u(1,t)=0$. Take $h=0.25$ and calculate the solution for 1 time level. **3**

3C. If X is random variable with pdf $f(x)=\begin{cases}2x & 0\le x\le 1\\ 0 & otherwise\end{cases}$. Find the pdf of $Y=8X^3$. **3**

4A. A company produces two types of paints, namely exterior and interior paints. The necessary data for the unit of production of the paints is given below. **4**

Name of the raw material	Raw material required (Tons)		Maximum availability (Tons)
	Interior paint	Exterior paint	
A	6	4	24
B	1	2	6
Profit/ton (units of 1000)	5	4	

The market survey indicates that the daily demand for interior paint can't exceed that exterior paint by 1 ton. Also, the maximum demand for the interior paint is 2 tons. Form the LPP corresponding to this and determine the best production schedule of paints by graphical method.

4B. Solve $y''+xy=1, y(0)=0, y'(1)=1$ with $h=0.5$ **3**

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4C.	Show that the geodesics on a plane are straight lines.	**3**
5A.	If X and Y are independent random variables with pdf given by $f(x)=e^{-\frac{x^2}{2}}, -\infty \le x \le \infty$ and $f(y)=e^{-\frac{y^2}{2}}, -\infty \le y \le \infty$ respectively. Find the pdf of $Z=\frac{X}{Y}$.	**4**
5B.	Find the moment generating function of a random variable X which is uniformly distributed in $(-a,a)$. Hence find $E(X^{2n})$, where n is a positive integer.	**3**
5C.	Let $\bar{X}$ be the mean of random sample of size $'n'$ from the distribution which has $N(\mu,9)$. Find $'n'$ such that $P(\bar{X}-1<\mu<\bar{X}+1)$.	**3**