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IV SEMESTER B.TECH (BIOTECHNOLOGY/CHEMICAL ENGINEERING) END SEMESTER EXAMINATION, MAY - JUNE 2016

SUBJECT: ENGINEERING MATHEMATICS IV [MAT 2204]

REVISED CREDIT SYSTEM

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ALL the questions.
- All the questions carry (4+3+3) marks.

1A.	Solve $\frac{\partial^2 u}{\partial t^2} = \frac{\partial^2 u}{\partial x^2}$, 0 <x<2, t="">0. $u(0,t) = u(2,t) = 0$, $u(x,0) = 0$,</x<2,>						
	$\frac{\partial u}{\partial t}(x,0) = 100(2x - x^2)$, $h = \frac{1}{2}$. Compute <i>u</i> for four time levels.	4 Marks					
1B.	Find $Z{\sin n\theta}$. Hence evaluate $Z{a^n \sin n\theta}$.	3 Marks					
1C.	Let $f(x) = \begin{cases} kx^3, 0 \le x < 1\\ 0, elsewhere \end{cases}$ be the probability density function of X. Then						
	determine the constant k and $P(\frac{1}{4} < X < \frac{3}{4})$.	3 Marks					
2A.	Solve the following LPP by two phase method: Minimize $Z = 4x_1 + x_2$						
	subject to $3x_1 + x_2 = 3$; $4x_1 + 3x_2 \ge 6$; $x_1 + 2x_2 \le 3$; $x_1, x_2 \ge 0$	4 Marks					
2B.	Solve $xy''+ y = 0$; $y'(1) = 0$; $y(2)=1$; h=0.5 by finite difference method.	3 Marks					
2C.	A two-dimensional random variable (X,Y) is uniformly distributed in the						
	region bounded by the circle $x^2 + y^2 = a^2$. Find the marginal p.d.f of X						
	and Y.	3 Marks					
3A.	Using Z-transforms, solve the difference equation						
	$y_{n+2} + 4y_{n+1} + 3y_n = 3^n; y_0 = 0, y_1 = 1.$	4 Marks					

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3B.	Solve the $x_1 + x_2 \le 1;$	$\begin{array}{l} e LPP g \\ 4x_1 + 5x_2 \le \end{array}$	raphically 20; $x_1 - 2x_2$: Maxim $1 \le 1; x_1 \le 3;$	$x_2 \le 2;$	Z = 6. x_1, x_2	$x_1 + 3$	<i>x</i> ₂	subjeo	rt to	3 M	arks
3C.	An officer is in hurry to reach airport to catch the flight scheduled at 1AM. Probability that he gets a taxi at such an early hour is 0.23. However if he gets a taxi, he would catch flight with probability 0.85. If he doesn't get a taxi, he will catch the flight with probability 0.43 by some other mode of transportation. If he catches the flight, what is the probability that he											
	came by taxi?								3 M	arks		
AB	$f(x, y) = \begin{cases} \\ (i) & \text{Find} \\ (ii) & \text{Eval} \end{cases}$	$e^{-y}, x > 0, y$ 0, <i>elsewhere</i> d the marg aluate $P(X)$	> x inal p.d.f o > 2 Y < 4)	f Y.	<u>s wa</u>	s fou	und t	o h	e nor	mally	4 M	arks
4D.	distributed with mean Rs.750 per month and standard deviation of Rs.50. What percentage of the persons have income exceeding Rs.668? What is the lowest income among the richest 200?									3 M	arks	
4C.	If (X,Y) has joint density function $f(x, y) = 2 - x - y; 0 < x < 1, 0 < y < 1$, compute P_{XY} .								3 M	arks		
5A.	Fit a least square parabola to the following data :											
	x y	1 2	2 3	5 6	7 8		8 10		11 12		4 M	arks
5B.	Obtain the mean and variance of Gamma distribution.								3 M	larks		
5C.	A random $f(x) = \frac{1}{2}e^{-1}$	variable X $ x $, $-\infty < x$	has the pr $<\infty$. Find	P($ X - \mu \ge$	ensity 2) .	functi	ion				3 M	larks