

IV SEMESTER B.TECH. MAKEUP EXAMINATION 2022 SUBJECT: ENGINEERING MATHEMATICS IV [MAT 2254]

(COMMON TO BT/CHEM)

Date of Exam: 22-7-2022 Time of Exam: 2-5pm Max. Marks: 50

Instruction to candidates: Answer all questions

1A	Solve $xy'' + y = 0$, $y(1) = 1$, $y(2) = 2$ with $h = 0.25$ by					
	finite difference method.					
1B	A man tosses a coin and throw a die, beginning with coin.	3				
	What is the probability that he get a head before he gets 5 or 6					
	on the die					
1C	Solve $\frac{\partial^2 u}{\partial t^2} = \frac{\partial^2 u}{\partial x^2}$, $0 < x < 1, t > 0$, $u(x, 0) = 100(x - x^2)$,	4				
	$\frac{\partial u}{\partial t}(x,0) = 0, \ u(0,t) = u(1,t) = 0 \text{ with } h = \frac{1}{4}.$					
	Compute u (x, t) for 4 time steps.					
2A	Diameter of an electric cable is assumed to be a continuous	3				
	random variable with pdf $f(x) = \begin{cases} 6x(1-x) \text{ for } 0 < x < 1\\ 0, \text{ elsewhere} \end{cases}$					
	1) Obtain the expression for cdf.					
	2) Compute $P\left\{Y < \frac{1}{2} \mid \frac{1}{2} < Y < \frac{2}{2}\right\}$					
	2) Compute $P\left(X \leq \frac{1}{2}\right) = X \leq \frac{1}{3}$.					
2B	Find the Z transform of the function $sin n\pi/2 + 5a +$	3				
	$7(n+1)^2$.					
2C	Solve the following LPP by simplex method	4				
	Maximize $z=10x+y$					
	Subject to $x + y \le 10$					
	4x + y < 20					
	x + 2y < 30					
	$x y \ge 0$					
34	$\overline{3z^2+2}$	3				
511	Find the inverse Z Transform of $\frac{1}{(5z-1)(5z+2)}$.					
3B	Derive the mean and variance of a binomial distribution.	3				

3C	The local authority in a certain city installs 10000 electric lamps in the streets of the city. If these lamps have an average life of 1000 burning hours with a standard deviation of 200 hours, assuming normality, what number of lamps might be expected to fail (i) In the first 800 burning hours? (ii) Between 800 and 1200 burning hours?							
4A	If X, Y, Z be uncorrelated random variables having the same standard deviation. Find the correlation coefficient between $X+Y$ and $Y+Z$.							
4B	Obtain the regression coefficient of x on y for the following data							
	X Y	0 -4	-1	2 4	3 11	4 20		
4C	Solve the following LPP by graphical method Minimize $Z = 3x + 2y$ Subject to $5x + y \ge 10$ $x + y \ge 6$ $x + 4y \ge 12$ $x, y \ge 0$							
5A	Solve the difference equation $y_{n+2} - 4y_{n+1} + 3y_n = 5^n$.							
5B	Urn A contains 3 red and 2 white balls. Urn B contains 2 red and 5 white balls. An urn is selected at random. A ball is drawn and put into the other, then a ball is drawn from that urn. Find the probability that the both balls are of same color.							
5C	Solve $32u_t = u_{xx}$, $0 < x < 1, t > 0, u(x, 0) = 0,$ u (0, t) =0, u (1, t) =t. Compute u (x, t) for four-time steps by taking h=1/4 and $\alpha = \frac{1}{2}$.							