[B19 BS 1101]

I B. Tech I Semester (R19) Regular Examinations
MATHEMATICS – I
(Common to All Branches)
MODEL QUESTION PAPER

TIME: 3 Hrs. **Max. Marks: 75 M**

Answer **ONE Question** from **EACH UNIT**
All questions carry equal marks
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	UNIT-I	**CO**	**KL**	**M**
1.a)	Solve the system of equations $20x + y - 2z = 17, 3x + 20y - z = -18$, $2x - 3y + 20z = 25$ by Gauss –Siedel method.	CO1	K2	8
b)	Investigate the values of λ and μ so that the equations $2x + 3y + 5z = 9;\ 7x + 3y - 2z = 8;\ 2x + 3y + \lambda z = \mu;$ has (i)no solution (ii) unique solution (iii) infinite number of solutions	CO1	K3	7
(OR)				
2. a)	Solve the system of equations 10x + y+z =12, 2x+10y+z =13, 2x+2y+10z =14 by Gauss- elimination method.	CO1	K2	8
b)	Define rank and find the rank of the matrix A by reducing it in to its normal form where A is: $A = \begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$.	CO1	K1	7
	UNIT-II			
3.a)	Verify Cayley-Hamilton theorem and find the inverse of the matrix $A = \begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{bmatrix}$.	CO2	K3	8
b)	Reduce the quadratic form $2x^2 + 2y^2 + 2z^2 - 2xy - 2yz - 2zx$ to canonical form by orthogonal transformation	CO2	K3	7
(OR)				
4. a)	Find the eigenvalues and the corresponding eigen vectors of the matrix $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$.	CO2	K3	8
b)	If A $= \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, use Cayley-Hamilton theorem to find the value of $2A^5 - 3A^4 + A^2 - 4I$. Also find the inverse of A.	CO2	K3	7

	UNIT-III			
5.a)	Solve $\frac{dy}{dx} + (\tan x)\, y = (\sec x)\, y^3$.	CO3	K2	8
b)	Find the orthogonal trajectories of the family of parabolas $ay^2 = x^3$.	CO3	K3	7
(OR)				
6. a)	Solve $(y^4 + 2y)dx + (xy^3 + 2y^4 - 4x)dy = 0$.	CO4	K2	8
b)	A body originally at 80^0C cools down to 60^0C in 20 minutes, the temperature of air being40^0C. What will be the temperature of the body after 40 minutes from the original?	CO4	K3	7
	UNIT-IV			
7.a)	Solve $(D^3 - D)y = 2x + 1 + 4\cos x$.	CO5	K2	8
b)	Solve $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = e^x \log x$ by the method of variation of parameters.	CO5	K2	7
(OR)				
8. a)	Solve $(D^2 + 3D + 2)y = e^{e^x}$.	CO5	K2	8
b)	Solve the differential equation $x^2\frac{d^2y}{dx^2} - x\frac{dy}{dx} + y = \log x$	CO5	K2	7
	UNIT-V			
9.a)	Find $L\{tcosat\}$ and $L\left\{\int_0^t e^{-t}\cos t\, dt\right\}$.	CO6	K2	8
b)	Using convolution theorem evaluate $L^{-1}\{\frac{1}{(s+a)(s+b)}\}$.	CO6	K3	7
(OR)				
10.a)	Find $L^{-1}\{\frac{5s+3}{(s-1)(s^2+2s+5)}\}$.	CO6	K2	8
b)	Solve $\frac{d^2y}{dt^2} + 4\frac{dy}{dt} + 3y = e^{-t}$, $y(0) = y'(0) = 1$ by using Laplace transforms	CO6	K3	7