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EAST POINT COLLEGE OF ENGINEERING & TECHNOLOGY
An Autonomous Institution Affiliated to Visvesvaraya Technological University (VTU) Belagavi

USN | | | | | | | | | | |

EPMTS201

Second Semester B.E. Degree Examination, May 2026
MATHEMATICS - II FOR CSE STREAM

TIME:3 hrs. Max.Marks:100

Note: 1. Answer any FIVE full questions, choosing ONE question from each MODULE
2. Formula Hand Books Permitted
3. M: Marks, L: Bloom's level, C: Course outcomes.

		Module-1	M	L	C
Q.1	a	Solve: $\frac{dy}{dx}+\frac{y}{x}=y^2x$.	6	L2	CO1
	b	Solve:$y(2xy+1)dx-xdy=0$.	7	L2	CO1
	c	A voltage Ee^{-at} is applied at t = 0 to a circuit of inductance L and resistance R.Show that the current at any time t is $\frac{E}{R-aL}[e^{-at}-e^{-Rt/L}]$given that the current is initially zero when $t=0$.	7	L3	CO1
		OR			
Q.2	a	Obtain the Orthogonal trajectories of the family $y2=4ax$.	7	L2	CO1
	b	Solve: $p^2+2py\cot x-y^2=0$	7	L2	CO1
	c	Obtain the General and Singular solution of the equation $xp^2+px-py+1-y=0$.	6	L2	CO1
		Module–2			
Q.3	a	Evaluate $\int_0^{log2}\int_0^x e^{x+y}\,dy\,dx$.	6	L2	CO2
	b	Evaluate $\int_0^1\int_x^{\sqrt{x}} xy\,dy\,dx$ by changing the order of integration.	7	L2	CO2
	c	Derive the relation $\beta(m,n)=\frac{\Gamma(m).\Gamma(n)}{\Gamma(m+n)}$	7	L2	CO2
		OR			
Q.4	a	Evaluate $\int_0^\infty\int_0^\infty e^{-(x^2+y^2)}dx\,dy$ by changing to polar coordinates.	7	L2	CO2
	b	Using double integration find the area of a plane in the form of a quadrant of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$.	7	L2	CO2
	c	Show that $\int_0^{\pi/2}\frac{d\theta}{\sqrt{\sin\theta}}\times\int_0^{\pi/2}\sqrt{\sin\theta}d\theta=\pi$	6	L3	CO2
		Module–3			
Q.5	a	Show that any plane passing through the origin is a subspace of R^3.	6	L2	CO3
	b	Find the dimension and basis of the subspace spanned by the vectors, (2,4,2), (1,-1,0), (1,2,1) and (0,3,1) in $V_3(R)$.	7	L2	CO3

	c	Find the matrix of Linear transformation $T: V_2(R) \rightarrow V_3(R)$ defined by $T(x,y) = (3x-y, 2x+4y, 5x-6y)$ with respect to $B_1 = \{(1,1),(3,1)\}$ and $B_2 = \{(1,1,1),(1,1,0),(1,0,0)\}$.	7	L2	CO3
		OR			
Q.6	a	Show that the vector $v = (1,-2,5)$ as a linear combination of the vectors $v_1 = (1,1,1), v_2 = (1,2,3), v_3 = (2,-1,1)$ in the vector space $R^3(R)$.	7	L2	CO3
	b	Find the dimension and basis of the subspace spanned by the vectors $(1,2,-1,3,4), (2,4,-2,6,8), (1,3,2,2,6), (1,4,5,1,8), (2,7,3,3,9)$ in $V_5(R)$	7	L2	CO3
	c	Let $T: R^3 \rightarrow R^3$ be a linear transformation defined by, $T(x,y,z) = (x+2y-z, y+z, x+y-2z)$. Find rank, nullity and hence verify the rank nullity theorem.	6	L2	CO3
		Module–4			
Q.7	a	Use method of false position to find a real root of the equation $x \log_{10} x - 1.2 = 0$ by carrying out three iterations.	6	L2	CO4
	b	A survey conducted ina slum locality reveals the following information as given below: Income per day in Rs. | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 No. of persons | 20 | 45 | 115 | 210 | 115 Find the probable number of persons in the income group 20 to 25.	7	L3	CO4
	c	Evaluate $\int_0^6 \frac{dx}{(4X+5)}$ using Simpson's 1/3rd rule by dividing interval into 6 equal parts.	7	L3	CO4
		OR			
Q.8	a	By Newton's-Raphson method find the root of $x\,sinx + cosx = 0$, which is near to $x = \pi$.	7	L2	CO4
	b	Using Lagrange's interpolation formula find y(10) from the data X | 5 | 6 | 9 | 11 Y | 12 | 13 | 14 | 16	7	L2	CO4
	c	Evaluate $\int_0^1 \frac{dx}{1+x}$ taking seven ordinates by applying Simpson's 3/8th rule.	6	L3	CO4
		Module–5			
Q.9	a	Using Modified Euler's method find $y(1.1)$ taking $h = 0.1$ given that $\frac{dy}{dx} = 1 + \frac{y}{x}$ with $y(1)=2$, find upto 2 approximations.	6	L2	CO5
	b	Using Runge-Kutta method find y a tx=0.1, Given that $\frac{dy}{dx} = 3e^x + 2y$, $y(0)=1$ by taking $h = 0.1$	7	L2	CO5
	c	Using Milne's Predictor-Corrector method find y(0.8),from $\frac{dy}{dx} = x - y^2$,given that $y(0)=0$, $y(0.2)=0.02$, $y(0.4)=0.0795$, $y(0.6)=0.1762$.	7	L2	CO5
		OR			
Q.10	a	Using Taylor series find the value of $y(0.1)$, $y(0.2)$, $y(0.3)$ given that $\frac{dy}{dx} = x^2 + y^2$ and $y(0) = 1$.	7	L2	CO5
	b	Using Runge-Kutta method find y at x=1.1, Given that $\frac{dy}{dx} + y = 2x, y(1) = 3$ by taking h=0.1	7	L2	CO5
	c	Using Milne's Predictor-Corrector method find y(0.8),from $\frac{dy}{dx} = -xy^2$, given that $y(0) = 2, y(0.2) = 1.9231, y(0.4) = 1.7241, y(0.6) = 1.4706$.	6	L2	CO5

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