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

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

EPMTC201

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

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	Evaluate $\int_0^2 \int_0^3 (x+y)\,dx\,dy$	7	L3	CO1
	b	Evaluate $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)}\,dxdy$ by changing into polar coordinates	7	L3	CO1
	c	Derive the relation $\beta(m,n) = \frac{\gamma(m)\gamma(n)}{\gamma(m+n)}$	6	L2	CO1
		OR			
Q.2	a	Evaluate $\int_0^1 \int_x^{\sqrt{x}} xy\,dydx$	7	L3	CO1
	b	Change the order of integration and hence evaluate $\int_0^1 \int_{\sqrt{y}}^1 dx\,dy$	7	L3	CO1
	c	Prove that $\gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$,using the definition of $\gamma(n)$.	6	L2	CO1
		Module–2			
Q.3	a	Form PDE from the relation $z = f(x+at) + g(x-at)$	7	L2	CO3
	b	Solve $\frac{\partial^2 z}{\partial x \partial y} = \sin x\, siny$ for which $\frac{\partial z}{\partial y} = -2siny$ when x=0 and z=0 when y is an odd multiple of $\pi/2$	7	L3	CO3
	c	Solve $x(y^2-z^2)p + y(z^2-x^2)q - z(x^2-y^2) = 0$	6	L3	CO3
		OR			
Q.4	a	Form the partial differential equation from $f(x+y+z, x^2+y^2+z^2) = 0$	7	L2	CO3
	b	Solve $\frac{\partial^2 z}{\partial x^2} + \frac{\partial z}{\partial x} - 4z = 0$, given that when x=0, z = 1 and $\frac{\partial z}{\partial x} = y$	7	L3	CO3
	c	With usual notation, derive one-dimensional wave equation $\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$	6	L2	CO3
		Module–3			
Q.5	a	Find the directional derivative of $\varphi = x^2yz + 4xz^2$ at (1,-2,-1) along $2i - j - 2k$	7	L3	CO3
	b	Evaluate $\int_c xy\,dx + xy^2\,dy$ Stoke' s theorem where c is the square in the x-y plane with the vertices(1,0), (-1,0), (0,1), (0,-1)	7	L3	CO3
	c	If $\vec{F} = (x+y+1)\,i + j - (x+y)k$, show that $\vec{F}.curl\ \vec{F} = 0$	6	L2	CO3
		OR			
Q.6	a	Find the angle between the surfaces $x^2+y^2+z^2 = 9$ and $z = x^2+y^2-3$ at (2 ,-1,2)	7	L3	CO3

	b	Evaluate using Green's theorem for $\oint_c (xy + y^2)\,dx + x^2 dy$ where C is the closed curve oftheregion bounded by y=x& $y=x^2$	7	L3	CO3
	c	Show that $\vec{F} = (y + z)\,i + (z + x)\,j + (x + y)\,k$ is irrotational.	6	L2	CO3
		Module–4			
Q.7	a	Find the real root of the equation $xe^x - 2 = 0$ correct to 3 decimal places using Newton-Raphson method.	7	L3	CO4
	b	Given $f(40) = 184, f(50) = 204, f(60) = 226, f(70) = 250,$ $f(80) = 276, f(90) = 304, find\ f(38)$ using suitable interpolation formulae.	7	L3	CO4
	c	Evaluate $\int_0^1 \frac{x}{1+x^2}\,dx$ by Simpson's 3/8th rule by taking seven ordinates and hence find $\log_e 2$.	6	L3	CO4
		OR			
Q.8	a	Find a Real root of the equation $x^3 - 2x - 5 = 0$ correct to three decimal places, by using regula-falsi method	7	L3	CO4
	b	Use Lagrange's interpolation formula to find y at $x = 10$ given,	7	L3	CO4
	c	Find the approximate value of $\int_0^{\frac{\pi}{2}} \sqrt{cos\theta}\,d\theta$ by Simson's 1/3rd rule, by dividing $[0,\pi/2]$ into 6 equal parts.	6	L3	CO4
		Module–5			
Q.9	a	Use Taylor's series method to find y at $x = 0.1,0.2,0.3$ considering terms upto the third degree given that $\frac{dy}{dx} = x^2 + y^2$ and $y(0) = 1$	7	L3	CO5
	b	Using Modified Euler's method to find y at x=0.2 given $\frac{dy}{dx} = 3x + \frac{1}{2}y$ with y(0)=1,taking $h = 0.1$.	7	L3	CO5
	c	Given that $\frac{dy}{dx} = x - y^2$ and the data $y(0) = 0, y(0.2) = 0.02, y(0.4) = 0.0795, y(0.6) = 0.1762$.Compute y(0.8) by Milne's method	6	L3	CO5
		OR			
Q.10	a	Employ Taylor's series method to find y at x=0.1, given $\frac{dy}{dx} - 2y = 3e^x, y(0) = 0$	7	L3	CO5
	b	Using Runge-Kutta method of fourth order, find y(0.2) for the equation $\frac{dy}{dx} = \frac{y-x}{y+x}$, y(0)=1 taking h =0.2	7	L3	CO5
	c	Use Modified Euler's method- given $\frac{dy}{dx} = x + y$,y(0)=1 & compute y(0.2) by taking h=0.2 ,carryout two approximation.	6	L3	CO5

		x	5	6	9	11
		y	12	13	14	16

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PROOF