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

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EPMTE201

Second Semester B.E. Degree Examination, May 2026
MATHEMATICS FOR EEE 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**	Find the angle between the surface $xy^2z=3x+z^2$ and $3x^2-y^2+2z=1$ at the point $(1,-2,1)$	**7**	**L2**	**CO1**
	b	Find $div\,\vec{F}$ and $Curl\ \vec{F}$ where $\vec{F}=\nabla(x^3+y^3+z^3-3xyz)$	**7**	**L2**	**CO1**
	c	Show that $\vec{A}=(y^2-z^2+3yz-2x)\hat{i}+(3xz+2xy)\hat{j}+(3xy-2xz+2z)\hat{k}$ is both solenoidal and irrotational.	**6**	**L3**	**CO1**
		OR			
Q.2	**a**	Find the total work done by the force represented by $\vec{F}=3xy\,\hat{i}-y\,\hat{j}+2zx\,\hat{k}$ in moving a particle round the circle $x^2+y^2=4$.	**7**	**L3**	**CO1**
	b	Using Green's theorem evaluate $\int_C (3x^2-8y^2)\,dx+(4y-6xy)\,dy$ where C is the boundary of the region enclosed by $y=\sqrt{x}$ and $y=x^2$	**7**	**L2**	**CO1**
	c	If $\phi = x^2y + 2xz - 4$, find $\nabla\phi$ *and* $\lvert\nabla\phi\rvert$ at the point $(1,-2,1)$	**6**	**L3**	**CO5**
		Module–2			
Q.3	**a**	Define a Vector space. Show that the set of all matrices order $M \times N$ is a Vector Space.	**7**	**L2**	**CO2**
	b	Define a basis for a vector space. Determine whether or not the vectors: (1,1,2), (1,2,5), (5,3,4)form a basis of R^3.	**7**	**L2**	**CO2**
	c	Prove that $T:R^3\rightarrow R^3$ be defined by $T(x_1,x_2,x_3)=(x_1-x_2,\ x_1+x_3)$ is a linear transformation	**6**	**L2**	**CO2**
		OR			
Q.4	**a**	Define linearly independent set of vectors and linearly dependent set of vectors. Are the vectors $(1,2,-1),(1,-2,1),(-3,2,-1)$ linearly dependent? Justify your answer.	**7**	**L2**	**CO2**
	b	State the rank-Nullity theorem and verify the theorem for the linear transformation $T: R^3\rightarrow R^3$ defined by $T(x,y,z)=(x,\ 0,\ x-y+z)$.	**7**	**L2**	**CO2**
	c	Verify the rank-nullity theorem for the linear transformation $T: V_3(R)\rightarrow V_3(R)$ defined by $T(x,y,z)=(x+2y-z, y+z, x+y-2z)$	**6**	**L2**	**CO2**
		Module–3			
Q.5	**a**	Find the Laplace transform of i) $e^{-3t}(2\cos 5t-3\sin 5t)$ ii) $(t+2)^2e^t$	**7**	**L2**	**CO3**
	b	Express the following function interms of unit step function and hence find its Laplace transform of $(t^3+t^2+t+1)\,u(t+1)$	**6**	**L3**	**CO3**

	c	Find the Laplace transform of the wave function $f(t)=\begin{cases} E & 0<t<a/2 \\ -E & a/2<t<a \end{cases}$	7	L3	CO3
		OR			
Q.6	a	Find the inverse Laplace transform of $i)\ f(s)=\frac{S+5}{S^2-6S+13}$ $ii)\ f(s)=\frac{1}{(S+1)^2}$	7	L2	CO3
	b	Using the convolution theorem, find the inverse Laplace transform of $\frac{s}{(s^2+a^2)^2}$	7	L2	CO3
	c	Solve the differential equation by using the Laplace transform method $y'''+2y''-y'-2y=0$ given $y(0)=y'(0)=0$ and $y''(0)=6$	6	L3	CO3
		Module–4			
Q.7	a	By Newton-Raphson method, find the root of $x\tan x+1=0$ which is near to $x=\pi$	7	L2	CO4
	b	Using Lagrange's interpolation formula, fit a polynomial which passes through the points (0, -4), (2, 2), (3, 14) and (6, 158) and hence estimate the value of y when x =4	7	L3	CO4
	c	Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by using Simpson's $1/3^{rd}$ rule by taking four equal strips.	6	L2	CO4
		OR			
Q.8	a	Find a real root of the equation $x^3-3x+4=0$ correct to three decimal places by the method of false position.	7	L3	C04
	b	Construct Newton's forward interpolation polynomial for the data X: 1, 2, 3, 4, 5 y: 10, 26, 58, 112, 194	7	L2	CO4
	c	Evaluate $\int_1^4 e^{1/x}\,dx$ by using Simpson's $3/8^{th}$ rule.	6	L3	CO4
		Module–5			
Q.9	a	Use Taylor series method to find $y(0.1)$ from $y'=x-y^2,\quad y(0)=1$	7	L2	CO4
	b	Using the Runge-Kutta method of order 4,find y at x=0.5, given that $(x+y)y'=1,\ y(0.4)=1$	7	L2	CO4
	c	Find y (0.4)by using Milne's Predictor and Corrector method,given $y'=2e^x-y,\ y(0)=2,\ y(0.1)=2.010,\ y(0.2)=2.040,\ y(0.3)=2.090$	6	L2	CO4
		OR			
Q.10	a	Using Modified Euler's method to find y at x = 0.1 given $y'=x-y^2,\ y(0)=1$ taking $h=0.1$	7	L3	CO4
	b	Using the Runge-Kutta method of order 4, find y at $x=1.1$, given that $y'=xy^{1/3},\ y(1)=1$	7	L3	CO4
	c	Using Taylor's Series find $y(0.1)$,given $y'=x-y\ \ y(0)=1$ by.	6	L3	CO5

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