



Fourth Semester B.E. Degree Examination, July/August 2022 Advanced Mathematics – II

Time: 3 hrs.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Max. Marks:100

Note: Answer any FIVE full questions.

 b. If cosa, cosp, cosp are the direction cosines of a line. Prove that (i) sin² α + sin² β + sin² γ = 2. (ii) cos 2α + cos 2β + cos 2γ = -1 c. Find the image of the point (2, -1, 3) in the plane 2x + 4y + z - 24 = 0. (07 Marks 2 a. Find the equation of the plane in the intercept form. (06 Marks b. Find the equation of the plane which passes through (3, -3, 1) and is perpendicular to the planes 7x + y + 2z = 6 and 3x + 5y - 6z = 8. (07 Marks c. Show that the lines x -5/4 = y - 7/4 = z + 3/-5 and x - 8/7 = y - 4/1 = z - 5/3 are coplanar. Find the common point. 3 a. Find sine of the angle between the vectors 2î - 2ĵ + k̂ and î - 2ĵ + 2k̂. (06 Marks b. Find the constant 'a' such that the vectors 2î - ĵ + k̂, î + 2ĵ - 3k̂ and 3î + aĵ + 5k̂ ar 	5)
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conlanar (07 Marks	e a
$\begin{bmatrix} - & - & - & - & - \\ - & - & - & - & - &$	'
c. Prove that $ a \times b, b \times c, c \times a = a b c $. (07 Marks	5)
4 a. A particle moves along the curve $x = 1 - t^3$, $y = 1 + t^2$, $z = 2t - 5$ where t is the time. Fin	d
the velocity and acceleration at $t = 1$. (06 Marks	5)
b. Find the unit normal vector to the surface $xy + x + zx = 3$ at $(1, 1, 1)$. (07 Marks	5)
c. Find the angle between the surfaces $x^2 + y^2 + z^2 = 9$ and $x = z^2 + y^2 - 3$ at the point (2 1 2)	ıt
(2, -1, 2). (07 Marks	5)
5 a. Find the directional derivative of $\phi = x^2yz + xz^2$ at the point (-1, 2, 1) in the direction of	of
$2\hat{i} - \hat{j} - 2\hat{k}$. (06 Marks	5)
b Show that the vectors $\vec{F} = (2xy + z^2)i + (x^2 + 2xy)i + (y^2 + 2zx)k$ is irrotational (07 Marks	3
= 2xy + 2y + 2y + (x + 2xy) + (y + 22x) x + 5 + 10 + 10 + 10 + 10 + 10 + 10 + 10	'
c. Given that $F = (x + y + 1)i + j - (x + y)k$, show that $F.curl F = 0$. (07 Marks	;)
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6 a. Using the definition show that $L[t] = \frac{1}{s^{n+1}}$. (05 Marks	5)
b. Find L[tcosat]. (05 Marks	5)
c. Find $L\left[\frac{\cos at - \cos bt}{t}\right]$. (05 Marks	5)
d. Find $L[\cos(at+b)]$. (05 Marks	5)
1 of 2	



- 8 a. Using Laplace Transform method solve $y'' + 2y' 3y = \sin t$ subject to the condition, y(0) = y'(0) = 0. (10 Marks)
 - b. By applying Laplace transform, solve the differential equation y'' + 4y' + 3y = 0 subject to the condition y(0) = 0 and y'(0) = 1. (10 Marks)