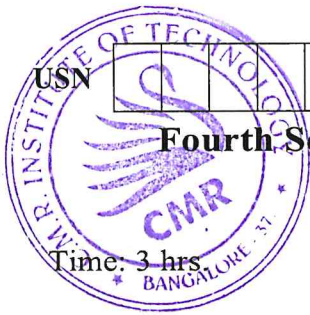


BRIDGE COURSE

MATDIP401



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

Time: 3 hrs

Max. Marks:100

Note: Answer any FIVE full questions.

- 1 a. Find the distance between the points A(1, 1, 1) and B(2, 3, 5). (06 Marks)
b. Find the angle between the lines whose direction cosines are proportional to 1, 2, 4 and -2, 1 5. (06 Marks)
c. If l, m, n are the direction of cosines of a line then prove that $l^2 + m^2 + n^2 = 1$. (08 Marks)
- 2 a. Find the equation of the plane passing through the points (3, -3, 1) and parallel to the plane $2x + 3y + 5z + 6 = 0$. (06 Marks)
b. Find the equation of the plane which passes through the points A(0, 1, 1), B(1, 1, 2) and C(-1, 2, -2). (06 Marks)
c. Show that points (2, 2, 0), (4, 5, 1), (3, 9, 4) and (0, -1, -1) are coplanar. (08 Marks)
- 3 a. If $\vec{a} = 2\hat{i} + 3\hat{j} - \hat{k}$, $\vec{b} = \hat{i} - 2\hat{j} + \hat{k}$ and $\vec{c} = 3\hat{i} - \hat{j} + 2\hat{k}$. Find $2\vec{a} + 3\vec{b} - 2\vec{c}$. (06 Marks)
b. If $\vec{a} = (3, -1, 4)$, $\vec{b} = (1, 2, 3)$ and $\vec{c} = (4, 2, -1)$ find $\vec{a} \times (\vec{b} \times \vec{c})$ (06 Marks)
c. Prove that $[\vec{a} + \vec{b}, \vec{b} + \vec{c}, \vec{c} + \vec{a}] = 2[\vec{a}, \vec{b}, \vec{c}]$ (08 Marks)
- 4 a. A particle moves along the curve $\vec{r} = (1 - t^3)\hat{i} + (1 + t^2)\hat{j} + (2t - 5)\hat{k}$. Determine its velocity and acceleration. (06 Marks)
b. If $\vec{F} = (3xz - 3yz)\hat{i} + (3y^2 - 3xz)\hat{j} + (3z^3 - 3xy)\hat{k}$, find $\text{div } \vec{F}$. (06 Marks)
c. Find $\text{Curl } \vec{F}$, whose $\vec{F} = (x + y + 1)\hat{i} + \hat{j} - (x + y)\hat{k}$. (08 Marks)
- 5 a. A particle moves along the curve $\vec{r} = \cos 2t\hat{i} + \sin 2t\hat{j} + t\hat{k}$. Find its velocity and acceleration. (06 Marks)
b. Find the divergence of the vector $\vec{V} = xyz\hat{i} + 3x^2y\hat{j} + (xz^2 - y^2z)\hat{k}$ (06 Marks)
c. If $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$, show that $\text{Curl } \vec{r} = 0$. (08 Marks)
- 6 a. Find the Laplace transform of $5\sin 2t + 3\cos 4t$. (06 Marks)
b. Find the Laplace transform of $\cos^2 2t$. (06 Marks)
c. Find the Laplace transform of
i) $\sin 4t + e^{-3t}$ ii) $\cosh 2t + 2$. (08 Marks)

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.

- 7 a. Find Laplace transform of $t \cos t$. (06 Marks)
b. Find the Laplace transform of $e^{-2t}[2 \cos 5t - \sin 5t]$. (06 Marks)
c. Find the inverse Laplace transform of $\frac{1}{s+2} + \frac{3}{2s+5} - \frac{4}{3s-2}$. (08 Marks)
- 8 a. Solve $\frac{d^2y}{dx^2} + 4 \frac{dy}{dx} + 3y = e^{-x}$ with $y(0) = y'(0) = 1$, by using Laplace transform method. (06 Marks)
b. Find $L^{-1}\left[\frac{1}{s(s^2 + a^2)}\right]$ by using convolution theorem. (06 Marks)
c. Find the inverse Laplace transform of $\frac{1}{(s+1)(s-2)}$. (08 Marks)

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