

Hall Ticket Number:

14MA201

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I/IV B.Tech (Supplementary) DEGREE EXAMINATION

January, 2021

Second Semester

Time: Three Hours

Common to all branches

Engineering Mathematics -II

Maximum : 60 Marks

Answer All Questions from Part - A.

(1X12 = 12 Marks)

Answer ANY FOUR questions from Part - B.

(4X12=48 Marks)

Part - A

1. Answer all questions

(1X12=12 Marks)

- Find the solution of $dy/dx = 2xy$.
- Define orthogonal trajectories.
- Find the integrating factor of $dy/dx + xy = \sin x$.
- What is the general solution of $(D^2 - 3D + 2)y = 0$, where $D \equiv d/dx$.
- Define Euler – Cauchy equation.
- Write L-C-R circuit without e.m.f.
- What is the Laplace transform of $f(t) = \sin 2t$.
- Define unit step function.
- State second shifting property of Laplace transforms.
- Given $\vec{A} = x^2 y \vec{i} - 2xz \vec{j} + 2yz \vec{k}$, find divergence of $\vec{A}$.
- When a vector function is said to be irrotational.
- State Stoke's theorem.

Part - B

- Solve the differential equation $y' - y = e^{2x}$, $y(0) = 0$. (6M)
 - Find the orthogonal trajectories of $y^2 = 4ax$. (6M)
- Solve the differential equation $y' \sin 2y + x \cos 2y = 2x$. (6M)
 - A thermometer, reading 10°C , is brought into a room whose temperature is 23°C . Two minutes later the thermometer reading is 18°C . How long will it take until the reading shows 22.8°C . (6M)
- Solve the differential equation $x^2 y'' - 4xy' + 6y = 0$, $y(1) = 1$, $y'(1) = 0$. (6M)
 - Using the method of undetermined coefficients solve $y'' + 3y' + 2y = 30e^{2x}$ (6M)
- Using the method of variation of parameters solve $y'' - 4y' + 4y = x^2 e^x$. (6M)
 - Find the current $I(t)$ in an L-C-R circuit with $R = 11 \text{ ohms}$, $L = 0.1 \text{ Henry}$, $C = 10^{-2} \text{ Farad}$ which is connected to a source of voltage $E(t) = 100 \sin 400t$. Assume that the current and charge are zero when $t = 0$. (6M)
- Find the Laplace transform of (i) $t \cos 2t$ (ii) $(e^{-at} - e^{-bt})/t$. (6M)
 - Using Laplace transform technique solve $(D^2 - 2D + 1)y = e^t$, $y(0) = 2$, $y'(0) = -1$. (6M)

7. a) Find $L^{-1}\left(\frac{1}{s(s^2 + \omega^2)}\right)$ (6M)
- b) Using convolution theorem, find $L^{-1}\left(\frac{1}{(s^2 + 4)(s^2 + 9)}\right)$ (6M)

UNIT IV

8. a) Find a unit normal vector to the surface $z^2 = 4(x^2 + y^2)$ at the point P: (1, 0, 2) (6M)
- b) Find the directional derivative of $f(x,y,z) = xy^2 + yz^3$ at the point (2,-1,1) in the direction of the vector $I + 2J + 2K$. (6M)

(OR)

9. a) If $\vec{F} = 3xyI - y^2J$ evaluate $\int_C \vec{F} \cdot d\vec{R}$, where C is the curve in the xy-plane $y = 2x^2$ from (0,0) to (1,2). (6M)
- b) Apply Green's theorem to evaluate $\int_C [(xy + y^2)dx + x^2dy]$, where C is bounded by $y = x$ and $y = x^2$. (6M)

