

R09
Code: 9ABS104

B.Tech I Year (R09) Supplementary Examinations June 2016

MATHEMATICS - I

(Common to all branches)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
 All questions carry equal marks

- 1 (a) Solve : $y = \cos x \frac{dy}{dx} + y^2(1 - \sin x)\cos x$.
 (b) Solve : $\tan y \frac{dy}{dx} + \tan x = \cos y \cos^2 x$.
- 2 (a) Solve : $(D^2 + 5D + 6)y = e^x$.
 (b) Solve : $(D^2 + 6D + 9)y = 2e^{-3x}$.
- 3 (a) Verify Rolle's theorem for $f(x) = e^{-x} \sin x$ in $[0, \pi]$.
 (b) Verify Rolle's theorem for $f(x) = \sqrt{4 - x^2}$ in $[-2, 2]$.
- 4 (a) Find the volume generated by the revolution of the curve $27ay^2 = 4(x - 2a)^3$ about x-axis.
 (b) Find the volume obtained by revolving the area bounded by the curve $\sqrt{x} + \sqrt{y} = \sqrt{a}$, $x = 0$, $y = 0$ about the x-axis.
- 5 (a) Evaluate $\int_0^1 \int_0^{\sqrt{1+x^2}} \frac{dy dx}{1+x^2+y^2}$.
 (b) Change the order of integration in $I = \int_0^1 \int_{x^2}^{2-x} xy dy dx$ and hence evaluate the same.
- 6 (a) Find the Laplace transform of $f(t) = \begin{cases} t & \text{when } 0 < t < \pi \\ \pi - t & \text{when } \pi < t < 2\pi \end{cases}$ with period 2π .
 (b) Use Heaviside's expansion formula to find $L^{-1} \left\{ \frac{2s^2 - 6s + 5}{s^3 - 6s^2 + 11s - 6} \right\}$.
- 7 (a) Using Laplace transform, Solve $y(t) = 1 - e^{-t} + \int_0^t y(t-u) \sin u du$.
 (b) Solve the D.E. $y'' + \omega^2 y = 0$, $y(0) = A$, $y'(0) = B$. Using Laplace transform.
- 8 State Gauss Divergence theorem and Verify Gauss Divergence theorem for:
 $\vec{F} = 4x\mathbf{i} - 2y^2\mathbf{j} + z^2\mathbf{k}$, over the cylindrical region bounded by $x^2 + y^2 = 4$, $z = 0$ and $z = 3$.
