Code: R7100102

B.Tech I Year (R07) Supplementary Examinations December/January 2015/2016
MATHEMATICS – I
(Common to all branches)
(For 2008 regular admitted batch only)

Time: 3 hours   Max. Marks: 80

Answer any FIVE questions
All questions carry equal marks

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1 (a) Solve $(y^2 - 2xy)dx = (x^2 - 2xy)dy$.
   (b) Prove that the system of parabolas $y^2 = 4a(x + a)$ is self orthogonal.

2 (a) Solve $(D^2 - 5D + 6)y = e^x sinx$.
   (b) Solve y'' - y' − 2y = 0.

3 (a) Verify Rolle's theorem for $f(x) = |x|$ in $[-1, 1]$.
   (b) If $u = \frac{x+y}{1-xy}$, $v = tan^{-1}x + tan^{-1}y$ find $\frac{\partial(u,v)}{\partial(x,y)}$.

4 (a) Find the radius of curvature at any point of the cardioid $r = a(1 - cos\theta)$.
   (b) Find the asymptotes for the curve $x^2 = \frac{y+1}{y-1}$.

5 (a) Evaluate $\int_0^2 \int_0^x e^{(x+y)} dy \, dx$.
   (b) Evaluate $\int_0^a \int_0^x \int_0^{x+y} e^{x+y+z} \, dx \, dy \, dz$.

6 Test for convergence of the series $1 + \frac{1}{2} + \frac{2!}{3^2}x^2 + \frac{3!}{4^3}x^3 + - - - - - - - - -$.

7 If $\bar{F} = 4xz\bar{\imath} - y^2\bar{\jmath} + yz\bar{k}$ evaluate $\int F.\bar{n} \, ds$ where S is the surface of the cube bounded by $x = 0$, $x = a$, $y = 0$, $y = a$, $z = 0$, $z = a$.

8 (a) Find $\mathcal{L}\{sin \, hat + sinat\}$.
   (b) Prove first shifting theorem of Laplace transform.

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