Code : 9ABS104 **1**

B.TECH. I Year(R09) Regular Examinations, May/June 2010

MATHEMATICS-I

(Common to all branches)

Time: 3 hours **Max Marks: 70**

Answer any FIVE questions

All questions carry equal marks

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1. (a) Solve : (y2 - 2xy)dx = (x2 - 2xy)dy.
   (b) Solve : (x2 - ay)dx = (ax - y2)dy.
2. (a) Solve : (D2 - 5D + 6) y = xe4x
   (b) Solve : (D2 +a2) y = Secax
3. (a) Verify Rolle's theorem for f(x) = e-x sin x in [0, π].
   (b) Verify Rolle's theorem for f(x) = $\sqrt{4-x^2}$ in [-2, 2].
4. (a) Find the radius of curvature at any point on the curve $y = c\cosh\frac{x}{c}$.
   (b) Find the radius of curvature of the curve x2y = a(x2 + y2) at (-2a, 2a).
5. (a) Evaluate $\int\limits_0^1 \int_0^{X^2} e^{y/x} dy\ \ dx$.
   (b) Change the order of integration and evaluate $\int_0^{4a} \int_{x^2/4a}^{2\sqrt{ax}} dy\ \ dx$.
6. (a) Find the Laplace transform of i) e-3t (2 cos 5t - 3 sin 5t) . ii) e3t sin2 t
   (b) Find $L^{-1}\left\{\frac{s^2}{(s^2+4)(s^2+9)}\right\}$ Using Convolution theorem.
7. (a) Using Laplace Transform, show that $\int_0^\infty t^2 e^{-4t}\sin 2t dt = \frac{11}{500}$.
   (b) Solve the D.E $y^{11} + n^2 y = a\sin(nt+2), y(0) = 0, y^1(0) = 0$ Using Laplace transform.
8. (a) If r=xi+yj+zk , show that $\nabla r^n = nr^{n-2}\overline{r}$
   (b) Find the works done in moving in a particle in the force field $\overline{F} = (3x^2)i + (2zx - y)j + zk$, , along i) the straight line form (0,0,0) to (2,1,3) ii) the curve defined by x2 = 4y, 3x3 = 8z from x= 0 to x= 2.

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Code : 9ABS104 **2**

B.TECH. I Year(R09) Regular Examinations, May/June 2010
MATHEMATICS-I
(Common to all branches)

Time: 3 hours **Max Marks: 70**

Answer any FIVE questions
All questions carry equal marks
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1. (a) Solve :$\left(1+e^{x/y}\right)dx+\left(1-\frac{x}{y}\right)e^{\frac{x}{y}}dy=0$ item Solve : x dx + y dy = $\frac{xdy-ydx}{x^2+y^2}$.

2. (a) Solve :$\frac{d^2y}{dx^2}+4\frac{dy}{dx}+3y=e^{2x}$ item Solve : (D3 - 5D2 + 8D - 4) y = e2x

3. (a) Verify Rolle's theorem for f(x) = (x - a)m (x - b)n in [a, b]. item Verify Rolle's theorem for f(x) = log $\frac{x^2+ab}{(a+b)x}$ in [a, b].

4. (a) Trace the curve y = x3. item Trace the curve y = (x - 1) (x - 2) (x - 3).

5. (a) Evaluate $\iint_R y\ \ dx\ \ dy,$,where R is the region bounded by the parabola y2 = 4x and x2 = 4y item Evaluate the integral by changing the order of integration $\int_0^1\int_0^{\sqrt{(1-x^2)}} y^2\ \ dx\ \ dy$.

6. (a) Find the Laplace transform of f(t) defined as $f(t)=t/\tau wheno<t<\tau$ $=1whent>\tau$. item Find $L^{-1}\left\{\frac{s}{(s2+a2)^2}\right\}$ Using Convolution theorem.

7. (a) Using Laplace transform, evaluate $\int_0^\infty\frac{(\cos at-\cos bt)}{t}dt$. item Solve the D.E. $y^{11}+2y^1+5y=e^{-t}\sin t,y(0)=0,y^1(0)=1$. Using L.T.

8. (a) If A is a constant vector and R=xi+yj+zk, prove that $\nabla X\left(\frac{\overline{A}X\overline{r}}{r^n}\right)=\frac{(2-n)\overline{A}}{r^n}+\frac{n(\overline{r}.\overline{A})\overline{r}}{r^{n+2}}$. item If $\overline{F}=(5xy-6x^2)i+(2y-4x)j$, Evaluate $\int_c\overline{F}.d\overline{R}$,where C is the curve in the xy-plane $y=x^3from(1,1)to(2,8)$.

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Code : 9ABS104 **3**

B.TECH. I Year(R09) Regular Examinations, May/June 2010
MATHEMATICS-I
(Common to all branches)

Time: 3 hours **Max Marks: 70**

Answer any FIVE questions
All questions carry equal marks

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1. (a) Solve :$\frac{dy}{dx} + \frac{y\cos x+\sin y+y}{\sin x+x\cos y+x} = 0$
   (b) Solve :$\frac{y(xy+e^x)dx-e^x dy}{y^2} = 0$
2. (a) Solve : (D2 - 3D + 2)y = cos hx
   (b) Solve : (D + 2) (D - 1)2 4 = e-2x + 2 sin hx
3. (a) Verify Rolle's theorem for f(x) = x(x + 3) $e^{-x/2}$ in [-3, 0].
   (b) Verify Rolle's theorem for f(x) = ex sin x in [0,].
4. (a) Trace the curve r = a(1 + cos θ).
   (b) Trace the curve r = a + b cos θ, a > b.
5. (a) Evaluate $\int\limits_A xydxdy$,where A is the domain bounded by x-axis, ordinate x=2a and the curve $x^2 = 4ay$.
   (b) Evaluate the integral by changing the order of integration $\int_0^\infty \int_x^\infty \frac{e^{-y}}{y}dy\ \ dx$.
6. (a) Find the Laplace Transform of $\left\{\left(\sqrt{t}+\frac{1}{\sqrt{t}}\right)^3\right\}$
   (b) Find $L^{-1}\left\{\frac{s}{s^4+4a^4}\right\}$.
7. (a) Using Laplace transform, evaluate$\int_0^\infty \frac{(e^{-t}-e^{-2t})}{t}dt$.
   (b) Solve the D.E $(D^2 + n^2)y = a\sin(nt + a), giveny = Dy = 0att = 0$ Using Laplace transform.
8. (a) Find the directional derivative of the function $f = x^2 - y^2 + 2z^2$ at the point P (1, 2, 3) in the direction of the line PQ where Q is the point (5, 0, 4).
   (b) Evaluate the Line integral $\int_c [(x^2 + xy)dx + (x^2 + y^2)dy]$ where c is the squre formed by the lines x= 1 and y = 1.

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Code : 9ABS104 **4**

B.TECH. I Year(R09) Regular Examinations, May/June 2010
MATHEMATICS-I
(Common to all branches)

Time: 3 hours **Max Marks: 70**

Answer any FIVE questions
All questions carry equal marks

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1. (a) Solve : (i) $\frac{ydx-xdy}{x^2}+e^{y^2}dy^2=0$
   (ii) $\frac{ydx-xdy}{xy}+2x\sin x^2dx=0$
   (b) Solve: (i) ydx + xdy + xy (ydx - xdy) = 0
   (ii) xdy + 2ydx = 2y2xdy
2. (a) Solve : (D2 + 5D + 6)y = ex
   (b) Solve : (D2 + 6D + 9) y = 2 e-3x
3. (a) Verify Rolle's theorem for f(x) = x2 - 5x + 6 in [2, 3].
   (b) Examine if Rolle's theorem is applicable for the function f(x) = tan x in [0,].
4. (a) Trace the curve x = a(+ sin), y = a(1 + cos).
   (b) Trace the curve x = a(- sin), y = a(1 - cos).
5. (a) Evaluate $\int_0^3\int_1^2 xy(1+x+y)dy\ \ dx$
   (b) Evaluate the integral by changing the order of integration $\int_0^3\int_1^{\sqrt{4-y}}(x+y)dx\ \ dy$.
6. (a) Find the Laplace transform of i) $\left\{\frac{\sin 3t.\cos t}{t}\right\}$.
   ii) $\left\{t^2\sin 2t\right\}$.
   (b) Find $L^{-1}\left\{\frac{s+1}{(s2+2s+2)^2}\right\}$.
7. (a) Using Laplace transform, evaluate $\int_0^\infty\frac{(\cos 5t-\cos 3t)}{t}dt$.
   (b) Solve the D.E. $\frac{d^2x}{dt^2}+9x=\sin t$ Using L.T. given that $x(0)=1, x\left(\frac{\pi}{2}\right)=1$.
8. (a) Find the angle between the surfaces $x^2+y^2+z^2=9andz=x^2+y^2-3$ at the point (2,-1, 2).
   (b) Apply Greens theorem to evaluate $\int_c[(2x^2-y^2)dx+(x^2+y^2)dy]$, where C is the boundary of the area enclosed by the x-axis and upper half of the circle $x^2+y^2=a^2$.

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