Subject Code: R10102/R10 **Set No - 1**

I B.Tech I Semester Supplementary Examinations Nov./Dec. - 2015

MATHEMATICS – I

(Common to All Branches)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

*** * * * ***

1. (a) If 30% of a radioactive substance disappear in 10 days, how long will it take for 90% of it to disappear?
   (b) Solve the D.E $(\cos^3 x)y^1 + y\cos x = \sin x$

[8+7]

2. (a) Solve the D.E $(D^2-4)\, y= e^{2x}+ \sin 2x$
   (b) Solve the D.E $(D^2-4D+2)\, y= x^2\, e^{2x}+ \cos 2x$

[8+7]

3. (a) Verify whether $u = \dfrac{x+y}{1-xy}$ & $v = \tan^{-1}(x) + \tan^{-1}(y)$ are functionally depended or independent.
   (b) Find Taylor series expansion for $\tan^{-1}(y/x)$ about (1,1)

[8+7]

4. (a) Trace the curve $xy^2=a^2(x-a)$ $(a>0)$
   (b) Trace the curve $r = a(1+\cos\theta)$

[8+7]

5. (a) Find the perimeter of the curve $r =a(\cos\theta +\sin\theta)$
   (b) Find the volume of the solid generated by revolution of $x = a\cos^3\theta$, $y = \sin^3\theta$ about its x-axis.

[8+7]

6. (a) By change of order of integration evaluate $\int_0^a \int_0^{\sqrt{a^2-x^2}} (x^2 + y^2)\,dxdy$
   (b) Evaluate $\iiint xyz\,dxdydz$ over a positive octant of a sphere with centre zero and radius a.

[8+7]

7. (a) Find the directional derivative of $f = x^3y^2z$ at (1,2,3) along the direction of $9\vec{i}+ 3\vec{j}+ \vec{k}$
   (b) Prove that curl(curlf) = grad divf - $\nabla^2 f$

[8+7]

8. Verify Stokes theorem for $f = y^2i+yj-zxk$ and S is the upper half of the surface $x^2+y^2+z^2=a^2$ and $z \geq 0$.

[15]

*****

Subject Code: R10102/R10 **Set No - 2**

I B.Tech I Semester Supplementary Examinations Nov./Dec. - 2015

MATHEMATICS – I

(Common to All Branches)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

*** * * * ***

1. (a) Solve the D.E $xy^1-2y=xy^4$

   (b) Find the orthogonal trajectories of the system of curves $\left(\frac{dy}{dx}\right)^2 = a/x$

[8+7]

2. (a) Solve the D.E $(D^2+3D+2)\ y = x^2+e^{-x}$

   (b) Solve the D.E $(D^2-4D+3)\ y = e^x \cos 2x$

[8+7]

3. (a) Find Taylor series expansion for e^{x+y} about (1,1)

   (b) Discuss the maxima or minima of sinx + siny + sin(x+y)

[8+7]

4. (a) Trace the curve $xy^2=4a^2(2a-x)$ (a>0)

   (b) Trace the curve $r= a(1-\cos\theta)$

[8+7]

5. (a) Find the length of the arc of the curve $x =a(\cos\theta +\theta\sin\theta)$, $y =a(\sin\theta-\theta\cos\theta)$ from $\theta = 0$ to any point on the curve.

   (b) Find the volume of the solid generated by revolution of ellipse about its minor axis.

[8+7]

6. (a) By change of order of integration evaluate $\int_0^a \int_0^{\sqrt{a^2-x^2}} xydxdy$

   (b) Evaluate $\iiint xy^2zdxdydz$ over a positive octant of a sphere with centre zero and radius a.

[8+7]

7. (a) Find the directional derivative of $f = x^2-2y^2+z=2$ at (1,-1,2) along the direction of i+3j+2k.

   (b) Prove that $grad(f.g) = f\times curl\, g + g\times curl f + (f.\nabla)g + (g.\nabla)f$

[8+7]

8. Verify Stokes theorem for $f = (x^2-y^2)i+2xyj$ and C is the rectangle in the xy-plane bounded by x =0 , x= a ,y = 0 ,y = b.

[15]

*****

Subject Code: R10102/R10 **Set No - 3**

I B.Tech I Semester Supplementary Examinations Nov./Dec. - 2015

MATHEMATICS – I

(Common to All Branches)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

*** * * * ***

1. (a) Solve the D.E $e^y dx + (xe^y + 2y)dy = 0$.
   (b) If the temperature of air is $20^0 C$ and the temperature of the body drops from $100^0 C$ to $80^0 C$ in 10 minutes. What will be its temperature after 20 minutes. When will be the temperature $40^0 C$

[8+7]

2. (a) Solve the D.E $(D^2-4D+4)y = e^{2x} + x^3$
   (b) Solve the D.E $(D^2+1)\, y = x\cos x$

[8+7]

3. (a) Find the points on the surface $z^2=xy+1$ nearest to origin
   (b) Prove that $J.J^1 = 1$ for $x= u(1-v)$, $y = uv$

[8+7]

4. (a) Trace the curve $x = a(\theta + \sin\theta)$, $y = a(1-\cos\theta)$
   (b) Trace the curve $r= a\sin 2\theta$

[8+7]

5. (a) Find the length of the arc of the curve $y^3 = ax^2$ from (0,0) to (a/8,a/4)
   (b) Find the surface of the solid generated $r^2 = a^2 \cos 2\theta$ about the initial line.

[8+7]

6. (a) By change of order of integration evaluate $\int_0^1 \int_{x^2}^{2-x} xy\,dx\,dy$
   (b) Evaluate $\int_0^e \int_0^{\log y} \int_0^{e^x} \log z\,dz\,dx\,dy$

[8+7]

7. (a) Find the directional derivative of $f = x^3y^2z^2 = 4$ at (-1,-1,2) along the direction of $4i+3j+2k$
   (b) Prove that $\text{curl}(\text{grad}\varphi) = 0$, where φ is a scalar point function

[8+7]

8. Verify Green's theorem for $f = (x^2+y^2)i-2xyj$ and C is the rectangle in the xy-plane bounded by $x = 0$, $x= a$, $y = 0$, $y = b$.

[15]

*****

|''|'''||''||'''||||

Subject Code: R10102/R10 **Set No - 4**

I B.Tech I Semester Supplementary Examinations Nov./Dec. - 2015

MATHEMATICS – I

(Common to All Branches)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
*** * * * ***

1. (a) The number of N of bacteria in a culture grew at a rate proportional to N. Thevalue of N was initially 100 and increased to 332 in one hour. What was the value of N after 3/2 hours.
   (b) Solve the D.E y(xy+1)dx+x(1-xy)dy=0

[8+7]

2. (a) Solve the D.E $(D^2-4D+3)y= \sin 3x \cos 2x$
   (b) Solve the D.E $(D^2-1)y= x^2 + x\sin x$

[8+7]

3. (a) Find Taylor series expansion for $e^x \cos y$ about (1,π/4)
   (b) Find the minima value of $x^2+y^2+z^2$ given that ax + by + cz = p by Lagrange's method of multipliers.

[8+7]

4. (a) Trace the curve $x =a(\theta -\sin\theta)$, $y =a(1+\cos\theta)$
   (b) Trace the curve $r^2= a^2 \sin 2\theta$

[8+7]

5. (a) Find the length of the arc of the curve y = log secx from x = 0 to x =π/3
   (b) Find the surface of the solid generated $r = a(1+\cos\theta)$ about the initial line.

[8+7]

6. (a) By change of order of integration evaluate $\int_0^\infty \int_x^\infty \frac{e^{-y}}{y} dy$
   (b) Evaluate $\int_0^a \int_0^x \int_0^{x+y} e^{x+y+z} dz dx dy$

[8+7]

7. (a) Find the directional derivative of f = xy+yz+zx at (1,2,3) along the direction of 3i+4j+5k
   (b) Prove that div(curlf) = 0 where f is a vector function

[8+7]

8. Verify Gauss divergence theorem for $f = yi+xj+z^2k$ for the cylindrical region given by $x^2+y^2 =a^2$, z =0 , z= h.

[15]

*****

|''|'''||''||'''||||