Code.No: R05010102 | R05 | SET-1

I B.TECH – EXAMINATIONS, DECEMBER - 2010
MATHEMATICS – I
(COMMON TO CE, EEE, ME, ECE, CSE, CHEM, EIE, BME, IT, E.CON.E, MCT, CSS, ETM, MMT, ECC, MEP, AE, ICE, AME)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks
- - -

1.a) Discuss the convergence of the following series

$$\left[\frac{2^2}{1^2}-\frac{2}{1}\right]^{-1}+\left[\frac{3^3}{2^3}-\frac{3}{2}\right]^{-2}+\left[\frac{4^4}{3^4}-\frac{4}{3}\right]^{-3}+\ldots\ldots\ldots\ldots\ldots$$

b) Prove that $\frac{\pi}{3}-\frac{1}{5\sqrt{3}}>\log^{-1}\frac{3}{5}>\frac{\pi}{3}-\frac{1}{8}$, using the Mean Value Theorem. [8+8]

2.a) If $x=4(1-v)\quad y=uv$, Prove that $J.J^*=1$ (Where $J^*=\frac{1}{J}$).

b) Find the envelop of circles through the origin, whose center lies on the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$. [8+8]

3.a) Trace the curve $r=2(1-2Sin\theta)$.

b) Find the volume of the solid generated by revolving $x^{2/3}+y^{2/3}=a^{2/3}$ about the x-axis. [8+8]

4.a) Solve the differential equation $(1+xy)y\,dx+(1-xy)x\,dy\geq 0$.

b) Solve $(D^2+1)y=x\sin x$, by the method of variation of parameters. [8+8]

5.a) State and prove the Second Shifting Theorem of Laplace Transformers. Hence, find the Laplace Transform of $g(t)$, $g(t)=4\sin(t-3)u(t-3)$.
[$u(t)$ is the Heavy sides unit function].

b) Solve the differential equation using Laplace Transforms.
$y^{11}+y=2e^t;\ y(0)=0,\ y^1(0)=2.$ [8+8]

6.a) Evaluate $\iint_R xy(x+y)dx\,dy$ where R is the region bounded by the curve $y=x^2\ and\ y=x.$

b) By changing to spherical coordinates evaluate $\iiint xyz\,dx\,dy\,dz$ over the positive octant of the sphere $x^2+y^2+z^2=a^2$. [8+8]

7.a) Find a unit normal vector to the surface $x^2+y^2+2z^2=26$ at the point (2, 2, 3).

b) If $\overline{A}$ is a constant vector and $\overline{R}=xi+yj+zk$ prove that Curl $(\overline{A}\times\overline{R})=2\overline{A}$. [8+8]

8.a) Find the work done by the force $\overline{F}=(2y+3)i+xzj+(yz-x)k$ when a partical is moved by it from (0, 0, 0) to (2, 1, 1) along the curve $x=2t^2$.

b) Using the Divergence Theorem, evaluate $\iint_S x\,dy\,dz+y\,dz\,dx+z\,dx\,dy$

$S: x^2+y^2+z^2=a^2.$ [8+8]

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Code.No: R05010102 | R05 | SET-2

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MATHEMATICS – I
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Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks
- - -

1.a) Trace the curve $r = 2(1-2Sin\theta)$.

b) Find the volume of the solid generated by revolving $x^{2/3} + y^{2/3} = a^{2/3}$ about the x-axis. [8+8]

2.a) Solve the differential equation $(1+xy)y\,dx + (1-xy)x\,dy \geq 0$.

b) Solve $(D^2+1)y = x\sin x$, by the method of variation of parameters. [8+8]

3.a) State and prove the Second Shifting Theorem of Laplace Transformers. Hence, find the Laplace Transform of $g(t)$, $g(t) = 4\sin(t-3)u(t-3)$.
[$u(t)$ is the Heavy sides unit function].

b) Solve the differential equation using Laplace Transforms.
$y^{11} + y = 2e^t;\ y(0) = 0,\ y^1(0) = 2.$ [8+8]

4.a) Evaluate $\iint_R xy(x+y)dx\,dy$ where R is the region bounded by the curve $y = x^2$ *and* $y = x$.

b) By changing to spherical coordinates evaluate $\iiint xyz\,dx\,dy\,dz$ over the positive octant of the sphere $x^2 + y^2 + z^2 = a^2$. [8+8]

5.a) Find a unit normal vector to the surface $x^2 + y^2 + 2z^2 = 26$ at the point (2, 2, 3).

b) If $\bar{A}$ is a constant vector and $\bar{R} = xi + yj + zk$ prove that Curl $(\bar{A}\times\bar{R}) = 2\bar{A}$. [8+8]

6.a) Find the work done by the force $\bar{F} = (2y+3)i + xzj + (yz-x)k$ when a partical is moved by it from (0, 0, 0) to (2, 1, 1) along the curve $x = 2t^2$.

b) Using the Divergence Theorem, evaluate $\iint_S x\,dy\,dz + y\,dz\,dx + z\,dx\,dy$
$S: x^2 + y^2 + z^2 = a^2$. [8+8]

7.a) Discuss the convergence of the following series

$$\left[\frac{2^2}{1^2} - \frac{2}{1}\right]^{-1} + \left[\frac{3^3}{2^3} - \frac{3}{2}\right]^{-2} + \left[\frac{4^4}{3^4} - \frac{4}{3}\right]^{-3} + \ldots\ldots\ldots\ldots$$

b) Prove that $\frac{\pi}{3} - \frac{1}{5\sqrt{3}} > \log^{-1}\frac{3}{5} > \frac{\pi}{3} - \frac{1}{8}$, using the Mean Value Theorem. [8+8]

8.a) If $x = 4(1-v)\quad y = uv$, Prove that $J.J^* = 1$ (Where $J^* = \frac{1}{J}$).

b) Find the envelop of circles through the origin, whose center lies on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. [8+8]

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Code.No: R05010102 | R05 | SET-3

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(COMMON TO CE, EEE, ME, ECE, CSE, CHEM, EIE, BME, IT, E.CON.E, MCT, CSS, ETM, MMT, ECC, MEP, AE, ICE, AME)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks
- - -

1.a) State and prove the Second Shifting Theorem of Laplace Transformers. Hence, find the Laplace Transform of $g(t),\ g(t) = 4\sin(t-3)u(t-3)$.
[$u(t)$ is the Heavy sides unit function].

b) Solve the differential equation using Laplace Transforms.
$y^{11} + y = 2e^t;\ y(0) = 0,\ y^1(0) = 2.$ [8+8]

2.a) Evaluate $\iint_R xy(x+y)\,dx\,dy$ where R is the region bounded by the curve $y = x^2$ *and* $y = x$.

b) By changing to spherical coordinates evaluate $\iiint xyz\,dx\,dy\,dz$ over the positive octant of the sphere $x^2 + y^2 + z^2 = a^2$. [8+8]

3.a) Find a unit normal vector to the surface $x^2 + y^2 + 2z^2 = 26$ at the point (2, 2, 3).

b) If $\overline{A}$ is a constant vector and $\overline{R} = xi + yj + zk$ prove that Curl $(\overline{A}\times\overline{R}) = 2\overline{A}$. [8+8]

4.a) Find the work done by the force $\overline{F} = (2y+3)i + xzj + (yz-x)k$ when a partical is moved by it from (0, 0, 0) to (2, 1, 1) along the curve $x = 2t^2$.

b) Using the Divergence Theorem, evaluate $\iint_S x\,dy\,dz + y\,dz\,dx + z\,dx\,dy$
$S: x^2 + y^2 + z^2 = a^2$. [8+8]

5.a) Discuss the convergence of the following series
$$\left[\frac{2^2}{1^2} - \frac{2}{1}\right]^{-1} + \left[\frac{3^3}{2^3} - \frac{3}{2}\right]^{-2} + \left[\frac{4^4}{3^4} - \frac{4}{3}\right]^{-3} + \ldots\ldots\ldots\ldots$$

b) Prove that $\frac{\pi}{3} - \frac{1}{5\sqrt{3}} > \log^{-1}\frac{3}{5} > \frac{\pi}{3} - \frac{1}{8}$, using the Mean Value Theorem. [8+8]

6.a) If $x = 4(1-v)\quad y = uv$, Prove that $J.J^* = 1$ (Where $J^* = \frac{1}{J}$).

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7.a) Trace the curve $r = 2(1 - 2Sin\theta)$.

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8.a) Solve the differential equation $(1+xy)y\,dx + (1-xy)x\,dy \geq 0$.

b) Solve $(D^2+1)y = x\sin x$, by the method of variation of parameters. [8+8]

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Code.No: R05010102 | R05 | SET-4

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MATHEMATICS – I
(COMMON TO CE, EEE, ME, ECE, CSE, CHEM, EIE, BME, IT, E.CON.E, MCT, CSS, ETM, MMT, ECC, MEP, AE, ICE, AME)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks
- - -

1.a) Find a unit normal vector to the surface $x^2 + y^2 + 2z^2 = 26$ at the point (2, 2, 3).
b) If $\overline{A}$ is a constant vector and $\overline{R} = xi + yj + zk$ prove that Curl $(\overline{A} \times \overline{R}) = 2\overline{A}$. [8+8]

2.a) Find the work done by the force $\overline{F} = (2y+3)i + xzj + (yz - x)k$ when a partical is moved by it from (0, 0, 0) to (2, 1, 1) along the curve $x = 2t^2$.
b) Using the Divergence Theorem, evaluate $\iint_S x\,dy\,dz + y\,dz\,dx + z\,dx\,dy$
$S : x^2 + y^2 + z^2 = a^2$. [8+8]

3.a) Discuss the convergence of the following series
$\left[\frac{2^2}{1^2} - \frac{2}{1}\right]^{-1} + \left[\frac{3^3}{2^3} - \frac{3}{2}\right]^{-2} + \left[\frac{4^4}{3^4} - \frac{4}{3}\right]^{-3} + \ldots\ldots\ldots\ldots$
b) Prove that $\frac{\pi}{3} - \frac{1}{5\sqrt{3}} > \log^{-1}\frac{3}{5} > \frac{\pi}{3} - \frac{1}{8}$, using the Mean Value Theorem. [8+8]

4.a) If $x = 4(1-v)$ $y = uv$, Prove that $J.J^* = 1$ (Where $J^* = \frac{1}{J}$).
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5.a) Trace the curve $r = 2(1 - 2Sin\theta)$.
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$y^{11} + y = 2e^t;\ y(0) = 0,\ y^1(0) = 2.$ [8+8]

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