

Code No: R07A1BS02

R07**Set No. 2**

I B.Tech Examinations, December 2010

MATHEMATICS - I

Common to CE, ME, CHEM, BME, IT, MECT, MEP, AE, BT, AME, ICE,
E.COMP.E, MMT, ETM, E.CONT.E, EIE, CSE, ECE, CSSE, EEE

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Find the radius of curvature of $x = 2a \sin t + a \sin 2t$, $y = 2a \cos t + a \cos 2t$.
(b) Show that the envelope of the circles whose centre lies on the parabola $y^2 = 4ax$ and which passes through its vertex is $y^2 (x + 2a) + x^3 = 0$. [8+8]
2. Solve the equation $(D^2 - 4D + 4)y = e^{2x} + x^2 + \sin 3x$. [16]
3. (a) Solve $(x^2 + y^2 - a^2) x dx + (x^2 + y^2 - b^2) y dy = 0$.
(b) If 20 percent of a radioactive element disappears in 1 year, compute its half-life. [8+8]
4. (a) Find $L^{-1} [\tan^{-1} s]$.
(b) Find $L^{-1} [\log ((s^2 + 1) / (s^2 - 4))]$. [8+8]
5. (a) Evaluate $\iiint_V (xy + yz + zx) dx dy dz$, where V is the region of space bounded by $x = 0, x = 1, y = 0, y = 2, z = 0, z = 3$.
(b) Find the value of $\iint xy dx dy$ taken over the positive quadrant of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. [8+8]
6. Verify Stoke's theorem for $\vec{F} = (x^2 - y^2)\vec{i} + 2xy\vec{j}$ over the box bounded by the planes $x = 0, x = a, y = 0, y = b, z = c$. [16]
7. (a) Examine the convergence or divergence of $\sum x^{2n-2} / (n+1)n^{1/2}$, $x > 0$.
(b) Examine the convergence or divergence of $\sum \frac{(n!)^2}{(n+1)!} x^n$, $x > 0$. [8+8]
8. (a) Verify Rolle's theorem for $f(x) = x^2 - 2x - 3$ in the interval (1, -3).
(b) Prove that $u = \frac{x^2 - y^2}{x^2 + y^2}$, $v = \frac{2xy}{x^2 + y^2}$ are functionally dependent and find the relation between them. [8+8]

Code No: R07A1BS02

R07**Set No. 4**

I B.Tech Examinations, December 2010

MATHEMATICS - I

Common to CE, ME, CHEM, BME, IT, MECT, MEP, AE, BT, AME, ICE,
E.COMP.E, MMT, ETM, E.CONT.E, EIE, CSE, ECE, CSSE, EEE

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Find $L^{-1} [\tan^{-1} s]$.
(b) Find $L^{-1} [\log ((s^2+1) / (s^2-4))]$. [8+8]
2. (a) Examine the convergence or divergence of $\sum x^{2n-2} / (n+1)n^{1/2}$, $x > 0$.
(b) Examine the convergence or divergence of $\sum \frac{(n!)^2}{(n+1)!} x^n$, $x > 0$. [8+8]
3. (a) Find the radius of curvature of $x = 2a \sin t + a \sin 2t$, $y = 2a \cos t + a \cos 2t$.
(b) Show that the envelope of the circles whose centre lies on the parabola $y^2 = 4ax$ and which passes through its vertex is $y^2 (x+2a) + x^3 = 0$. [8+8]
4. (a) Evaluate $\iiint_V (xy + yz + zx) \, dx dy dz$, where V is the region of space bounded by $x = 0, x = 1, y = 0, y = 2, z = 0, z = 3$.
(b) Find the value of $\iint xy \, dx dy$ taken over the positive quadrant of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. [8+8]
5. (a) Solve $(x^2 + y^2 - a^2) x \, dx + (x^2 + y^2 - b^2) y \, dy = 0$.
(b) If 20 percent of a radioactive element disappears in 1 year, compute its half-life. [8+8]
6. Verify Stoke's theorem for $\vec{F} = (x^2 - y^2)\vec{i} + 2xy\vec{j}$ over the box bounded by the planes $x = 0, x = a, y = 0, y = b, z = c$. [16]
7. Solve the equation $(D^2 - 4D + 4)y = e^{2x} + x^2 + \sin 3x$. [16]
8. (a) Verify Rolle's theorem for $f(x) = x^2 - 2x - 3$ in the interval (1,-3).
(b) Prove that $u = \frac{x^2-y^2}{x^2+y^2}$, $v = \frac{2xy}{x^2+y^2}$ are functionally dependent and find the relation between them. [8+8]

Code No: R07A1BS02

R07**Set No. 1**

I B.Tech Examinations, December 2010

MATHEMATICS - I

Common to CE, ME, CHEM, BME, IT, MECT, MEP, AE, BT, AME, ICE,
E.COMP.E, MMT, ETM, E.CONT.E, EIE, CSE, ECE, CSSE, EEE

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Examine the convergence or divergence of $\sum x^{2n-2} / (n+1)n^{1/2}$, $x > 0$.
(b) Examine the convergence or divergence of $\sum \frac{(n!)^2}{(n+1)!} x^n$, $x > 0$. [8+8]
2. (a) Find $L^{-1} [\tan^{-1} s]$.
(b) Find $L^{-1} [\log ((s^2+1) / (s^2-4))]$. [8+8]
3. (a) Verify Rolle's theorem for $f(x) = x^2 - 2x - 3$ in the interval (1,-3).
(b) Prove that $u = \frac{x^2-y^2}{x^2+y^2}$, $v = \frac{2xy}{x^2+y^2}$ are functionally dependent and find the relation between them. [8+8]
4. (a) Find the radius of curvature of $x = 2a \sin t + a \sin 2t$, $y = 2a \cos t + a \cos 2t$.
(b) Show that the envelope of the circles whose centre lies on the parabola $y^2 = 4ax$ and which passes through its vertex is $y^2 (x + 2a) + x^3 = 0$. [8+8]
5. Verify Stoke's theorem for $\vec{F} = (x^2 - y^2)\vec{i} + 2xy\vec{j}$ over the box bounded by the planes $x = 0, x = a, y = 0, y = b, z = c$. [16]
6. (a) Solve $(x^2 + y^2 - a^2) x dx + (x^2 + y^2 - b^2) y dy = 0$.
(b) If 20 percent of a radioactive element disappears in 1 year, compute its half-life. [8+8]
7. Solve the equation $(D^2 - 4D + 4)y = e^{2x} + x^2 + \sin 3x$. [16]
8. (a) Evaluate $\iiint_V (xy + yz + zx) dx dy dz$, where V is the region of space bounded by $x = 0, x = 1, y = 0, y = 2, z = 0, z = 3$.
(b) Find the value of $\iint xy dx dy$ taken over the positive quadrant of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. [8+8]

Code No: R07A1BS02

R07**Set No. 3**

I B.Tech Examinations, December 2010

MATHEMATICS - I

Common to CE, ME, CHEM, BME, IT, MECT, MEP, AE, BT, AME, ICE,
E.COMP.E, MMT, ETM, E.CONT.E, EIE, CSE, ECE, CSSE, EEE

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Evaluate $\iiint_V (xy + yz + zx) \, dx dy dz$, where V is the region of space bounded by $x = 0, x = 1, y = 0, y = 2, z = 0, z = 3$.
- (b) Find the value of $\iint xy \, dx dy$ taken over the positive quadrant of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. [8+8]
2. (a) Examine the convergence or divergence of $\sum x^{2n-2} / (n+1)n^{1/2}, x > 0$.
- (b) Examine the convergence or divergence of $\sum \frac{(n!)^2}{(n+1)!} x^n, x > 0$. [8+8]
3. (a) Solve $(x^2 + y^2 - a^2) x \, dx + (x^2 + y^2 - b^2) y \, dy = 0$.
- (b) If 20 percent of a radioactive element disappears in 1 year, compute its half-life. [8+8]
4. (a) Find the radius of curvature of $x = 2a \sin t + a \sin 2t, y = 2a \cos t + a \cos 2t$.
- (b) Show that the envelope of the circles whose centre lies on the parabola $y^2 = 4ax$ and which passes through its vertex is $y^2 (x + 2a) + x^3 = 0$. [8+8]
5. (a) Verify Rolle's theorem for $f(x) = x^2 - 2x - 3$ in the interval (1,-3).
- (b) Prove that $u = \frac{x^2 - y^2}{x^2 + y^2}, v = \frac{2xy}{x^2 + y^2}$ are functionally dependent and find the relation between them. [8+8]
6. Verify Stoke's theorem for $\vec{F} = (x^2 - y^2)\vec{i} + 2xy\vec{j}$ over the box bounded by the planes $x = 0, x = a, y = 0, y = b, z = c$. [16]
7. (a) Find $L^{-1} [\tan^{-1} s]$.
- (b) Find $L^{-1} [\log ((s^2 + 1) / (s^2 - 4))]$. [8+8]
8. Solve the equation $(D^2 - 4D + 4)y = e^{2x} + x^2 + \sin 3x$. [16]
