Code No: R07A1BS02 **R07** **Set No. 2**

I B.Tech Examinations,June 2011
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

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1. (a) Examine the convergence of $\sum 3^{n+1}/\ (n+1)\ 2^n$
   (b) Examine the convergence or divergence of $\sum n^2\ x^{n+1}$, (x>0) [6+10]

2. (a) Find the centre of curvature of $x^3 = a^2\ y$ at (a, a).
   (b) Find the evolute of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, considering it as the envelope of normals. [8+8]

3. Verify Green's theorem in the xy-plane for $\int_C (x^2 - y^2)\,dx + 2xy\,dy$ where C is the closed curve of the region bounded $y = x^2$ and $y^2 = x$. [16]

4. (a) Solve $(x^2 - y^2)\ dx = 2xy\ dy$.
   (b) If a population is increasing exponentially at the rate of 2 percent per year, what will be the percentage increase over a period of 10 years? [8+8]

5. (a) Solve $(D^2+2D+2)\ y = e^{-x} + \sin 2x$
   (b) Solve the equation $(D^2 - 2D + 2)y = e^x \tan x$. [8+8]

6. (a) Verify Lagrange's Mean Value Theorem for $f(x) = 2x^2 - 7x + 10$ in [0 , 5].
   (b) Find the Jacobian of x, y with respect to θ, ϕ given that $x = \sin\theta\sqrt{1 - a^2\sin^2\phi}$, $y = \cos\theta\cos\phi$. [8+8]

7. (a) Find L [f (t)] where f (t) is given by
   $f(t) = t, \quad 0 < t < b$
   $= 2b\text{-}t, \quad b < t < 2b,$
   2b being the period of f (t).
   (b) Find $L^{-1}\ [\ (2s+3)/\ (s^3 - 6s^2 + 11s - 6)\ ]$ [8+8]

8. Evaluate $\iiint \frac{dxdydz}{\sqrt{a^2-x^2-y^2-z^2}}$ where the integral is taken over the region of space bounded by the coordinate planes and sphere $x^2 + y^2 + z^2 = a^2$ and contained in the first octant. [16]

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Code No: R07A1BS02 **R07** **Set No. 4**

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MATHEMATICS - I
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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Solve $(D^2+2D+2)\ y = e^{-x} + \sin 2x$
   (b) Solve the equation $(D^2 - 2D + 2)y = e^x \tan x$. [8+8]
2. (a) Examine the convergence of $\sum 3^{n+1}/\ (n + 1)\ 2^n$
   (b) Examine the convergence or divergence of $\sum n^2\ x^{n+1}$, (x>0) [6+10]
3. (a) Solve $(x^2 - y^2)\ dx = 2xy\ dy$.
   (b) If a population is increasing exponentially at the rate of 2 percent per year, what will be the percentage increase over a period of 10 years? [8+8]
4. Verify Green's theorem in the xy-plane for $\int_C (x^2 - y^2)\,dx + 2xy\,dy$ where C is the closed curve of the region bounded $y = x^2$ and $y^2 = x$. [16]
5. (a) Find the centre of curvature of $x^3 = a^2\ y$ at (a, a).
   (b) Find the evolute of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, considering it as the envelope of normals. [8+8]
6. (a) Verify Lagrange's Mean Value Theorem for $f(x) = 2x^2 - 7x + 10$ in [0 , 5].
   (b) Find the Jacobian of x, y with respect to θ, ϕ given that $x = \sin\theta\sqrt{1 - a^2\sin^2\phi}$, $y = \cos\theta\cos\phi$. [8+8]
7. Evaluate $\iiint \frac{dxdydz}{\sqrt{a^2-x^2-y^2-z^2}}$ where the integral is taken over the region of space bounded by the coordinate planes and sphere $x^2 + y^2 + z^2 = a^2$ and contained in the first octant. [16]
8. (a) Find L [f (t)] where f (t) is given by
   f (t) = t, 0 < t < b
   = 2b-t, b < t < 2b,
   2b being the period of f (t).
   (b) Find L^{-1} [(2s +3)/ ($s^3 - 6s^2 + 11s - 6$)] [8+8]

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Code No: R07A1BS02 **R07** **Set No. 1**

I B.Tech Examinations,June 2011
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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Solve $(D^2+2D+2)\ y = e^{-x} + \sin 2x$
   (b) Solve the equation $(D^2 - 2D + 2)y = e^x \tan x$. [8+8]
2. (a) Solve $(x^2 - y^2)\ dx = 2xy\ dy$.
   (b) If a population is increasing exponentially at the rate of 2 percent per year, what will be the percentage increase over a period of 10 years? [8+8]
3. (a) Find L [f (t)] where f (t) is given by
   $f(t) = t, \quad 0 < t < b$
   $= 2b-t, \quad b < t < 2b,$
   2b being the period of f (t).
   (b) Find $L^{-1}[\ (2s+3)/(s^3 - 6s^2 + 11s - 6)\ ]$ [8+8]
4. (a) Verify Lagrange's Mean Value Theorem for $f(x) = 2x^2 - 7x + 10$ in [0 , 5].
   (b) Find the Jacobian of x, y with respect to θ, ϕ given that $x = \sin\theta\sqrt{1 - a^2\sin^2\phi}$, $y = \cos\theta\cos\phi$. [8+8]
5. (a) Examine the convergence of $\sum 3^{n+1}/(n+1)\ 2^n$
   (b) Examine the convergence or divergence of $\sum n^2\ x^{n+1}$, (x>0) [6+10]
6. Verify Green's theorem in the xy-plane for $\int_C (x^2 - y^2)\,dx + 2xy\,dy$ where C is the closed curve of the region bounded $y = x^2$ and $y^2 = x$. [16]
7. (a) Find the centre of curvature of $x^3 = a^2\ y$ at (a, a).
   (b) Find the evolute of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, considering it as the envelope of normals. [8+8]
8. Evaluate $\iiint \frac{dxdydz}{\sqrt{a^2-x^2-y^2-z^2}}$ where the integral is taken over the region of space bounded by the coordinate planes and sphere $x^2 + y^2 + z^2 = a^2$ and contained in the first octant. [16]

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Code No: R07A1BS02 **R07** **Set No. 3**

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Examine the convergence of $\sum 3^{n+1}/\ (n+1)\ 2^n$
   (b) Examine the convergence or divergence of $\sum n^2\ x^{n+1}$, (x>0) [6+10]

2. Evaluate $\iiint \frac{dxdydz}{\sqrt{a^2-x^2-y^2-z^2}}$ where the integral is taken over the region of space bounded by the coordinate planes and sphere $x^2 + y^2 + z^2 = a^2$ and contained in the first octant. [16]

3. (a) Solve $(x^2 - y^2)\ dx = 2xy\ dy$.
   (b) If a population is increasing exponentially at the rate of 2 percent per year, what will be the percentage increase over a period of 10 years? [8+8]

4. Verify Green's theorem in the xy-plane for $\int_C (x^2 - y^2)\,dx + 2xy\,dy$ where C is the closed curve of the region bounded $y = x^2$ and $y^2 = x$. [16]

5. (a) Find the centre of curvature of $x^3 = a^2\ y$ at (a, a).
   (b) Find the evolute of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, considering it as the envelope of normals. [8+8]

6. (a) Solve $(D^2+2D+2)\ y = e^{-x} + \sin 2x$
   (b) Solve the equation $(D^2 - 2D + 2)y = e^x \tan x$. [8+8]

7. (a) Find L [f (t)] where f (t) is given by
   $f(t) = t, \quad 0 < t < b$
   $= 2b\text{-}t, \quad b < t < 2b,$
   2b being the period of f (t).
   (b) Find $L^{-1}\ [\ (2s+3)/\ (s^3 - 6s^2 + 11s - 6)\ ]$ [8+8]

8. (a) Verify Lagrange's Mean Value Theorem for $f(x) = 2x^2 - 7x + 10$ in [0 , 5].
   (b) Find the Jacobian of x, y with respect to θ, ϕ given that $x = \sin\theta\sqrt{1 - a^2\sin^2\phi}$, $y = \cos\theta\cos\phi$. [8+8]

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