Code No: R10202/R10 **Set No. 1**

I B.Tech II Semester Supplementary Examinations, February 2013
MATHEMATICS- II
(Common to Civil Engineering, Electrical & Electronics Engineering, Mechanical Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Chemical Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Information Technology, Electronics & Computer Engineering, Aeronautical Engineering, Bio-Technology, Automobile Engineering, Mining and Petroliem Technology)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Find the Laplace transform of cos3t sin5t
   (b) Find the Laplace transform of $\frac{1-e^{-t}}{t}$ [7+8]

2. (a) Find $L^{-1}[(2s^3+3)/s^2(s^2+1)(s^2+2)]$.
   (b) Find$L^{-1}\left\{\frac{e^{4-3s}}{(s+4)^{5/2}}\right\}$. [7+8]

3. Find a fourier expansion of f(x)=x cos x, 0<x<2π [15]

4. Find the fourier cosine and sine transform of f(x) defined by f(x) = e^{-ax}/x and hence deduce that $\int_0^\infty \frac{e^{-ax}-e^{-bx}}{x}\sin sx\,dx$ [15]

5. (a) Solve $\sqrt{p}+\sqrt{q}=x^2$
   (b) Solve ap+bq+cz=0 [8+7]

6. (a) Solve $2x\frac{dz}{dx}-3y\frac{dz}{dy}=0$ by the Method of Separation of Variables
   (b) Solve $\frac{du}{dx}=2\frac{du}{dt}+u$, where u(x,o)=$6e^{-3x}$ by the Method of Separation of Variables. [8+7]

7. (a) Find the Z-transforms of (i) $e^{-an}\sin n\theta$ (ii)$3n^2+10\cos\left(\frac{n\pi}{2}\right)+a^{n+2}$.
   (b) Find the Z-transforms of (i) $(n-1)^2$ (ii) $5e^{-an}\sin\left(\frac{n\pi}{4}\right)-3a^4$. [8+7]

8. (a) Evaluate $\int_0^1 x^3\sqrt{1-x}\,dx$,using beta and gamma functions.
   (b) Prove that$\int_0^\infty x^{2n-1}\ e^{-ax^2}dx=\frac{\Gamma(n)}{2a^n}$, a > 0, n > 0. [8+7]

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Code No: R10202/R10 **Set No. 2**

I B.Tech II Semester Supplementary Examinations, February 2013
MATHEMATICS- II
(Common to Civil Engineering, Electrical & Electronics Engineering, Mechanical Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Chemical Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Information Technology, Electronics & Computer Engineering, Aeronautical Engineering, Bio-Technology, Automobile Engineering, Mining and Petroliem Technology)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Find the Laplace transform of f(t) = cost, o< t <π,f(t)= sin t, t>π
   (b) Using Laplace transforms, evaluate $\int_0^\infty \frac{\cos at - \cos bt}{t}$ dt. [7+8]

2. (a) Find $L^{-1}\left\{\frac{s+1}{(s+2s+2)^2}\right\}$.
   (b) Find $L^{-1}\left\{\frac{1}{(s^2-1)(s^2+25)}\right\}$ using convolution theorem. [7+8]

3. Find the fourier series to represent the function f(x) given by f(x)=0, for - π< x<0, f(x) x^2, for 0< x<π [15]

4. (a) Find the fourier cosine and sine transform of f(x)= xe^{-ax}
   (b) Find the inverse fourier cosine transform of (sin ap)/p [8+7]

5. (a) Solve p + q = sin x + sin y
   (b) Solve xp + yq = z [8+7]

6. A long rectangular plate of width 'a' with insulated surface has its temperature 'v' equal to zero on both the long sides and one of the short sides so that v(0, y)=0, v(a, y)=o; v(x, 8)=0, and v(x,0) = kx. Find the steady state temperature in the plate. [15]

7. (a) Find the Z-transforms of (i) $a^n \sin n\alpha$ (ii) $a^n \cos n\alpha$, n = 0.
   (b) Find the Z-transforms of (i) $e^{-an}\cos n\theta$ (ii) $2n - 5\sin\left(\frac{n\pi}{4}\right) + 3a^4$. [8+7]

8. (a) Prove that $\int_0^1 \frac{1}{\sqrt{1-x^n}}dx = \frac{\sqrt{\pi}}{n}\frac{\Gamma\left(\frac{1}{n}\right)}{\Gamma\left(\frac{1}{n}+\frac{1}{2}\right)}$
   (b) Evaluate $\int_0^\infty x\, e^{-x^8}dx \cdot \int_0^\infty x^2 e^{-x^4}dx$ using beta and gamma functions. [8+7]

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Code No: R10202/R10 **Set No. 3**

I B.Tech II Semester Supplementary Examinations, February 2013
MATHEMATICS- II
(Common to Civil Engineering, Electrical & Electronics Engineering, Mechanical Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Chemical Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Information Technology, Electronics & Computer Engineering, Aeronautical Engineering, Bio-Technology, Automobile Engineering, Mining and Petroliem Technology)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) A function is periodic in(0,2b) and is defined as f(t)= 1 , 0<t,0<b,f(t) = 0, b<t<2b find the Laplace transform of f(t).
   (b) Using Laplace transforms evaluate $\int_0^\infty$t e^{-t}sint dt [7+8]
2. (a) Find inverse Laplace transform of $\frac{s}{(s+3)^2}$
   (b) Find inverse Laplace transform of $\frac{1}{(s^2+5^2)^2}$ [7+8]
3. (a) Find the fourier series to represent f(x)=x^2-2 when $-2 \leq x \leq 2$
   (b) Find the half range cosine series for the function f(x)=(x-1)^2 in 0<x<1 hence deduce that $1+1/2^2+1/3^2+\ldots\ldots = \pi^2/6$ [8+7]
4. Find the fourier cosine and sine transform of f(x) defined by f(x)= x^{n-1} and f(x)=1/υx [15]
5. (a) Form the Partial Differential Equation by eliminating arbitrary function from z = f(y/x)
   (b) Solve $p^2+q^2=z^2$ [8+7]
6. A tightly stretched string with fixed end points x=0 and x=l is initially at rest in its equilibrium position. If it is vibrating by giving to each of its points a velocity $\lambda x(l-x)$, find the displacement of the string at any distance 'x' from one end at any time 't'. [15]
7. (a) Find the inverse Z-transform of $\frac{z^2}{(z-\frac{1}{2})(z-\frac{1}{4})}$
   (b) Evaluate $Z^{-1}\left(\frac{z}{z^2+11z+24}\right)$. [8+7]
8. (a) Evaluate $\int_0^2 (8-x^3)^{1/3}\,dx$ using beta and gamma functions.
   (b) Prove that $\int_0^{\pi/2} \sqrt{\sin\theta}d\theta \cdot \int_0^{\pi/2} \frac{1}{\sqrt{\sin\theta}}d\theta = \pi$. [8+7]

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Code No: R10202/R10 **Set No. 4**

I B.Tech II Semester Supplementary Examinations, February 2013
MATHEMATICS- II
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Time: 3 hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Find the Laplace transform of e^{3t}-$2e^{-2t}$ + sin 2t + cos 3t + sinh3t – 2 cosh4t + 9
   (b) Find the Laplace transform of $f(t) = \begin{cases} 1, & if \quad 0 < t < 1 \\ 0, & if \quad 1 < t < 2 \\ 5, & if \quad 2 < t < 3 \\ 0, & if \quad t > 3 \end{cases}$ [7+8]

2. (a) Find inverse Laplace transform of $\frac{s+3}{s^2 - 10s + 29}$
   (b) Find inverse Laplace transform of $\frac{1}{s^2(s^2+a^2)}$ [7+8]

3. (a) Find the fourier series to represent f(x)=x^2-2 when $-2 \leq x \leq 2$
   (b) Find the half range cosine series for the function f(x)=$(x-1)^2$ in 0<x<1 hence deduce that $1+1/2^2+1/3^2+\ldots\ldots = \pi^2/6$ [8+7]

4. (a)Find the finite fourier sine and cosine transform of $f(x) = \frac{e^{-ax}-e^{-bx}}{x}$
   (b) Find the finite fourier sine and cosine transform of f(x)=x where 0<x<4 [8+7]

5. (a) Solve p-q = x – y
   (b) Solve $x^2(y-z)\,p + y^2(z-x)q = z^2(x-y)$ [8+7]

6. A square plate is bounded by the lines x=0, y=0, x= l & y = 1. Its tales are insulated. The temperature along the upper horizontal edge is given by u(x, l) = x (l- x), $0 \leq x \leq l$, while the other three edges are kept 0^oC. Find the steady state temperature in the plate. [15]

7. (a) Find the inverse Z-transform of $\frac{z^2}{\left(z-\frac{1}{2}\right)\left(z-\frac{1}{4}\right)}$
   (b) Evaluate $Z^{-1}\left(\frac{z}{z^2+11z+24}\right)$. [8+7]

8. (a) Prove that $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$
   (b) Evaluate $\int_0^\infty \frac{x^8(1-x^6)}{(1+x)^{24}}dx$, using beta and gamma functions. [8+7]

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