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

I B.Tech II Semester Supplementary Examinations, July. 2015
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
$e^{2t} + e^{-5t} + 4\sin 4t - \cos 5t + \sinh 3t - 2\cosh 2t + t^7 + 9$
(b) Find the Laplace transform of $e^{5t}\sin 2t\cos 2t$ [7+8]

2. (a) Find $L^{-1}\left\{\frac{(s^2-1)}{(s^2+1)^2}\right\}$.
(b) Using Laplace transforms, solve$(D^2+1)x = t\cos 2t$, given that $x = \frac{dx}{dt} = 0$ at $t = 0$. [7+8]

3. Find the half range Fourier cosine series of f(x)= sin(πx/L) in the range 0<x<L [15]

4. Find the fourier sine transform of f(x) defined by f(x)= 1/ x(x^2+a^2) And hence find fourier cosine transform of f(x)= 1/a^2+x^2 [15]

5. (a) Form the Partial Differential Equation by eliminating arbitrary function fromϕ (xyz, x+y+z)=0
(b) Solve xp - yq=xz [8+7]

6. A bar AB of length 10cm has its ends A and B kept at 30^{o}C and 100^{o}C temperatures respectively, until steady state condition is reached. Then the temperature at A is reduced to 20^{o}C and that at B to 40^{o}C and these temperatures are maintained. Find the subsequent temperature distribution. [15]

7. (a) Solve the difference equation
$6\,u_{n+2} - u_{n+1} - u_n = 0$, *given* that $u_0 = 0, u_1 = 1$ by Z-transforms.
(b) Solve the difference equation $4\,u_n - u_{n+2} = 0$, *given* that $u_0 = 0, u_1 = 2$ by Z-transforms. [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, July. 2015
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 L(t^2 e^tcos2t)
   (b) Find L$\left(\frac{e^{-at}-e^{-bt}}{t}\right)$ [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 a fourier expansion of f(x)=x cos x, 0<x<2π [15]

4. Find the inverse fourier sine transform of f(x) of [F_s(p)]=p/1+p^2 [15]

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

6. A tightly stretched string with fixed points x=0 and x=l is initially at rest in its equilibrium position. If it is set vibrating by giving to each of its points a velocity $\frac{dy}{dt} = 3(lx - x^2)$ at t=o, find y(x, t). [15]

7. (a) Find the inverse Z-transform of $\frac{z}{(z-1)(z-2)}$
   (b) Determine u_2 where $U(z) = \frac{2z^2+3z+4}{(z-3)^3}$, $|z| > 3$ [8+7]

8. (a)Show that $\int_0^\infty x^m\ e^{-ax^n}dx = \frac{1}{na^{\frac{m+1}{n}}}\Gamma\left(\frac{m+1}{n}\right)$where m, n are positive constants.
   (b) Evaluate $4\int_0^\infty \frac{x^2}{1+x^4}dx$ 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, July. 2015
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 cost cos2t cos3t
   (b) Find the Laplace transform of f(t)= $\begin{cases} \cos t, 0 < t < 2\pi \\ 0, otherwise \end{cases}$ [7+8]

2. (a) Find inverse Laplace transform of $\frac{e^{-2s}}{s^2+4s+13}$
   (b) Find inverse Laplace transform of $\frac{s}{2s^2-8}$ [7+8]

3. Expand f(x)= $3x^2$ -2 as a fourier series in (-3,3) [15]

4. Find the finite fourier sine and cosine transform of
   f(x)=x, 0=x= $\pi/2$,
   f(x) = π-x, $\pi/2$=x= π [15]

5. (a) Solve xp + yq = z
   (b) Solve $\frac{p}{x^2} + \frac{q}{y^2} = \frac{1}{z^2}$ [8+7]

6. A bar of length 30 cm. has its ends A and B maintained at 60^{o}C and 0^{o}C respectively until steady state conditions prevailed. Then the end B is suddenly insulated and kept so. The temperature at other end A is reduced to 0^{o}C and maintained. And the temperature distribution in the bar. [15]

7. (a) Find $Z^{-1}\left(\frac{3z^2+z}{(5z-1)(5z+2)}\right)$.
   (b) Find $Z^{-1}\left(\frac{z^2-3z}{(z+2)(z-5)}\right)$ [8+7]

8. (a) Prove that $\Gamma(m)\Gamma\left(m+\frac{1}{2}\right) = \frac{\sqrt{\pi}}{2^{2m-1}}\Gamma(2m)$
   (b) Prove that $\int_0^\infty x^n \ e^{-a^2x^2}dx = \frac{1}{2a^{n+1}}\Gamma\left(\frac{n+1}{2}\right)$,n>-1 [8+7]

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

I B.Tech II Semester Supplementary Examinations, July. 2015
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 cos3t sin5t
   (b) Find the Laplace transform of $\frac{1-e^{-t}}{t}$ [7+8]

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

3. (a) Find the fourier series of periodicity 3 for f(x)=2x-x^2 in 0<x<3
   (b) Expand f(x)=3x^2-2 as a fourier series in the interval (-3,3) [8+7]

4. Find the fourier transform of f(x)defined by
   f(x)= 1, |x|<a,f(x) =0, |x|>a and hence $\int_0^\infty \frac{\sin 2\,ax}{x^2}dx = \frac{\pi a}{2}$ [15]

5. (a) Solve p-q=z-y
   (b) Solve (x-a)p + (y-b) q = z-c [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)=0; v(x, 8)=0, and v(x,0) = kx. Find the steady state temperature in the plate. [15]

7. (a) Find the inverse Z-transform of $\frac{4z^2-2z}{z^3-5z^2+8z-4}$.
   (b) Find Z [n cos nθ] [8+7]

8. (a) Evaluate $\int_0^{\pi/2}\sin^{7/2}\theta\cos^{3/2}\theta\,d\theta$ using beta and gamma functions.
   (b) Show that $\int_a^b (x-a)^{m-1}(b-x)^{n-1}dx = (b-a)^{m+n-1}\beta(m,n)$. [8+7]

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