Total No. of Questions :09] [Total No. of Pages : 02

I/IV B.Tech. DEGREE EXAMINATIONS, NOV/DEC-2017

Second Semester

CSE/ECE/EEE

MATHEMATICS-II

Time: Three Hours **Maximum marks:60**

Answer Question No.1 Compulsory **12X1=12 M**

Answer ONE Question from each Unit **4X12=48 M**

1. a) Solve $y^{11}-2y^{1}+10y=0$

   b) Solve $y\sqrt{1-x^2}dy+x\sqrt{1-y^2}dx=0$

   c) Find the Inverse Trasform of $\frac{S^2}{(S-2)^3}$

   d) Find the particular integral of $\left(D^2-2D+4\right)y=e^x.\cos x$?

   e) Find $L\left\{\frac{e^t-e^{-t}}{t}\right\}$

   f) Define unit Impulse function and write its Laplace transformation?

   g) State Newton's law of cooling?

   h) Find the orthogonal trajectories of $x^2+(y-\alpha)^2=\beta^2$

   i) Write down C.F when the roots are 2,3 for f(0). y=Q

   j) Find a unit vector normal to the surface $xy^3z^2=4$ at the point (-1,-1,2)

   k) Find $\nabla\phi$, if $\phi=\log(x^2+y^2+z^2)$

   l) Show that grad $\left(\frac{1}{r}\right)=-R/r^3$

UNIT-I

2. a) Solve $\frac{d^2y}{dx^2}+2\frac{dy}{dx}+y=e^{2x}-\cos^2 x$

   b) Find the orthogonal trajectories of the family of curves $\frac{x^2}{a^2}+\frac{y^2}{b^2+\lambda^2}=1$ where λ is a parameter.

(OR)

3. a) Solve $x^2\frac{d^2y}{dx^2}+4x\frac{dy}{dx}+2y=e^x$

   b) If the air is maintained at 15^{O}C and the temperature of the body drops from 70^{O}C to 40^{O}C in 10 minutes. What will be its temperature after 30 min.

P.T.O

UNIT-II

4. a) Solve $y^{11}-4y^{1}+3y=4e^{3x}, y(0)=-1, y^{1}(0)=3$

   b) Solve $(D^2+4)y=\text{Tan}\,2x$ using variation of parameters.

(OR)

5. a) Solve $(D^2-4D+4)y=8x^2e^{2x}\sin 2x$

   b) Solve by the method of variation of parameters $y^{11}-2y^{1}+y=e^{x}\log x$

UNIT-III

6. a) Apply convolution theorem to evaluate $L^{-1}\left[\frac{S^2}{S^4-a^4}\right]$

   b) Using laplace transform solve $y^{11}-3y^{1}+2y=4t+e^{3t}, y(0)=1, y^{1}(0)=-1$

(OR)

7. a) Find the i) $L[t^2\cos at]$ ii) $L[e^{2t}\cos^2 t]$

   b) Find the Inverse laplace of the following

   i) $\frac{S+1}{S^2-3S-4}$ ii) $Cot^{-1}(S+1)$

UNIT-IV

8. a) Use Green's theorem to evaluate $\oint_C (x^2+xy)dx+(x^2+y^2)dy,$ where C is the square formed by the lines $x=\pm 1, y=\pm 1$

   b) Use divergence theorem to evaluate $\oint\oint(xdydz+ydxdz+zdxdy)$ where S is the portion of the plane x+2y+3z=6. Which lies in the first octant.

(OR)

9. a) P.T $\nabla^2(\log r)=\frac{1}{r}$ where $\bar{r}=x\bar{i}+y\bar{j}+2\bar{k}$, $r=|\bar{r}|$

   b) Find the work done by $f=(2x-y-z)\bar{i}+(x+y-z)\bar{j}+(3x-2y-5z)\bar{k}$ along a curve C in the XY-plane given by $x^2+y^2=9$, z=0.

Total No. of Questions : 09] [Total No.of Pages : 02

I/IV B. Tech. DEGREE EXAMINATIONS, JUNE / JULY 2017

SECOND SEMESTER

BT / CSE / ECE / EEE

MATHEMATICS - II

Time : **Three Hours** Maximum Marks : **60**

Answer Question No. 1 Compulsory. 12x1=12 M

Answer ONE question from each Unit. 4x12=48 M

1. a) Define Bernoulli's equation.

   b) Form D.E. from the equation x = a sint (wt+b).

   c) Define exact equation.

   d) What is Integrating factor of $y\,(2xy+e^x)\,dx = e^x\,dy$?

   e) Define the wronskian of x and e^x.

   f) What is the solution of $(D^2-2D+5)^2\,y = 0$?

   g) Particular integral of $\frac{d^2y}{dx^2} + \frac{dy}{dx} = x^2 + 2x + 4$.

   h) What is the general solution of $(D^2-D-2)\,x = 0$?

   i) Define the Cauchy's homogenous linear equation.

   j) Define inverse Laplace transform.

   k) Define the first shifting property.

   l) Define Green's theorem.

UNIT - I

2. a) Solve $\frac{dy}{dx} = e^{2x-3y} + 4x^2\,e^{-3y}$.

   b) Solve $(y \log x - 2)\,y\,dx - x\,dy = 0$.

(OR)

3. a) Find the orthogonal trajectories of the family of curves $\gamma^n = a \sin n\theta$.

   b) Find the atmospheric pressure p lb per ft at a height of z ft, above the sea level, both when the temperature is constant or variable.

P.T.O.

UNIT - II

4. a) Solve y'' - 2y' + 2y = e^x tan$x$ by the method of variation of parameters.

   b) Solve $x^2 \frac{d^2y}{dx^2} + 3x\frac{dy}{dx} + y = \frac{1}{(1-x)^2}$.

(OR)

5. a) Solve $(1+x)^2 \frac{d^2y}{dx^2} + (1+x)\frac{dy}{dx} + y = 4\cos\log(1+x)$.

   b) Solve the simultaneous equations $\frac{dx}{dt} + 5x - 2y = t$, $\frac{dy}{dt} + 2x + y = 0$ being given x=y=0 when t = 0.

UNIT - II

6. a) Find the lapalce transform of $\frac{(\cos at - \cos bt)}{t}$.

   b) Evaluate $L^{-1} \frac{s^2}{(s^2 + a^2)(s^2 + b^2)}$ by applying convolution theorem.

(OR)

7. a) Solve ty'' + 2y' + ty = cost given that y (0) = 1.

   b) A beam is simply supported at its end x = 0 and is clamped at the other end x = l. It carries a load w at $x = \frac{l}{4}$. Find the resulting deflection at any point.

UNIT - IV

8. a) Evaluate $\int_S F.ds$, where F = 4xi - 2y^2j + z^2k and s is the surface bounding the region x^2+y^2 = 4, z = 0 and z = 3.

   b) Apply Stoke's theorem to evaluate $\int_S (ydx + zdy + xdz)$ where C is the curve of intersection of x^2+y^2+z^2=a^2 and x+z = a.

(OR)

9. a) Verify Green's theorem for $\int_C \left[(xy + y^2)\,dx + x^2\,dy\right]$, where C is bounded by y=x and y=x^2.

   b) Show that $\nabla^2(\gamma^n) = n(n+1)\,\gamma^{n-2}$.