Roll No. .... **Total Pages : 04**

BT-3/D-19 33149

HIGHER ENGINEERING MATHEMATICS

BS-204A/BS-205A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Find the Laplace Transform of the function $e^{-t}\cos^2 t$. 7½

(b) Find the inverse Laplace Transform of the function : 7½

$$\frac{s}{s^2+6s+25}$$

2. (a) Find the Laplace Transform of the function : 7½

$$f(t)=\begin{cases}\sin wt & \text{for } 0<t<\dfrac{\pi}{w}\\ 0 & \text{for } \dfrac{\pi}{w}<t<\dfrac{2\pi}{w}\end{cases}$$

(b) Solve the following differential equation using Laplace Transform : 7½

$$\frac{d^2y}{dt^2}+25\frac{dy}{dt}=10\cos 5t$$

where $y(0)=2, y'(0)=0$.

Unit II

3. (a) From the Partial differential equation of the function : 7½

$$x^2+y^2+(z-c)^2=a^2$$

(b) From the Partial differential equation : 7½

$$x\left(z^2-y^2\right)\frac{\partial z}{\partial x}+y\left(x^2-z^2\right)\frac{\partial z}{\partial y}=z\left(y^2-x^2\right)$$

4. (a) Using Charpit's method, solve : 7½

$$(p+q)(px+qy)-1=0$$

(b) Solve the equation : 7½

$$2\frac{\partial^2 z}{\partial x^2}-5\frac{\partial^2 z}{\partial x\partial y}+2\frac{\partial^2 z}{\partial y^2}=5\sin(2x+y)$$

Unit III

5. (a) Find the real root of the equation $x^3-4x-9=0$, using Bisection method in four stage. 7½

(b) Estimate the missing terms from the following table : 7½

x	0	1	2	3	4	5	6
$F(x)$	5	11	22	40	–	140	–

6. (a) Evaluate F(9) using Newton's divided difference formula from the table given as : 7½

x	5	7	11	13	17
$F(x)$	150	392	1452	2366	5202

(b) Estimate the value of F(42) from the following available data : 7½

x	20	25	30	35	40	45
$F(x)$	354	332	291	260	231	204

Unit IV

7. (a) Find the minimum value of $y(x)$ from the function tabulated below : 7½

x	0.60	0.65	0.70	0.75
$y(x)$	0.6221	0.6155	0.6138	0.6170

(b) Simpson's 1/3rd rule, evaluate $\int_0^{0.6} e^{-x^2}\,dx$ by taking seven ordinates. 7½

8. (a) Given that $\frac{dy}{dx} = x + y$ and $y = 0, x = 0$. 7½

Find an approximate value of y at x = 0.3 by Euler's method taking h = 0.1. 7½

(b) Find an approximate value of $y(0.1)$ in the steps of 0.1, if $\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = 0, y(0) = 1, y'(0) = 0$ by Runge-Kutta method of forth order. 7½