IIND SEM./COMMON/2022(S)

BST201 ENGINEERING MATHEMATICS-II

Full Marks: 80 Time- 3 Hrs

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10

a. Evaluate $\lim_{x\to\infty} \frac{3x^2+2}{x^3+5}$

b. Find the derivative of $\log x$ with respect to x^2

c. Evaluate $\int_0^1 \frac{dx}{1+x^2}$

d. If $y = e^{\cos x^2}$, then find y_1

e. Find order and degree of the differential equation

$$2\frac{d^2y}{dx^2} = \left\{5 + \left(\frac{dy}{dx}\right)^2\right\}^{\frac{3}{5}}$$

f. Integrate $\int logx\, dx$

g. Find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$, if $z = log(x^2 - y^2)$

h. Find Image of the point$(2, -3, 1)$ with respect to XY- plane

i. Find centre and Radius of the Sphere $x^2 + y^2 + z^2 - 2x - 2y - 2z - 1 = 0$

j. Integrate $\int e^x\{\cot x + log \sin x\}dx$

2. Answer **Any Six** Questions 6 x 5

a. Find angle between the planes $x + 2y + 2z - 7 = 0\ and\ 2x - y + z - 6 = 0$

b. Evaluate $\lim_{x\to 0} \frac{\log(x+1)}{\sqrt{x+1}-1}$

c. Solve $\frac{dy}{dz} = (y^2 + 1)(z^2 + 1)$

d. Find the value of $\int_0^{\frac{\pi}{2}} \frac{dx}{1+cotx}$

e. Find $\frac{dy}{dx}$, $if\ y = x^{\sin x}$

f. Integrate $\int x \sin^{-1} x$ dx

	g	Find $\frac{dy}{dx}$, if $x = t + \sin t$, $y = 1 + \cos t$ $at\ t = \frac{\pi}{4}$	
3		Determine extremum value and extremum points of the function $y = 2x^3 - 15x^2 - 36x + 18$	10
4		Integrate $\int e^{2x} \cos 3x\, dx$	10
5	a)	Solve $\frac{dy}{dx} + y\, secx = \tan x$	5
	b)	Find $\frac{dy}{dx}$ $, if\ x^2y + xy^2 + 1 = 0$	5
6	a)	Test the Continuity of the function $f(x) = \begin{cases} 3x - 2 & whenx \leq 0 \\ x + 1 & when\ x > 0 \quad at\ x = 0 \end{cases}$	5
	b)	If $y = e^{\tan^{-1} x}$, Then prove that $(1 + x^2)y_2 + (2x - 1)y_1 = 0$	5
7	a)	Find co ordinate of foot of perpendicular drawn from $(1,2,3)$ on line joining the points$(-2,3,4)\ and\ (2,-1,6)$	5
	b)	Prove that $\int \frac{dx}{\sqrt{a^2 - x^2}} = \sin^{-1}\left(\frac{x}{a}\right)$+ k ,where K= integrating constants	5