Sub Code:EAG101

Paper Id: 180111 Roll No:

B TECH
(SEM-I) THEORY EXAMINATION 2019-20
ENGINEERING MATHS- I

Time: 3 Hours *Total Marks: 100*

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt any *four* parts of the following: **5x4 = 20**

a) Find all point of discontinuity $f(x) = \begin{cases} \frac{x4-16}{x-2}, when\ x \neq 2 \\ 16 \quad , when\ x = 2 \end{cases}$.

b) Determine the coordinates of stationary points of the following function $f(x,y) = x^3+y^3-3axy$.

c) Evaluate $\lim_{x\to 2} \frac{x^2-5x+6}{x^2-4}$.

d) Find the derivative of $x^2 \sin x$ with respect to x.

e) Solve $\int \frac{\cos x-\sin x}{\cos x+\sin x} dx$.

f) Evaluate $\int \frac{1-\cot x}{1+\cot x} dx$.

2. Attempt any *two* parts of the following: **10x2 = 20**

a) Expand $e^x \sin x$ in powers of x by Maclaurin's theorem as far as x^4.

b) If $\frac{x^2}{a^2+u}+\frac{y^2}{b^2+u}+\frac{z^2}{c^2+u}=1$, show that $(\frac{\partial u}{\partial x})^2 + (\frac{\partial u}{\partial y})^2 + (\frac{\partial u}{\partial z})^2 = 2\,(x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z})$.

c) If $x = r\cos\theta$, $y = r\sin\theta$, find $\frac{\partial(r,\theta)}{\partial(x,y)}$.

3. Attempt any *two* parts of the following: **10x2 = 20**

a) Evaluate the area enclosed between the parabola $y = x^2$ and the straight line $y=x$.

b) Evaluate the $\iiint \frac{dxdydz}{(x^2+y^2+z^2)}$ throughout the volume of the sphere $x^2+y^2+z^2 = a^2$.

c) Prove that $\beta(m,n) = \beta(n,m)$.

4. Attempt any *four* parts of the following: **5x4 = 20**

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

b) Solve $\frac{dy}{dx} = x \tan y$

c) Solve $\frac{d^2y}{dx^2} + y = x$.

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

e) Using method of variation of parameter to solve $y'' + y = \tan x$.

f) Solve the following system of differential equation.

$\frac{dx}{dt} = y + 1$, $\frac{dy}{dt} = x + 1$

5. Attempt any *two* parts of the following: **10x2 = 20**

a) Find the eigen values of the following matrix $A = \begin{bmatrix} 1 & 2 & -2 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$

b) Find inverse of the matrix by using elementary transformation $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$

c) Find the rank of the matrix $A = \begin{bmatrix} 1 & -2 & 5 \\ 4 & -9 & 10 \\ 3 & -6 & 15 \end{bmatrix}$