



PRESIDENCY UNIVERSITY

BENGALURU

SCHOOL OF ENGINEERING

MAKEUP EXAMINATION- JAN 2023

Course Code: MAT101

Course Name: Engineering Mathematics-I

Program : B.Tech

Date: 20-JAN-2023

Time: 09:30 AM TO 12:30 PM

Max Marks: 100

Weightage: 50%

Instructions:

- (i) Read the all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts
- (iii) Scientific and Non-programmable calculators are permitted.

Part A [Memory Recall Questions]

Answer all the Questions. Each Question carries TWO marks. (5Qx 2M=10M)

1. $\lim_{x \rightarrow 0} \frac{a^x - b^x}{x} = \underline{\hspace{2cm}}$ (C.O.NO.01) [Comprehension]

2. If $z = y \sin x + e^{xy}$ then $\frac{\partial z}{\partial y} = \underline{\hspace{2cm}}$ (C.O.NO.02) [Knowledge]

3. If $u = \frac{x^3 + y^3}{\sqrt{x} - \sqrt{y}}$, then by Euler's theorem $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \underline{\hspace{2cm}}$

(C.O.NO.02) [Knowledge]

4. Rank of $\begin{bmatrix} 1 & 2 & 3 \\ 3 & 6 & 9 \\ 2 & 4 & 6 \end{bmatrix} = \underline{\hspace{2cm}}$ (C.O.NO.05) [Knowledge]

5. Eigen values of a matrix $\begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix} \underline{\hspace{2cm}}$ (C.O.NO.05) [Knowledge]

Part B

Answer all the Questions. Each Question carries TEN marks

(4Qx10M=40M)

6. (i). Using Taylor's expansion expand $\tan x$ in powers of $\left(x - \frac{\pi}{2}\right)$ upto second degree. (C.O.NO.01) [Knowledge] [6M]

(ii). Using Maclaurin's series expand $\log(1+x)$.

(C.O.NO.01) [Knowledge] [4M]

7. Find the extreme values of $f(x, y) = x^3 + y^3 - 3x - 12y + 20$

(C.O.NO.02) [Knowledge]

8. Evaluate $\int_0^{\pi} x \sin^4 x \cos^2 x dx$

(C.O.NO.03) [Knowledge]

9. Solve the following system of equations using Gauss elimination method and Gauss Jordan method

$$2x - y + 3z = 9, \quad x + y + z = 6, \quad x - y + z = 2$$

(C.O.NO.05) [Comprehension]

Part C

Answer all the Questions. Each Question carries FIFTEEN marks. (2Qx15M=30M)

16. Obtain the reduction formula for $\int \cos^n x dx$ and $\int_0^{\pi/2} \cos^n x dx$

(C.O.NO.03) [Comprehension]

17. Find all the eigen values and the corresponding eigen vectors of the matrix

$$\begin{bmatrix} 7 & -2 & 0 \\ -2 & 6 & -2 \\ 0 & -2 & 5 \end{bmatrix}$$

(C.O.NO.05) [Knowledge]