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MATH122 Enrol. No. .....

[ST]

END SEMESTER EXAMINATION : JUNE 2022

APPLIED MATHEMATICS – II

Time : 3 Hrs. *Maximum Marks : 60*

Note: ***Attempt questions from all sections as directed.***

SECTION – A (24 Marks)

Attempt any **four** *questions out of* **five.**
Each question carries **06** *marks.*

1. Find complete solution of the equation :

$$\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 3y = x^2 + \cos x$$

2. Expand the following function in Taylor/Laurent series :

$$F(z) = \frac{z}{(z+1)(z+3)} \quad \text{for } 1 < |z| < 3.$$

P.T.O.

3. Determine the analytic function whose real part is given by

$$e^{2x}(x \cos 2y - y \sin 2y)$$

4. Find the inverse Laplace Transforms using convolution theorem :

$$F(s) = \frac{s}{(s^2+1)(s^2+4)}$$

5. Evaluate the following complex integral for the curve c, where c the circle $|z - i| = 2$:

$$\int_c \frac{z-1}{(z+1)^2(z-2)}\,dz$$

SECTION – B (20 Marks)

Attempt any **two** *questions out of* **three.**

Each question carries **10** ***marks.***

6. (a) Find the inverse Laplace Transforms of

$$F(s) = \frac{s}{(s^2+4)^2} \qquad (5)$$

(b) Express Log (log i) in the form (A + iB). (5)

7. (a) Solve : $(2xy^2 - x^3)dy + (y^3 - 2x^2y)dx = 0$ (5)

(b) Determine whether the following function is analytic or not?

$$F(x,y)=\frac{x-iy}{(x^2+y^2)} \quad (5)$$

8. (a) Evaluate $\oint_C \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)^2(z-2)} dz$ where C is the circle $|z| = 3$. (5)

(b) Separate into real and imaginary parts $\sqrt{i}^{\sqrt{i}}$. (5)

SECTION – C (16 Marks)

(Compulsory)

9. (a) Use method of Laplace transform to solve the differential equation :

$$\frac{d^2x}{dt^2}+5\frac{dx}{dt}+6x=te^t, \text{ where } x(0) = 2 \text{ and } x'(0) = 1$$

(8)

P.T.O.

(b) Find complete solution of the equation :

$$x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = \log x \, \mathrm{Sin}(\log x) \qquad (8)$$