

(b) Evaluate :

$$\oint_C \frac{2z-1}{z(z+1)(z-3)} dz$$

$C : |z - 0| = 2$, using Cauchy Residue theorem. **10**

Part C

6. (a) A can hit a target 4 times in 5 shots; B 3 times 4 shots; C twice in 3 shots. They fire a volley. What is the probability that at least two shots hit ? **10**
- (b) Out of 800 families with 4 children each, how many families would be expected to have (i) at least one boy (ii) at most two girls. **10**
7. (a) The 9 items of a sample have the following values
45, 47, 50, 52, 48, 47, 49, 53, 51.
Does the mean of these values differ significantly from the assumed mean 47.5 ? **10**

No. of Printed Pages : 05

Roll No.

302

B. Tech. EXAMINATION, Dec. 2018

(Third Semester)

(Old Scheme) (Re-appear Only)

(CSE, EE, ECE, ME, CHE, CE, BME, IC, EEE, AEI)

MATH201

MATHEMATICS-III

Time : 3 Hours]

[Maximum Marks : 100

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

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

Part A

1. (a) Find a Fourier series to represent $x - x^2$ from $x = -\pi$ to $x = \pi$. Hence show that : **10**

$$\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots = \frac{\pi^2}{12}$$

- (b) Find the half-range cosine series for the function $f(x) = x^2$ in the range $0 \leq x \leq \pi$. **10**

2. (a) Express $f(x) = \begin{cases} 1, & 0 \leq x \leq \pi \\ 0, & x > \pi \end{cases}$ as a Fourier sine integral. **10**

- (b) Find the Fourier transform of :

$$f(x) = \begin{cases} 1, & |x| < a \\ 0, & |x| > a \end{cases}$$

Hence deduce that : **10**

$$\int_0^{\infty} \frac{\sin x}{x} dx = \frac{\pi}{2}$$

Part B

3. (a) If z is a complex variable, then prove that : **10**

$$\tan 2z = \frac{2 \tan z}{1 - \tan^2 z}$$

- (b) Prove that $\lim_{z \rightarrow 0} \frac{\bar{z}}{z}$ does not exist. **10**

4. (a) Show that the function $f(z) = \sqrt{|xy|}$ is not analytical at the origin, even though C.R. equations are satisfied at origin. **10**

- (b) Determine the analytical function whose real part is : **10**

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

5. (a) Find the series expansion of :

$$f(z) = \frac{z^2 - 1}{z^2 + 5z + 6}$$

about $z = 0$ in the region $2 < |z| < 3$. **10**

- (b) A die is thrown 270 times and the results of these throws are given below :

No. appeared on the die	1	2	3	4	5	6
Frequency	40	32	29	59	57	59

Test whether the die is biased or not ? **10**

8. Solve the linear programming problem :

Maximize $Z = 60x + 40y$

Subject to constraints :

$$x + 2y \leq 12$$

$$2x + y \leq 12$$

$$4x + 5y \geq 20$$

$$x, y \geq 0$$

by using :

- (i) Graphically method
- (ii) Simplex method.

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