

**Indian Maritime University**  
**(A Central University, Govt of India)**  
**Supplementary Examinations – March/April 2025**  
**Programme Name: B Sc Nautical Science**  
**Semester: II**  
**Subject Code:UG21T5201**  
**Subject Name: APPLIED MATHEMATICS**

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Date: 10.03.2025	Max Marks: 70
Duration: 03 Hrs	Pass Marks: 35

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General Instructions

- (i) All Sections (A, B & C) are to be attempted.
- (ii) Options, if any, are specified in respective section.

**Section A**

Ten MCQs/Fill in the Blanks of 01 Mark each – Choose the correct answer as applicable.

1. The period of a constant function is .....
2. The half-range sine series for 1 in  $(0, \pi)$  is .....
3. If  $L[f(t)] = \bar{f}(s)$  then  $L[t^n f(t)] = \dots\dots\dots$
4. If  $L^{-1}[\bar{f}(s)] = f(t)$  then  $L^{-1}[\bar{f}(s - a)] = \dots\dots\dots$
5. The equation of regression lines is  $y = 0.5x + a$  and  $x = 0.4y + b$ . The correlation coefficient is .....
6. The mode of the numbers 7,7,7,11,9,10,11,11,11,12 is .....
7. By trapezoidal rule  $\int_0^1 x^3 dx$  considering five sub-intervals is 0.26. True or False
8. If  $y_1 = 1, y_3 = 4, y_4 = 8$  then  $y_2 = \dots\dots\dots$
9. In the regular -Falsi method the first approximation is given by the formula .....
10. Fourier sine integral representation of a function  $f(x)$  is given by .....

**Section B**

Five Questions of 02 Marks each

11. Explain the Dirichlet's conditions for Fourier expansion of a function.

12. Find the Laplace transform of  $e^{-t}\sin^2 t$ .  
 13. From the following data compute arithmetic mean

Marks	0-10	10-20	20-30	30-40	40-50	50-60
No: of students	5	10	25	30	20	10

14. Evaluate  $\sqrt{28}$  by Newton's iterative method.  
 15. Prove that  $2\delta\mu = \Delta + \nabla$

### Section C

Seven Questions of 10 Marks each of which any 05 questions to be answered.

16. Find the Fourier expansion for  $f(x) = \begin{cases} 0 & -\pi \leq x \leq 0 \\ \sin x & 0 \leq x \leq \pi \end{cases}$  and prove that

$$\frac{1}{1.3} + \frac{1}{3.5} + \dots = \frac{1}{2}$$

17. a) Find the value of (i)  $L(t^2 e^{-3t} \sin 2t)$  (ii)  $L(\sin^3 2t)$   
 b) Find the value of (i)  $L^{-1}(\tan^{-1} \frac{1}{s})$  (ii)  $L^{-1}(\frac{s+1}{s^2+2s+1})$
18. a) Compute the coefficient of quartile deviation from the following data

Marks	10	20	30	40	50	60
No: of students	4	7	15	8	7	2

- b) Find the coefficient of correlation when the two regression equations are  $x = -0.2y + 4.2$  and  $y = -0.8x + 8.4$
19. a) Find the cubic polynomial which takes the following values.

x	0	1	2	3
f(x)	1	0	1	10

- b) Evaluate  $\int_0^6 \frac{dx}{1+x^2}$  using (i) Simpson's 1/3<sup>rd</sup> rule. (ii) Simpson's 3/8<sup>th</sup> rule.
20. Solve by the method of transforms the equation  $y'''' + 2y'' - y' - 2y = 0$  given  $y(0) = y'(0) = 0$  and  $y''(0) = 6$
21. Calculate the mean and standard deviation for the following

Size of the item	6	7	8	9	10	11	12
frequency	3	6	9	13	8	5	4

22. a) A curve passes through the point (0,18), (1,10), (3,-18) and (6,90). Find the slope of the curve at  $x=2$ .  
 b) Using Picard's process of successive approximation, obtain a solution upto the fifth approximation of the equation  $\frac{dy}{dx} = y+x$  such that  $y=1$  when  $x=0$