Indian Maritime University

(A Central University, Govt of India)

End Semester Examinations – June 2024

Programme Name: B Sc Nautical Science

Semester: II

Subject Code:UG21T5201

Subject Name: APPLIED MATHEMATICS

Date: 28.05.2024	Max Marks: 70
Duration: 03 Hrs	Pass Marks: 35

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 $L[t^n f(t)]=$.....
4. If $L^{-1}[\bar{f}(s)]=f(t)$ then $L^{-1}[\bar{f}(s-a)]=$.....
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 $y_2=$.....
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) $=\begin{cases} 0 & -\pi \le x \le 0 \\ \sin x & 0 \le x \le \pi \end{cases}$ and prove that $\frac{1}{1.3}+\frac{1}{3.5}+\cdots\ldots=\frac{1}{2}$

17. a) Find the value of (i)$L(t^2e^{-3t}\sin 2t)$ (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 1/3rd rule. (ii)Simpson's 3/8th 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

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