INDIAN MARITIME UNIVERSITY

Time Bound Assignment September/October 2020

B Sc (NS) Arrear Examinations

Applied Mathematics
UG21T3201

Date: 08/10/2020 Maximum Marks: 70

Time: 3 Hrs Pass Marks: 35

Note: Q.No.1 is compulsory.
Solve any SIX questions from remaining eight questions.
All questions carry equal marks.
Use of approved type Scientific Calculator is permitted.

Q.1 Attempt the following: **(10 Marks)**

a) Find λ so that, $\bar{u} = (x + 3y)i + (y - 2z)j + (x + \lambda z)k$ is solenoidal.

b) Solve $y(\log y)\, dx + (x - \log y)\, dy = 0$.

c) Form a partial differential equation by eliminating the arbitrary function from:

$z = f(x^2 - y^2)$

d) Evaluate $\left(\frac{\Delta^2}{E}\right) x^3$, the interval of differencing being 1.

e) Find the Laplace transform of $e^{-t} sin^2 3t$.

Q.2 a) Compute the directional derivative of $x^2 + y^2 + 4xyz$ at (1,-2,2) in the direction $2i - 2j + k$. **(5 Marks)**

b) Using the line integral compute the work done by the force,

$\bar{F} = (2y + 3)i + xz\, j + (yz - x)k$ when it moves a particle from the point $(0,0,0)$ to the point $(2,1,1)$ along the curve $x = 2t^2, y = t, z = t^3$. **(5 Marks)**

Q.3 a) Solve $(D^2 - D - 2)y = \sin 2x$. **(5 Marks)**

b) Solve $x^2 y'' + xy' + y = x$. **(5 Marks)**

Q.4 a) Solve the equation: $(z-y)\,p+(x-z)\,q=y-x$. **(5 Marks)**

b) Solve by Charpit's method $z=p^2x+q^2y$. **(5 Marks)**

Q.5 a) Find by Newton Raphson method a root of the equation $x^3-2x-5=0$

Correct upto 3 decimal places. **(5 Marks)**

b) Estimate y for $x=2$ using Lagrange's interpolation formula from:

x	1	3	5	6
y	5	9	13	15

(5 Marks)

Q.6 a) Find the Laplace transform of $\frac{e^{at}-\cos bt}{t}$. **(5 Marks)**

b) Using the Convolution theorem evaluate, $L^{-1}\left[\frac{s}{(s-1)(s^2+1)}\right]$. **(5 Marks)**

Q.7 a) A curve is drawn to pass through the points given by the following table:-

x	1	1.5	2	2.5	3	3.5	4
y	2	2.4	2.7	2.8	3	2.6	2.1

Estimate the area bounded by the curve ,x-axis and the lines $x=1$, $x=4$.

(5 Marks)

b) Use divergence theorem to evaluate $\int_S F.ds$ where $\bar{F}=4xi-2y^2j+z^2k$

and S is the surface bounding the region $x^2+y^2=4, z=0$ and $z=3$ **(5 Marks)**

Q.8 a) Apply Gauss Elimination method to solve the equations:

$2x+4y+z=3\,,3x+2y-2z=-2\,,x-y+z=6$ **(5 Marks)**

b) Solve by the method of variation of parameters, $\frac{d^2y}{dx^2}-4\frac{dy}{dx}+4y=e^{-2x}$. **(5 Marks)**

Q.9 a) Solve $\frac{\partial^3 z}{\partial x^3}-3\frac{\partial^3 z}{\partial x^2\partial y}+4\frac{\partial^3 z}{\partial y^3}=e^{x+2y}$ .. **(5 Marks)**

b) Solve $y''+4y'+3y=e^{-t}$ where , $y(0)=y'(0)=1$. **(5 Marks)**
