TAMIL NADU OPEN UNIVERSITY Chennai - 15 School of Sciences HOME / SPOT ASSIGNMENT
: 131
: M. Sc Mathematics
: MMSS-41 Integral Transforms and Calculus of
Variations
: CY- 2022
: One Assignment for Each 2 Credits
: 30 (Average of Total No. of Assignments)

## <u>ASSIGNMENT - 1</u> <u>Answer any two of the following three questions</u>

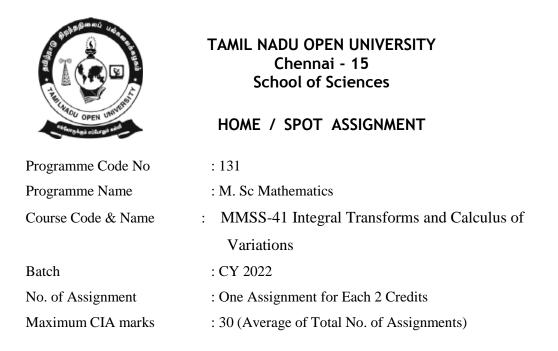
Max: 30 Marks

1. Find the inverse Laplace of  $\frac{5s^2 - 15s - 11}{(s+1)(s-2)^3}$ .

2. Find the Fourier transform of f(t) defined by

$$f(x) = \begin{cases} 1, & |t| < a \\ 0, & |t| > a \end{cases}$$
  
and hence evaluate  $\int_{0}^{\infty} \frac{\sin s}{s} ds$  and  $\int_{-\infty}^{\infty} \frac{\sin as \cos st}{s} ds$ 

3. Derive Euler-Lagrange's equation.



## <u>ASSIGNMENT – 2</u>

#### Answer any two of the following three questions

- 1. Prove that (i)  $L[J_1(t)] = 1 \frac{p}{\sqrt{p^2 + 1}}$ . (ii)  $L[tJ_1(t)] = \frac{1}{(p^2 + 1)^{3/2}}$
- 2. Solve  $\frac{d^2y}{dt^2} \frac{dy}{dt} 2y = 0$ , given that y(0) = -2; y'(0) = 5.
- 3. Discuss Brachistochrone problem.



## HOME / SPOT ASSIGNMENT

Programme Code No	: 131
Programme Name	: M. Sc Mathematics
Course Code & Name	: MMSS – 42 Probability and Random Processes
Batch	: CY 2022
No. of Assignment	: One Assignment for Each 2 Credits
Maximum CIA marks	: 30 (Average of Total No. of Assignments)

## ASSIGNMENT – 1

#### Answer any two of the following three questions

- 1. Find the mean, variance and moment generating function of Binomial distribution.
- 2. Verify that  $f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{\left[\frac{(x-m)^2}{2\sigma^2}\right]}$  where  $\sigma > 0$ , is a density for normal distribution.
- 3. Calculate the rank correlation coefficient from the following data

Statistics Rank	1	2	3	4	5	6	7	8	9	10
Mathematics Rank	2	4	1	5	3	9	7	10	6	8



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#### ASSIGNMENT - 2

#### Answer any two of the following three questions

- 1. Find mean, variance and moment generating function of the Weibull distribution.
- 2. Let X be a continuous random variable with probability density function  $f_X(x)$ . Let y = g(x) be strictly monotonic (increasing or decreasing) function of x. Assume that g(x) is differentiable for all x. Then probability density function of the random variable Y is given by  $h_Y(y) = f_X(x) \left| \frac{dx}{dy} \right|$ , where x is expressed in terms of y.
- 3. If  $\{N(t), t \ge 0\}$  is a non stationary Poisson process with intensity function  $\lambda(t), t \ge 0$ , then N(t + s) N(s) is a Poisson random variable with mean, then prove that  $m(t + s) m(s) = \int_{s}^{t+s} \lambda(y) dy$ .



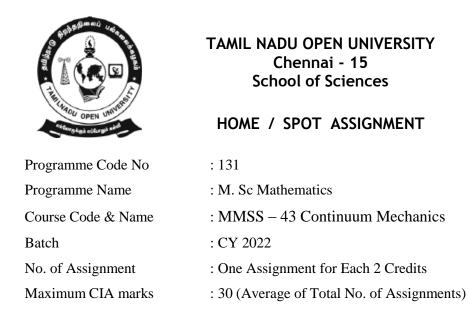
## HOME / SPOT ASSIGNMENT

Programme Code No	: 131
Programme Name	: M. Sc Mathematics
Course Code & Name	: MMSS – 43 Continuum Mechanics
Batch	: CY 2022
No. of Assignment	: One Assignment for Each 2 Credits
Maximum CIA marks	: 30 (Average of Total No. of Assignments)

# <u>ASSIGNMENT – 1</u>

# Answer any two of the following three questions

- 1. Discuss Principal values and Principal directions of Real symmetric tensors.
- 2. Discuss compatibility conditions for infinitesimal Strain components.
- 3. Discuss Plane-Poiseuille flow.



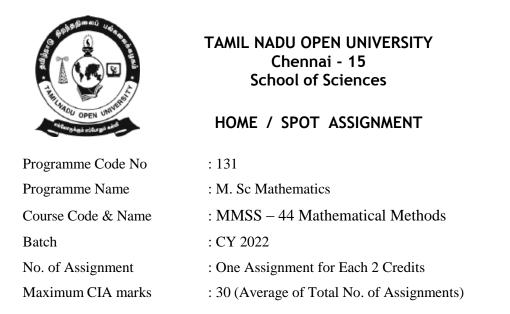
### ASSIGNMENT – 2

### Answer any two of the following three questions

- 1. Given the velocity field:  $v_1 = kx_2$ ;  $v_2 = v_3 = 0$ .
  - (a) Find the rate of deformation and spin tensor.
  - (b) Determine the rate of extension of the material elements:

$$dx^{(1)} = (ds_1)e_1, \ dx^{(2)} = (ds_2)e_2, \ and \ dx = \frac{ds}{\sqrt{5}}(e_1 + 2e_2)$$

- (c) Find the maximum and minimum rates of extension.
- 2. Discuss the components of stress tensor.
- 3. Discuss Hagen-Poiseuille flow.



## ASSIGNMENT – 1

#### Answer any two of the following three questions

Max: 30 Marks

1. Solve the Fredholm integral equation of the second kind

$$g(s) = f(s) + \lambda \int_{0}^{1} (st^{2} + s^{2}t) g(t) dt$$

- 2. Derive Freedom's first series.
- 3. Form an integral equation corresponding to the differential equation

y''+sy'+y=0 with the initial conditions y(0)=1, y'(0)=0.



# HOME / SPOT ASSIGNMENT

Programme Code No	: 131
Programme Name	: M. Sc Mathematics
Course Code & Name	: MMSS – 44 Mathematical Methods
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# ASSIGNMENT – 2

## Answer any two of the following three questions

Max: 30 Marks

1. Solve the integral equation by approximation method.

$$g(s) = e^{s} - s - \int_{0}^{1} s(e^{st} - 1)g(t)dt$$

2. Find the resolvent kernel and solution of

$$g(s) = f(s) + \lambda \int_{0}^{1} (s+t)g(t)dt$$

**3**. Find the solution of Abel integral equation.



## HOME / SPOT ASSIGNMENT

Programme Code No	: 131
Programme Name	: M. Sc Mathematics
Course Code & Name	: MMSS-EL6 Optimization Techniques
Batch	: CY 2022
No. of Assignment	: One Assignment for Each 2 Credits
Maximum CIA marks	: 30 (Average of Total No. of Assignments)

### ASSIGNMENT - 1

#### Answer any two of the following three questions

Max: 30 Marks

1. Solve following transportation problem.

	1	2	3	4	5	6	Supply
Ι	9	12	9	6	9	10	5
II	7	3	7	7	5	5	6
III	6	5	9	11	3	11	2
IV	6	8	11	2	2	10	9
Demand	4	4	6	2	4	2	

- 2. Write Dijkstra's Algorithm.
- 3. Find the optimum integer solution to the following linear programming problem.  $Max. Z = 5x_1 + 8x_2$

Subject to:

 $x_1 + 2x_2 \le 8$   $4x_1 + x_2 \le 10$  $x_1, x_{2,} \ge 0 \text{ and are integers.}$ 



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### <u>ASSIGNMENT – 2</u>

#### Answer any two of the following three questions

Max: 30 Marks

1. Solve the following assignment problem.

2	9	2	7	1
6	8	7	6	1
4	6	5	3	1
4	2	7	3	1
5	3	9	5	1

- 2. Write Maximal flow problem algorithm.
- 3. Solve the following 0-1 programming problem by additive algorithm.

Maximize  $w = 3y_1 + 2y_2 - 5y_3 - 2y_4 + 3y_5$ Subject to

 $y_1 + y_2 + y_3 + 2y_4 + y_5 \le 4$ 7 y\_1 + 3 y\_3 - y\_4 + 3 y\_5 \le 8 11 y\_1 - 6 y\_2 + 3 y\_4 - 3 y\_5 \ge 3 y\_1, y\_2, y\_3, y\_4, y\_5 = {0,1}