TAMIL NADU OPEN UNIVERSITY

Chennai-25.

M.Sc Maths – Second Year

HOME ASSIGNMENT

Programme Code No : 231

Programme Name : M.Sc (Maths)

Course Code & Name : MMS 28 & Differential Equations

Batch : AY2020-2021

No. of Assignment : 04

Maximum CIA Marks : 15 Marks (Average of total no. of Assignments)

ASSIGNMENT-1

Max: ___ Marks.

Answer any ONE of the following three questions.

1. Reduce the equation $\frac{\partial^2 z}{\partial x^2} + 2\frac{\partial^2 z}{\partial x \partial y} + \frac{\partial^2 z}{\partial y^2} = 0$ into its canonical form.

2. Derive the Bessel function of order *n* of the second kind.

3. State and Prove Kelvin's inversion theorem.

ASSIGNMENT-2

Max: __ Marks.

Answer any ONE of the following three questions:

1 State and Prove a necessary condition for the existence of the solution of the interior Neumann's problem.

2. Solve the Legendre equation $\left(1-x^2\right)y''-2xy'+\alpha\left(\alpha+1\right)y=0$.

3. Find the first four successive approximations for the initial value problem $y'=y;\quad y(0)=1.$

ASSIGNMENT-3

Max: ___ Marks.

Answer any ONE of the following three questions.

1. Prove that two solutions φ_1, φ_2 of L(y)=0 are linearly independent on I if and only if $W(\varphi_1,\varphi_2)(x) \neq 0 \ \forall \ x \in I$.

2. State and prove Picard's theorem.

3. Show that the one-parameter family of surfaces $x^2 + y^2 = cz^2$ can form a family of equipotential surfaces.

ASSIGNMENT-4

Max: ___Marks.

Answer any ONE of the following three questions.

1 Solve: $y'' + y = 0$, $y(0) = 1$, $y\left(\frac{\pi}{2}\right) = 2$.

2. Define Legendre equation and solve using the power series technique.

3. Discuss the method of solving hyperbolic equations.

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M.Sc Maths – Second Year

HOME ASSIGNMENT

Programme Code No	**: 231**
Programme Name	**: M.Sc (Maths)**
Course Code & Name	**: MMS 27 & Graph Theory and Algorithms**
Batch	**: AY2020-2021**
No. of Assignment	**: 04**
Maximum CIA Marks	**: 15 Marks (Average of total no. of Assignments)**

ASSIGNMENT-1

Max: 15 Marks.

Answer any ONE of the following three questions.

1. State and prove Tutte's Theorem.

2. Prove that a connected graph G is Eulerian if and only if each vertex of G has even degree.

3. State and Prove Vizing's theorem.

ASSIGNMENT-2

Max: 15 Marks.

Answer any ONE of the following three questions:

1. Prove that when the breadth-first search algorithm halts, each vertex reachable from (given vertex) v is labeled with its distance from v.

2. State and Prove Whitney Theorem on connectivity.

3. Prove that every planar graph is 5-vertex colourable.

ASSIGNMENT-3

Max: 15 Marks.

Answer any ONE of the following three questions.

1. Explain an algorithm to find a spanning tree of a graph and illustrate with example.

2. State and prove Menger's theorem.

3. Prove that after completion of Kruskal's algorithm, T induces a minimum weight spanning tree.

ASSIGNMENT-4

Max: 15 Marks.

Answer any ONE of the following three questions.

1. Explain sequential colouring algorithm and illustrate.
2. State and prove Haval and Hakimi theorem.
3. Explain Hungarian algorithm with illustration.

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M.Sc Maths – Second Year

HOME ASSIGNMENT

Programme Code No	**: 231**
Programme Name	**: M.Sc (Maths)**
Course Code & Name	**: MMS 26 & Operations Research**
Batch	**: AY2020-2021**
No. of Assignment	**: 04**
Maximum CIA Marks	**: 15 Marks (Average of total no. of Assignments)**

ASSIGNMENT-1

Max: 15 Marks.

Answer any ONE of the following three questions.

1. Use two – phase simplex method to minimize $Z = \frac{15}{2}x_1 - 3x_2$

Subject to the constraints:

$3x_1 - x_2 - x_3 \geq 3$

$x_1 - x_2 - x_3 \geq 2$

$x_1, x_2, x_3 \geq 0.$

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2. Find the optimum integer solution to the following all I.P.P:

Maximize $Z = x_1 + 2x_2$

Subject to the constraints

$x_1 + x_2 \leq 7$, $2x_1 \leq 11$, $2x_2 \leq 7$,

x_1, $x_2 \geq 0$ and are integers..

3. Derive (M/M/1): (∞, FIFO) queueing model and find all the characteristics of this model.

ASSIGNMENT-2

Max: __ Marks.

Answer any ONE of the following three questions:

1. Solve the following 3 × 3 game by linear programming.

$$\text{Player A} \overset{\textit{player B}}{\begin{bmatrix} 1 & -1 & -1 \\ -1 & -1 & 3 \\ -1 & 2 & -1 \end{bmatrix}}.$$

2. Use dual simplex method to solve the L.P.P.

Minimize $Z = x_1 + 2x_2 + 3x_3$ subject to the constraints:

$$x_1 - x_2 + x_3 \geq 4$$

$$x_1 + x_2 + 2x_3 \leq 8$$

$$x_2 - x_3 \geq 2$$

$$x_1, x_2, x_3 \geq 0.$$

3. In a public telephone booth the arrivals are on the average 15 per hour. A call on the average takes 3 minutes. If there is just one phone find

(i) expected number of callers in the booth at any time

(ii) the proportion of the time the booth is expected to be idle?

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ASSIGNMENT-3

Max: ___ Marks.

Answer any ONE of the following three questions.

1. Solve the following 5x2 game graphically:

	B_1	B_2
A_1	-2	5
A_2	-5	3
A_3	0	-2
A_4	-3	0
A_5	1	-4

2. Explain Pure and Death model.

3. Use Branch and Bound to solve the following

$$Max.Z = 2x_1 + 2x_2$$

Subject to: $5x_1 + 3x_2 \leq 8$

$$x_1 + 2x_2 \leq 4$$

$x_1, \; x_2 \; \geq 0$ and integers

ASSIGNMENT-4

Max: ___Marks.

Answer any ONE of the following three questions.

1. Use linear programming to solve the game probems whose payoff matrices are given below:

$$\begin{bmatrix} 1 & -1 & -2 \\ -1 & 1 & 1 \\ 2 & -1 & 0 \end{bmatrix}$$

2. Explain Integer Programming problem algorithm**.**

3. Explain the two – phase technique to solve an L.P.P.

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M.Sc Maths – Second Year

HOME ASSIGNMENT

Programme Code No	**: 231**
Programme Name	**: M.Sc (Maths)**
Course Code & Name	**: MMS 25 & Topology and Functional Analysis**
Batch	**: AY2020-2021**
No. of Assignment	**: 04**
Maximum CIA Marks	**: 15 Marks (Average of total no. of Assignments)**

ASSIGNMENT-1

Max: 15 Marks.

Answer any ONE of the following three questions.

1. (i) State and prove uniform limit theorem.

(ii) Prove that every compact subset of a Hausdorff space is closed

2. Let X be a simply ordered set having the $l.u.b$ property. In the order topology each closed interval is compact.

3. If P is the projection on a closed linear subspace M of a Hilbert space H, then M reduces an operator T if and only if TP = PT**.**

ASSIGNMENT-2

Max:15 Marks.

Answer any ONE of the following three questions:

1. Prove that the Cartesian product of connected spaces is connected**.**

2. State and Prove Urysohn's lemma**.**

3. Prove that a closed convex subset C of a Hilbert space H contains a unique vector of smallest norm**.**

ASSIGNMENT-3

Max: 15 Marks.

Answer any ONE of the following three questions.

1. If L is a linear continuum in the order topology, then prove that L is connected and so is every interval and ray in L.

2. **(i)** State and Prove Closed graph theorem**.**

(ii) State and prove the open mapping theorem.

3. Let H be the given Hilbert space and T^* be adjoint of the operator T. Prove that T^* is a bounded linear transformation and T determines T^* uniquely.

ASSIGNMENT-4

Max: 15 Marks.

Answer any ONE of the following three questions.

1. State and Prove Tietze extension theorem**.**

2. State and prove the Riesz Representation Theorem**.**

3. State and Prove Gram-Schmidt Orthogonalisation Process**.**
