Uttar Pradesh Rajarshi Tandon Open University

School of Science, Assignment Session 2021-22

Course Code: UGMM-06	Course Title**: Abstract Algebra**	Maximum Marks : 30

(Section 'A')

(Long Answer Questions)

NOTE: Answer each question in 500 to 800 words. All carry equal marks.

Maximum Marks: 18

1. State and Prove fundamental theorem of group homomorphism.
2. Let N be a normal subgroups of a group G and H be a subgroup of G then show that:

   (i) $H \cap N$ is normal subgroup of H (ii) HN is a subgroup of G (iii) N is normal subgroup of HN.
3. Prove that if G is abelian then $G|_{Z(G)}$ is cyclic where Z(G) is centre of G.

(Section – B)

(Short Answer Questions)

Maximum Marks: 12

Note : Answer each question in 200 to 300 Words. All carry equal marks.

4. Give all sub groups of (Z_{12}, +)
5. Let f: $G_1$1 $\rightarrow$ G_2 be a group homomorphism then show that kernel f is a normal subgroup of G_1.
6. Give an example noncycle group whose all subgroups are cyclic.
7. Find all zero divisor elements of $Z/_{20}$.

Uttar Pradesh Rajarshi Tandon Open University

School of Science, Assignment Session 2021-22

Course Code: UGMM-09	Course Title**: Real Analysis**	Maximum Marks : 30

(Section 'A')

(Long Answer Questions)

NOTE: Answer each question in 500 to 800 words. All carry equal marks.

Maximum Marks: 18

1. (a) Evaluate $\underset{x \longrightarrow o}{\ell im} \frac{(1+X)^{\frac{1}{X}} - e}{x}$

   (b) If $y^{1/m} + y^{1+m} 2x$, prove that $(x^2 - 1)Yn + 2 + +(2n +)XY_{n+1} + (n^2 - m^2)Y_n = 0$, Whrre Y_n denotes the nth derivative of denotes the nth derivative of Y.

2. (a) Evaluate $x \rightarrow a \frac{a^x - x^a}{x^x - a^a}$

   (b) If, $y^{1/m} + y^{1+m} 2x$, prove that $(x^2 - 1)Yn + 2 + +(2n +)XY_{n+1} + (n^2 - m^2)Y_n = 0$, Whrre Y_n denotes the nth derivative of denotes the nth derivative of Y with respect X.

3. (a) Test the convergence of the series $x + \frac{2^2 x^2}{2!} + \frac{3^3 x^3}{3!} + \dots \dots \dots (x > 0)$

   (b) State and prove Cauchy's Mean Value theorem.

(Section – B)

(Short Answer Questions)

Maximum Marks: 12

Note : Answer each question in 200 to 300 Words. All carry equal marks.

4. If f and g are integrable in [a, b] and $f(X) \leq g\ (X) \in X \in [a, b\}$, prove that

$$\int_a^b f\ (X) d_X \leq \int_a^b g\ (X) dX$$

5. Test for uniform convergence, the sequence {fₙ}, where $f_n(x) = \frac{nx}{1+n^2x^2} \forall \times \varepsilon TR$
6. Show that $e^x cosx = 1 - 1x - \frac{2x^2}{3!} - \frac{2^2 x^4}{4!} - \frac{2^2 x^5}{5!} \dots \dots \dots \dots \dots \dots \dots$
7. Show that arbitrary union of open sets is open.

Uttar Pradesh Rajarshi Tandon Open University

School of Science, Assignment Session 2021-22

Course Code: UGMM-10	Course Title**: Numerical Analysis**	Maximum Marks : 30

(Section 'A')

(Long Answer Questions)

NOTE: Answer each question in 500 to 800 words. All carry equal marks.

Maximum Marks: 18

. Show that Newton-Raphison method has a convergence of order two.

1. Using simplex method solve the problem.

$Max\ Z = 2x = 2x_1 + 5x_2 + 7x_3.$

$Subject\ to\ 3x_1 + 2x_2 + 4x_3 \quad 100$

$$X_1 + 4x_2 + 2x_2 \leq 100$$

$$X_1 + x_2 + 3x_3 \leq 100, x_1 \geq 0,\ \ x_3 \geq 0.$$

2. Solve the transportation problem.

	To			
From	1	2	3	Supply
1	2	7	4	5
2	3	3	1	8
3	5	4	7	7
4	1	6	2	14
Demand	7	9	18	34

(Section – B)

(Short Answer Questions)

Maximum Marks: 12

Note : Answer each question in 200 to 300 Words. All carry equal marks.

4. Evaluate the integral $\int_1^{2.5} e^x\, dx$ by Simpson's $\frac{1}{2}$ rd rule.
5. Using Lagrange's interpolation formula, find the form of the function from he given

From	0	1	3	4
Y	-12	0	12	24

6. Use Runge-Kutta method to approximate y, when $x = 0.1$ and $x = 0.2$ given that $x = 0$ when $y = 1\ and \frac{dy}{dn} = x + y$
7. By LU decamp position method Find inverse of the matrix when

$$A = \begin{bmatrix} 2 & -2 & 4 \\ 2 & 3 & 2 \\ -1 & 1 & -1 \end{bmatrix}$$

Uttar Pradesh Rajarshi Tandon Open University

School of Science, Assignment Session 2021-22

Course Code: UGMM-11	Course Title**: Probability & Statistics**	Maximum Marks : 30

(Section 'A')

(Long Answer Questions)

NOTE: Answer each question in 500 to 800 words. All carry equal marks.

Maximum Marks: 18

1. Calculate variance from the following data

C.I	0-10	10-20	20-30	30-40	40-50
f	12	21	45	30	10

2. Calculate mean from following data

C.I	0-10	10-20	20-30	30-40	40-50
f	9	14	26	20	12

3. Calculate co-relation co-efficient from given data

X	68	69	64	59	63	61
y	58	52	56	52	41	49

(Section – B)

(Short Answer Questions)

Maximum Marks: 12

Note : Answer each question in 200 to 300 Words. All carry equal marks.

4. Discuss about skewness and kurtosis.
5. Write short notes on
   a. (Level of significance)
   b. (Types of Hypothesis).
6. $If\ \times \sim B(15,1/2)\ the\ find\ \ mean\&\ variance$
7. $If\ \times \sim N(20,12)\ then\ find\ P(\times \leq 5)\ \&\ \ P(\times^3 \geq 10)$

Uttar Pradesh Rajarshi Tandon Open University

School of Science, Assignment Session 2021-22

Course Code: UGMM-12	Course Title: **Linear Programming**	Maximum Marks : 30

(Section 'A')

(Long Answer Questions)

NOTE: Answer each question in 500 to 800 words. All carry equal marks.

Maximum Marks: 18

1. Using simplex method solve the problem.
   $Max\ Z = 2x + 5x_2 + 7x_3.$
   $Subject\ to\ 3x_1 + 2x_2 + 4x_3 \leq 100$
   $X_1 + 4x_2 + 2x_3 \leq 100$
   $X_1 + x_2 + 3x_3 \leq 100, x_1 > ,0,\ \ x_2 > ,0. x_3 \geq 0.$
2. Solve the minimal assignment problem

Man → / Job ↓

	1	2	3	4
I	12	30	21	15
II	18	33	9	31
III	44	25	24	21
IV	23	30	28	14

3. Solve the cost minimizing assignment where cost matrix is given by

	m_1	m_2	m_3	m_4
J_1	2	5	7	9
J_2	4	9	10	1
J_3	7	3	5	8
J_4	8	2	4	9

(Section – B)

(Short Answer Questions)

Maximum Marks: 12

Note : Answer each question in 200 to 300 Words. All carry equal marks.

4. Explain Hungnrium method for assignment problem.
5. Solve the LPP Problem by graphical method.

$$Max\ Z = 8x_1 + 7x_2$$
$$Subject\ to\ 3x_1 + x_2 \leq 66000$$
$$x_1 + x_2 \leq 45000$$
$$x_2 \leq 20000$$
$$x_2 \leq 40000, x_1 \geq, o, x_1 \geq, O.$$

6. Write short notes.
   (i) Feasible solution
   (ii) Primal and Dual solution
   (iii) Optimization problem in two variables.
7. Show that $S = \{(x, y) :\ 3x^2 + 2y^2 \leq 5\}$ is convex set.