TAMIL NADU OPEN UNIVERSITY

Chennai – 600 015

Name of the School

HOME ASSIGNMENT

Programme Code	:	131
Programme Name	:	B.Sc., (Mathematics)
Course Code	:	**BMS 21**
Course Name	:	Groups and Rings
Batch	:	
No. of Assignment	:	04
Maximum CIA	:	15 Marks (Average of total no. of Assignments)

ASSIGNMENT-1

Max:15 Marks.

Answer any ONE of the following three questions.

1. (i) Prove that the union of two subgroups of a group G is a subgroup if and only if one is contained in the other.

   (ii) State and prove a necessary and sufficient condition for an ideal of a commutative ring with identity to be a prime ideal.

2. Prove that any Euclidean domain is a unique factorization domain.

3. State and prove the fundamental theorem of homomorphism on groups.

ASSIGNMENT-2

Max: __ Marks.

Answer any ONE of the following three questions:

1. (i) Define an equivalence relation and illustrate with an example.

   (ii) State and prove Lagrange's theorem.

2. Prove that every integral domain is a field.

3. (i) Prove that any Euclidean domain is a unique factorization domain.

   (ii) Define centre of a group and prove that the centre of a group G is a subgroup of G.

ASSIGNMENT-3

Max:15 Marks.

Answer any ONE of the following three questions.

1. State and prove a necessary and sufficient condition for an ideal of a commutative ring with identity to be a maximal ideal.

2. If G is a group then prove that

(i) The identity element of G is unique.

(ii) Every $a \in G$ has a unique inverse in G.

(iii) Every $a \in G$, $(a^{-1})^{-1} = a$.

(iv) For all $a, b \in G$, $(ab)^{-1} = b^{-1}a^{-1}$.

3. Prove that every integral domain can be embedded in a field.

ASSIGNMENT-4

Max:15 Marks.

Answer any ONE of the following three questions.

1. If R is a ring with unit element then for all $a, b \in R$, prove that

(i) a0=0a=0

(ii) a(–b)=(–a)b=–(ab)

(iii) (–a)(–b)=ab

(iv) (–1)a=–a

(v) (–1)(–1)=1.

2. **(**a)Prove that N is normal subgroup of G if and only if $gng^{-1} = N, \forall g \in G$.

(b) If ϕ is an homomorphism of G into $\bar{G}$, then prove that

(i) $\phi(e) = \bar{e}$, the unit element of $\bar{G}$.

(ii) $\phi(x^{-1}) = \phi(x)^{-1}$ for all $x \in G$.

3. State and Prove Cayley's theorem

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Name of the School

HOME ASSIGNMENT

Programme Code	: 131
Programme Name	: B.Sc., (Mathematics)
Course Code	: BMS22
Course Name	: **Statistics and Mechanics**
Batch	:
No. of Assignment	: 04
Maximum CIA	: 15 Marks (Average of total no. of Assignments)

ASSIGNMENT-1

Max:15 Marks.

Answer any ONE of the following three questions.

1. Fit a straight line to the following data.

x	0	1	2	3	4	5
f	3	8	11	14	16	18

2. A particle moves with an acceleration $\mu[3au^4 - 2(a^2 - b^2)u^5]$ and is projected from an apse at a distance (a+b) with a velocity $\frac{\sqrt{\mu}}{a+b}$. Prove that the equation of orbit is $r = a + b\cos\theta$.

3. The following are the gains in weights of rats fed on two different diets D_1 and D_2.

D_1: 25, 32, 30, 34, 24, 14, 32, 24, 30, 31, 35, 25

D_2: 44, 34, 22, 10, 47, 31, 40, 30, 32, 35, 18, 21, 35, 29, 22.

Test if the two diets differ significantly as regards their effect on increase in weights..

ASSIGNMENT-2

Max:15 Marks.

Answer any ONE of the following three questions:

1. Ten competitors in a beauty contest are ranked by two judges in the following order.

X	1	6	5	10	3	2	4	9	7	8
Y	6	4	9	8	1	2	3	10	5	7

On the basis of this taking, examine whether the judges have common tastes in beauty.

2. An elastic sphere is projected from a given point O with given velocity V at an inclination α to the horizontal and after hitting a smooth vertical wall at a distance 'd' from O returns to O. Prove that $d = \frac{V^2 sin2\alpha}{g} \frac{e}{1+e}$, where 'e' is the coefficient of restitution.

3. Find the rank correlation for the following data.

x	1	2	3	4	5	6	7	8	9	10
y	1	4	2	5	3	9	7	10	6	8

ASSIGNMENT-3

Max:15 Marks.

Answer any ONE of the following three questions.

1. (a) If $P(A) = a, P(B) = b, P(A \cap B) = c$.

Find $(i)\ P(\bar{A} \cap B)\ (ii) P(\bar{A} \cup \bar{B})\ (iii) P(\bar{A} \cap \bar{B})\ (iv) P(\bar{A} \cup B)$.

(b) State and prove Baye's theorem.

2. (a) A manufacturer of pins knows that $2\ \%$ of his products are defective.If he sells in boxes of 100 and guarantees that not more than 4 pins will be defective.What is the probability that a box will fail to meet the guaranteed quality ?

(b) X is a Normal Distribution with mean 30 and Standard Deviation 5.

Find $(i) P(X \geq 45)\ (ii) P(26 \leq X \leq 40)\ (iii) P(|X - 30| > 5)$.

3. A particle is projected with velocity $2\sqrt{ag}$ so that it just clear two walls of equal height a which are a distance 2a apart. Find the latus rectum of the path and the time of passing between the walls.

ASSIGNMENT-4

Max:15 Marks.

Answer any ONE of the following three questions.

1. (i) Find the rank correlation coefficient for the following data:

x	92	89	87	86	86	77	71	63	53	50
y	86	83	91	77	68	85	52	82	37	57

(ii) Let r denote the coefficient of correlation, then show that $-1 \leq r \leq 1$.

2. If the law of acceleration is $5\mu u^3 + 8\mu c^2 u^5$ and the particle is projected from an apse at a distance c with a velocity $\frac{3\sqrt{\mu}}{c}$. Prove that the equation of orbit is $r = c\cos\frac{2\theta}{3}$.

3. Show that the resultant motion of two S.H.M of same period along two perpendicular lines is along an ellipse.

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Name of the School

HOME ASSIGNMENT

Programme Code	:	131
Programme Name	:	B.Sc., (Mathematics)
Course Code	:	BMS23
Course Name	:	Classical Algebra and Numerical methods
Batch	:	
No. of Assignment	:	04
Maximum CIA	:	15 Marks (Average of total no. of Assignments)

ASSIGNMENT-1

Max:15 Marks.

Answer any ONE of the following three questions.

1. Solve by Gauss Seidal method

$8x - 3y + 2z = 20, \quad 4x + 11y - z = 33, \; 6x + 3y + 12z = 35$

2. (a) Find y_6 if $y_0 = 9,\ y_1 = 18,\ y_2 = 20,\ y_3 = 24,$ given that the third differences are constant.

(b) Using Newton's backward formula, find y when $x = 63$, given that

x	45	50	55	60	65
y	114.84	96.16	83.32	74.48	68.48

3. Compute y(0.2) given $\frac{dy}{dx} + y + xy^2 = 0,\ y(0) = 1$ by taking h=0.1 using R.K. method of fourth order(correct to four decimals).

ASSIGNMENT-2

Max:15 Marks.

Answer any ONE of the following three questions:

1. (i) If a, b, c are positive quantities, then show that

$$(a + b + c)\left(\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right) \geq 9.$$

(ii) Use Newton – Raphson method to obtain a root correct to three decimal places of the equation $x^3 + 3x^2 - 3 = 0$.

2. (i) Show that the sum of the ninth powers of the roots of the equation $x^3 + 3x + 9 = 0$ is zero.

(ii) Obtain a root, correct to three decimal places, for the equation $x^3 - 4x - 9 = 0$ using the bisection method.

3. Find the sum to n terms of the series $\frac{1}{1.2.3} + \frac{1}{2.3.4} + \frac{1}{3.4.5} + \cdots$

ASSIGNMENT-3

Max:15 Marks.

Answer any ONE of the following three questions.

1. Given

θ	0^0	5^0	10^0	15^0	20^0	25^0	30^0
tan θ	0	0.0875	0.1763	0.2679	0.3640	0.4663	0.5774

Using Stirling's formula to find the value of $\tan 16^0$

2(i) Derive Lagrange's interpolation formulae.

(ii) Find the positive root of $f(x) = e^x - 2x - 1$ by Newton-Raphson method.

3. Apply Lagrange's formula inversely to find a root of the equation $f(x) = 0$, when $f(30) = -30,\ f(34) = -13,\ f(38) = 3,\ f(42) = 18.$

ASSIGNMENT-4

Max:15 Marks.

Answer any ONE of the following three questions.

1. By means of Lagrange's formula, Prove the following:

(i) $y_1 = y_3 - 0.5(y_5 - y_{-3}) + 0.2(y_3 - y_{-5})$

(ii) $y_0 = \frac{1}{2}(y_1 + y_{-1}) - \frac{1}{8}\left[\frac{1}{2}(y_3 - y_1) - \frac{1}{2}(y_{-1} - y_{-3})\right]$

2. Sum the series $\frac{5}{3.6} + \frac{5.7}{3.6.9} + \frac{5.7.9}{3.6.9.12} + \ldots$

3. (i) Solve the equation $6x^5 - x^4 - 43x^3 + 43x^2 + x - 6 = 0$.

(ii) Determine the positive root of $x^3 + x^2 + x - 100 = 0$ by inverse interpolation.
