TAMIL NADU OPEN UNIVERSITY

Chennai-25.

B.Sc Maths – Second Year

HOME ASSIGNMENT

Programme Code No	**: 131**
Programme Name	**: B.Sc (Maths)**
Course Code & Name	**: BMS23 & CLASSICAL ALGEBRA AND NUMERICAL METHODS**
Batch	**: AY2020-2021**
No. of Assignment	**: 03**
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. Solve the following system of equations by Gauss-Seidal Method:
   $10x + 2y + z = 9$, $2x + 20y - 2z = -44$, $-2x + 3y + 10z = 22$
2. Obtain a root to three correct decimal places for the equation $x^3 - 4x - 9 = 0$ using the bisection method.
3. Show that the sum of the ninth powers of the roots of the equation $x^3 + 3x + 9 = 0$ is zero.

ASSIGNMENT -2

Max: 15 Marks

Answer any ONE of the following three questions.

1. Find the values of a for which $ax^3 - 9x^2 + 12x - 5 = 0$ has equal roots and solve the equation in one case.
2. Solve the following system of equations by Gauss – Seidal Method: $10x + 2y + z = 9$, $2x + 20y - 2z = -44$, $-2x + 3y + 10z = 22$.
3. Solve the equation $6x^5 - x^4 - 43x^3 + 43x^2 + x - 6 = 0$.

ASSIGNMENT -3

Max: 15 Marks

Answer any ONE of the following three questions.

1. Use Newton – Raphson method to obtain a root correct to three decimal places of the equation $x^3 + 3x^2 - 3 = 0$.
2. Solve, by Euler's method, the equation

   $$\frac{dy}{dx} = x + y \text{ and } y(0) = 0.$$

   Choose h = 0.2 and computer y (0.4) and y (0.6).
3. Derive Largrange's formula for interpolation.

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HOME ASSIGNMENT

Programme Code No	**: 131**
Programme Name	**: B.Sc (Maths)**
Course Code & Name	**: BMS-21 & GROUPS AND RINGS**
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) Define a cyclic group, give an example and prove that a subgroup of a cyclic group is cyclic.
   (ii) State and prove a necessary and sufficient condition for an ideal of a commutative ring with identity to be a maximal ideal.
2. (i) State and prove Cayley's theorem.
   (ii) Prove that any Euclidean domain is a unique factorization domain
3. (i) List the elements of S_3 and show that S_n contains n! elements.
   (ii) Define an Integral domain and prove that any field F is an integral domain. What about the converse? Justify

ASSIGNMENT -2

Max: 15 Marks

Answer any ONE of the following three questions.

1. State and Prove Fundamental theorem of homomorphism.
2. (i) Show that the Gaussian ring $Z[i] = \{a + bi / a, b \in Z\}$ is an Euclidean domain.
   (ii) State and prove Lagrange's theorem.
3. (i) Define Ordered integral domain. State and prove two of its properties.
   (ii) Let A and B be two subgroups of a group G. Prove that AB is a subgroup of G if and only if AB = BA.

ASSIGNMENT -3

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.
   (vi) a0=0a=0

2. Prove that every integral domain can be embedded in a field.
3. State and prove unique factorization theorem on Euclidean rings.

ASSIGNMENT -4

Max: 15 Marks

Answer any ONE of the following three questions.

1. (i) Prove that N is normal subgroup of G if and only if $gng^{-1} = N, \forall g \in G$.
   (ii) If ϕ is an homomorphism of G into $\bar{G}$, then prove that
   (a) $\phi(e) = \bar{e}$, the unit element of $\bar{G}$.
   (b) $\phi(x^{-1}) = \phi(x)^{-1}$ for all $x \in G$.
2. (i) Show that the Gaussian ring Z[i] = {a + bi/ a, b∈Z} is an Euclidean domain.
   (ii) If A_n is a alternating group of n symbols and S_n is a symmetric group of n symbols, prove that A_n is a normal subgroup of S_n and A_n contains $\frac{n!}{2}$elements.
3. 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 $a, b \in G$, $(ab)^{-1} = b^{-1}a^{-1}$.

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B.Sc Maths – Second Year

HOME ASSIGNMENT

Programme Code No	**: 131**
Programme Name	**: B.Sc (Maths)**
Course Code & Name	**: BMS22 & STATISTICS AND MECHANICS**
Batch	**: AY2020-2021**
No. of Assignment	**: 03**
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. Find the coefficient of rank correlation for the following data which shows the heights a sample of 12 fathers and their sons.

Height of Father	65	63	67	64	68	62	70	66	68	67	69	71
Height of Son	68	66	68	65	69	66	68	65	71	67	68	70

2. 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.

3. A particle falls from a height h upon a fixed horizontal plane. If e be the coefficient of restitution. Show that the whole distance described below the particle has finished rebounding is $h\left(\frac{1+e^2}{1-e^2}\right)$.

ASSIGNMENT -2

Max: 15 Marks

Answer any ONE of the following three questions.

1. Compute the coefficient of correlation between the variables X and Y given below

X	1	3	5	6	7	8	10	12
Y	1	2	3	5	6	9	11	13

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. Calculate Index Numbers of food grains production for the years 1980-81, and 1981-82 with base 1979-80=100 from the following data:

Food grains	Weight	Production (million tones)		
		1979-80	1980-81	1981-82
Rice	34	42	53	54
Wheat	12	29	32	35
Jowar	5	11	12	12
Bajra	3	6	5	6
Other cereals	6	11	12	13
Pulses	10	10	11	12

ASSIGNMENT -3

Max: 15 Marks

Answer any ONE of the following three questions.

1. State and prove Baye's theorem .
2. Show that the resultant motion of two simple harmonic motions of same period along two perpendicular lines, is along an ellipse.
3. You are given the population figures of India as follows:

Census Year(X)	1911	1921	1931	1941	1951	1961	1971
Population (in crores)	25.0	25.1	27.9	31.9	36.1	43.9	54.7

Fit an exponential trend $Y = ab^X$ to the above data by the method of least squares and find the trend values. Estimate the population in 1981.