DEPARTMENT OF MATHEMATICS

UNIT TEST 1
Subject : Transform Techniques

Class : II B.Sc. Maths

Max.Marks : 25

Date :11/1/23

Sub. Code:SM24A

PART A (5 ×2 =10 Marks)
Answer any FIVE questions

1. Define Laplace Transform
2. Write the sufficient condition for Laplace transform
3. Give the formula for $L\{e^{at}\}$
4. What is $L\{sinhat\}$
5. Mention the formula for $L\{1\}$
6. Expand $L\{cosat\}$
7. What is laplace transform of periodic function

PART B (5 ×1 = 5 Marks)
Answer any ONE question

8. Prove that $L[\text{sinhat}] = a\backslash s^2 - a^2$
9. State and prove linearity property.

PART C (10× 1 = 10 Marks)
Answer any ONE question

10. Prove that the sufficient condition for laplace transform.
11. a) $L[f'(t)] = sL[f(t)] - f(0)$.
    b) Prove that $L[\text{cosat}] = s\backslash s^2 + a^2$.

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DEPARTMENT OF MATHEMATICS

UNIT TEST 1
Subject : Statics

Class :II B.Sc Mathematics
Max.Marks :25

Date : 12/1/2023
Sub. Code: SM24B

PART A ($5 \times 2 = 10$ Marks)
Answer any FIVE questions

1. Define Force
2. Mention the types of force
3. What is Tension?
4. Resultant of two forces on a particle
5. If the resultant of two forces 3p, 5p is equal to 7p. Find angle between the forces
6. Define Gravitational force.
7. What is Linear momentum.

PART B – ($5 \times 1 = 5$ Marks)
Answer any ONE question

1. State laws of friction
2. To find the magnitude and direction of the resultant of F_1 and F_2.

PART C – ($1 \times 10 = 10$ Marks)
Answer ONE question

1. The magnitude of the resultant of 2 given forces P and Q is R. If Q is doubled the R is doubled, if Q is reversed, then R is doubled. Shows that P:Q:R = $\sqrt{2}:\sqrt{3}:\sqrt{2}$.
2. Three forces acting at a point are parallel to the sides of a triangle ABC, taken in order and in magnitude they are proportional to the cosines of the opposite angles. Show that the magnitude of their resultant is proportional to $\sqrt{1 - 8\cos A \cos B \cos C}$.

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DEPARTMENT OF MATHEMATICS

UNIT TEST 1

Subject : Mathematical Statistics 2

Class : II B.Sc Maths   Date :18/01/2023

Max.Marks : 25   Sub. Code:

PART A (5 ×2 =10 Marks)
Answer any FIVE questions

1. Define Population.
2. Explain Sampling theory
3. What is Chi square Distribution
4. Define T distribution
5. Explain Estimation
6. Define Unbiased Estimation
7. What is Efficient estimation
8. Explain F distibution

PART B – (5 ×1 = 5 Marks)
Answer any ONE question

9. Derive student t distribution.
10. State and prove chi square distribution.

PART C – (10× 1 = 10 Marks)
Answer any ONE question

11. Explain Sampling theory
12. Derive F distribution.

DEPARTMENT OF MATHEMATICS
UNIT TEST - I
Subject: Algebraic structure - II

Class : III B.Sc (Mathematics)　　　　　Date:09/01/2023

Max. Marks:25　　　　　　　　　　　Sub. Code: SM26A

PART A (5 × 2 = 10 Marks)
Answer any five questions

1. Define Vector Space
2. Write the Definition for Subspace
3. Let $V = \{a + b\sqrt{2}, a, b \in Q\}$. then V is a vector space over Q under addition and multiplication.
4. Let V be a vector space over a field F then (i) $\alpha 0 = 0 \; for \; all \; \alpha \in F$ (ii) $0v = 0$ for all $v \in V$.
5. What are all the properties should be satisfied for a subspace
6. Give any one example for vector space
7. Give any one example for Subspace and comment your answer

PART B – (1 × 5 = 5 Marks)
Answer any one question

8. $R \times R$ is a vector space over R under addition and scalar multiplication defined by $(x_1, x_2) + (y_1, y_2) = (x_1 + y_1, x_2 + y_2)$ and $\alpha(x_1, x_2) = (\alpha x_1, \alpha x_2)$
9. Prove that C is a vector space over the field F

PART C – (1 × 10 = 10 Marks)
Answer any one question

10. Let V be a vector space over a field F. A non empty subset W of V is a subspace of V if and only if $u, v \in W$ and $\alpha, \beta \in F$ then $\alpha u + \beta v \in W$.
11. Prove that R is a vector space over C

DEPARTMENT OF MATHEMATICS
UNIT TEST 1
Subject: Real Analysis II

Class: III B. Sc., Maths.

Max. Marks: 25

Date: 10.01.23

Sub. Code: SM26B

PART A (5 × 2 =10 Marks)
Answer any FIVE questions

1. What is meant by open sets?
2. Define closed sets with example.
3. Explain the term: $\in$ −dense sets.
4. Define contraction mapping.
5. Explain type F_σ.
6. What is meant by homeomorphism?
7. Define the term nowhere dense set.

PART B – (5 × 1 = 5 Marks)
Answer any ONE question

8. If G_1 and G_2 are open subsets of a metric space M then $G_1 \cap G_2$ is also open.
9. If the subset A of metric space $< M, \rho >>$ is totally bounded then A is bounded.

PART C – (10× 1 = 10 Marks)
Answer any ONE question

10. Let $f: R \to R$ and $a\epsilon R$, then
    a) If f is continuous at a then $\omega[f; a] = 0$
    b) If f is not continuous at a then $\omega[f; a] > 0$
11. State and prove Picard's fixed point theorem.

DEPARTMENT OF MATHEMATICS
UNIT -I
Subject : Complex Analysis

Class   : III BSC(MATHS)   Date: 11.01.2023-FN

Max.Marks: 25   Sub. Code: SM26C

PART A ($5 \times 2 = 10$ Marks)
Answer any FIVE questions

1. Write polar form of C – R equations.
2. Find the constant ' a ' so that $u(x, y) = ax^2 - y^2 + xy$ is harmonic.
3. Define Analytic function.
4. Write the definition of Harmonic function.
5. If $f(z) = z^2$ at any point z, find $f'(z)$.
6. When do you say $w = f(z)$ is a conformal mapping.
7. Define limit of a function .

PART B ($1 \times 5 = 5$ Marks)
Answer any ONE question

8. Show that the function $u = x^3 + x^2 - 3xy^2 + 2xy - y^2$ is harmonic and find the corresponding analytic function $f(z) = u+iv$.

9. Show that an analytic function with constant modulus is constant.

PART C ($1 \times 10 = 10$ Marks)
Answer any ONE question

10. Derive C-R eqn. in Cartesian form.

11. Find the analytic func. $F(z) = u + iv$

$$\text{if } u+iv = \frac{sin2x}{cosh2y - cos2x.}$$

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25 YEARS IN EDUCATION

DEPARTMENT OF MATHEMATICS

UNIT TEST - I
Subject: Operations Research

Class : III B.Sc Mathematics   Date:18.01.23

Max.Marks: 25   Sub. Code:

PART A (5 × 2 = 10 Marks)
Answer any FIVE questions

1. Define: Basic feasible solution.
2. Write a mathematical formulation of a transportation problem.
3. Give a short note about sequencing problem.
4. What do you mean by idle time?
5. If 5 jobs are processed through 2 machines, find the number of possible sequence.
6. What do you mean by unbalanced assignment problem?
7. Define degenerate basic feasible solution in the transportation problem.

PART B – (5 × 1 = 5 Marks)
Answer any ONE question

8. Solve the following assignment problem.

Jobs\Mans	I	II	III	IV	V
A	11	17	8	16	20
B	9	7	12	6	15
C	13	16	15	12	16
D	21	24	17	28	26
E	14	10	12	11	13

9. Solve the following transportation problem by north west corner method.

	P	Q	R	Supply
A	16	19	12	14
B	22	13	19	16
C	14	28	8	12
Demand	10	15	17	

PART C – (10 × 1 = 10 Marks)
Answer any ONE question

10. Solve the following sequencing problem.

Jobs\Mach	A	B	C	D	E	F
Machine I	3	12	5	2	9	11
Machine II	8	6	4	6	3	1
Machine III	13	14	9	12	8	13

11. Solve the following game graphically.

Player A

Player B $\begin{pmatrix} 1 & 0 & 4 & -1 \\ -1 & 1 & -2 & 5 \end{pmatrix}$