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**Action Taken Report for Slow
and Advance Learners**

Department of Mathematics

Action Taken Report for Slow and Advanced Learners

Session: 22231

1. Faculty Name: Dr. Shelly Garg

a. Course Name (Course Code): Group Theory-I (MTH222)

Action taken for Slow Learners

1. Assignment was given.
2. Provided links of video lectures for better understanding.

Action taken for Advanced Learners

1. Assignment was given.
2. Discussed advanced problems related to the subject concern.
3. Motivated for online courses related to the subject.
4. Online NPTEL video lectures are provided to them.

Assignment for slow Learners

Q. No.	Question	CO Mapped	RBT Level
1	Let $f: (\mathbb{Z}, +) \rightarrow (4\mathbb{Z}, +)$ be defined by $f(x) = 4x$. Prove that f is a group isomorphism.	CO4	L3
2	Prove that homomorphic image of an abelian group is abelian.	CO4	L3
3	Let $f: G \rightarrow G'$ be a group homomorphism. Prove that $\ker f$ is a normal subgroup of G .	CO4	L3

Assignment for Advance Learners

Q. No.	Question	CO Mapped	RBT Level
1	Prove that homomorphic image of a finite group is finite.	CO4	L3
2	Prove that every infinite cyclic group is isomorphic to \mathbb{Z} .	CO4	L5
3	Let G be the group of real numbers under addition. Show that $\theta: G \rightarrow G$ such that $\theta(x) = [x]$ is not a homomorphism, where $[x]$ is the greatest integer function.	CO4	L4

Course Outcomes (COs): After successfully completing this course the students will be able to
CO1: To recognize the mathematical objects called groups.
CO2: To understand the concept of Cyclic Groups and to learn cyclic notation for permutations and its types.
CO3: To explain the significance of the notions of cosets, normal subgroups, and factor groups and to learn Lagrange's theorem and its consequences.
CO4: Describe about structure preserving maps between groups and their consequences.

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
	L1	L2	L3	L4	L5	L6
RBT Level No.						
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

Faculty Name: Dr. Shelly Garg

b. Course Name (Course Code): Mathematics for Chemists II (MTH260A)

Action taken for Slow Learners

No slow learner in class.

Action taken for Advanced Learners

1. Assignment was given.
2. Motivated for online courses related to the subject.
3. Discussed advanced problems related to the subject.

Assignment for Advance Learners

Q. No.	Question	CO Mapped	RBT Level
1	Evaluate $\int \frac{3x}{1+2x^4} dx$	CO4	L3
2	Evaluate $\int \frac{x^2}{\sqrt{x^6+a^6}} dx$	CO4	L5
3	Evaluate the integral $\int \sqrt{\frac{a+x}{a-x}} dx$	CO4	L5
4	Evaluate the integral $\int x^3 \sqrt{3+x^4} dx$	CO4	L3
5	Evaluate the integral $\int \frac{x+2}{2x^2+6x+5} dx$	CO4	L5

6	Evaluate $\int \frac{x^3}{(x-1)(x-2)} dx$	CO4	L4
7	Evaluate $\int \frac{1}{(x-3)\sqrt{x+1}} dx$	CO4	L3

Course Outcomes (COs): After successfully completing this course the students will be able to
CO1: Learn the concept of domain and range of a function and the concepts of limit and continuity
CO2: Learn different formulas to find derivative of a given function
CO3: Applications of derivatives like to identify increasing/ decreasing functions, maxima/minima of functions, Rolle's, Lagrange's and Mean Value Theorems etc.
CO4: Different methods to find integration, definite integrals

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
	L1	L2	L3	L4	L5	L6
RBT Level No.						
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

Shelly Kearney
10/11/12

Department of Mechanical Engineering
Action Taken Report for Slow and Advanced Learners

1. Faculty Name: Vipin Bansal

a. Course Name (Course Code): MEC309B

Action taken for Slow Learners

1. Encouraging the students to study by academic and personal counseling.
2. Remedial classes are conducted to improve the academic performance

Student Name	Regd. No.	12/11	19/11	26/11	02/12	03/12
Munish	12100856	P	P	P	P	P
Darkan	12000438	P	P	P	P	P
Mandeep	12101348	P	P	P	P	P

All the students were able to pass the exam.

Action taken for Advanced Learners

1. Nil (No advanced learner)

b. Course Name: MEC103

Action taken for Slow Learners

1. Encouraging the students to study through academic and personal counseling.
2. Remedial classes are conducted to improve the academic performance

Action taken for Advanced Learners

1. They are given access to additional learning and reference material.

Fast Learner

Student Name	Regd. No.	Action Taken
ANIKET TANEJA	12200351	Handouts were provided to Aniket to solve the higher-order difficulty questions.

Slow Learner

Name of Student	Roll No	19/11	26/11	02/12	03/12
ROHIT	12200070	P	P	P	P
VIVEK	12200086	P	P	A	A
DHIRAJ PAL	12200112	A	P	P	P
KARTIC SHARMA	12200164	P	P	P	P
BALJIT KAUR	12200238	P	A	P	P
AKASH	12200267	P	P	P	P
ASHISH	12200305	P	P	P	P
CHIRAG NARULA	12200498	A	A	A	A
ARSH	12201296	A	P	P	P
AKASH SINGH	12200108	A	A	P	P
PRATAP SINGH	12200148	P	P	P	P
SALISH KUMAR	12200185	P	P	P	P
AMRIK SINGH	12200252	P	P	A	P
SHWETA THAKUR	12200339	P	P	P	P
SHIVAM	12201084	p	P	A	P

Department of Mechanical Engineers
Action Taken Report for Slow and Advanced Learners

2. Faculty Name Mohinder Pal Garg

c. Course Name (Course Code): **Robotics and Automation (MEC 461B)**

Action taken for Slow Learners

1. Conduct of extra classes for the students
2. Student Counselling to devote more time
3. Hand written notes were also given. Links of NPTEL lectures are also shared.

Action taken for Advanced Learners

1. Students are advised to prepare for GATE and other competitive exams.

d. Course Name (Course Code): **Heat Transfer (MEC 303B)**

Action taken for Slow Learners

1. Student Counselling to devote more time
2. Conduct of extra classes for the students OM 11/10, 18/10, 1/11
3. Hand written notes were also given.

Action taken for Advanced Learners: NIL: No advanced learner

e. Course Name: **Manufacturing Processes (MEC209)**

Action taken for Slow Learners

1. Conduct of extra classes for the students
2. Student Counselling to devote more time
3. Hand written notes were also given.

Action taken for Advanced Learners

1. Student motivated to Develop analytical skills.
2. Advised to keep an eye on current affairs.

*Attendance of conduct of extra classes is in the attendance register.

Department of Mechanical Engineering
Action Taken Report for Slow and Advanced Learners

3. Faculty Name Harish Kumar Garg

f. Course Name Mechanics of Solids-I (MEC207)

Action taken for Slow Learners

1. Extra Classes Taken
2. Important questions notes are given
3. Counselling to devote time on studies.

Action taken for Advanced Learners

1. Advise to solve numerical problems from other books
2. Notes given on selected topics.
3. Motivated to prepare for GATE

g. Course Name Design of Machine Elements (MEC307B)

Action taken for Slow Learners

1. Took extra classes
2. Important questions marked

Action taken for Advanced Learners

1. Extra advance books given
2. Organized doubt session.

h. Course Name Engineering Drawing (MEC101A)

Action taken for Slow Learners

1. Took extra classes for students joined late.
2. Important questions and ppts shared
3. Personal interaction

Action taken for Advanced Learners

1. Extra advance problems given
2. Organized doubt session.

Department of Mechanical Engineering
Action Taken Report for Slow and Advanced Learners

4. Faculty Name: Dr Sharanjit Singh

i. Engineering materials and metallurgy (MEC210)

Action taken for Slow Learners

1. Ask for case studies/Presentations on simple topics
2. Revision of topics

Action taken for Advanced Learners

1. Ask for case studies/Presentations

j. Machine Drawing (MEC211A)

Action taken for Slow Learners

1. Ask for case simple Drawings
2. Revision of topics

Action taken for Advanced Learners

1. Ask for assembly drawings

k. Flexible Manufacturing Systems (MEC424A)

Action taken for Slow Learners

1. Ask for case studies/Presentations on simple topics
2. Revision of topics

Action taken for Advanced Learners

1. Ask for case studies/Presentations

Department of Mechanical Engineering
Action Taken Report for Slow and Advanced Learners

1. Faculty Name: Sumit Nijjar

a. Course Name: Kinematics of Machines: MEC201

Action taken for Slow Learners

1. Revision of Topics.
2. Encouragement to study by academic and personal counselling.

Action taken for Advanced Learners

1. Guided to study from reference books too.
2. Motivated to prepare for state and national level engineering tests (IES, SDO, JE)

b. Course Name: Non-Conventional Machining Processes: MEC308B

Action taken for Slow Learners

1. Student counselled to devote more time to studies.
2. Revision of the topics.

Action taken for Advanced Learners

1. Motivated to work hard for GATE exam.
2. Suggested about reference books for keen study.

c. Course Name: Maintenance and Reliability: MEC451

Action taken for Slow Learners

1. Advised to go through NPTEL lectures.
2. Revision of the topics.

Action taken for Advanced Learners

1. Motivated to work hard for GATE exam.
2. Advised to plan the future in field of interest and start working on it.

Department of Mechanical Engineering
Action Taken Report for Slow and Advanced Learners

2. Faculty Name: Er Ved Raj Khullar

d. Course Name (Course Code) **Mechanics of Fluids (MEC306B)**

Action taken for Slow Learners

1. Extra classes
2. Class doubt session
3. Personal counseling

Name of Student	Roll No	21/10 /22	25/10 /22	26/10 /22	4/11 /22	5/11/ 22
CHIRAG	12000595	P	P	P	P	P
VIKAS	12000202	P	P	P	P	P
SUKHRAJ SINGH	12000408	P	P	P	P	P
CHAITANYA VASUDEVA	12000422	P	P	P	P	P
JASPREET BANSAL	12100854	P	P	P	P	P
MUNISH BHATIA	12100856	P	P	P	P	P
MANDEEP SINGH	12101348	P	P	P	P	P

Action taken for Advanced Learners

- * Extra books for numerical
- * Encouraged to prepare for GATE

b. Course Name (Course Code) Applied Thermodynamics (MEC208)

Action taken for Slow Learners

- Remedial classes
- Provide handwritten notes
- Motivate to study hard and read basic books

Name of Student	Roll No	27/10/22	28/10/22	02/11/22	04/11/22	10/11/22	02/12/22
LOVEPREET	12100022	P	P	P	P	P	P
VAIBHAV MANHAS	12100056	P	P	P	P	P	P
AYANESH CHAUHAN	12100184	P	P	P	P	P	P
RAHUL CHOUDHARY	12100049	P	P	P	P	P	P
SAMEER	12100220	P	P	P	P	P	P
AVTAR SINGH	12100247	P	P	P	P	P	P
DAVINDER SINGH	12100366	P	P	P	P	P	P
GAURAV SHARMA	12100401	P	P	P	P	P	P
NIXANDEEP SAINI	12100484	P	P	P	P	P	P
ANIKET JAKHU	12100650	P	P	P	P	P	P
AMNINDER SINGH	12101265	P	P	P	P	P	P

Action taken for Advanced Learners

- Motivate to attend Workshop.
- Provide Advance Lecture Video
- Motivate to crack GATE Exam

Department of Mechanical Engineering
Action Taken Report for Slow and Advanced Learners

1. Faculty Name: Vipin Bansal

a. Course Name (Course Code): MEC309B

Action taken for Slow Learners

1. Encouraging the students to study by academic and personal counseling.
2. Remedial classes are conducted to improve the academic performance

Student Name	Regd. No.	12/11	19/11	26/11	02/12	03/12
Munish	12100856	P	P	P	P	P
Darkan	12000438	P	P	P	P	P
Mandeep	12101348	P	P	P	P	P

All the students were able to pass the exam.

Action taken for Advanced Learners

1. Nil (No advanced learner)

b. Course Name: MEC103

Action taken for Slow Learners

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Action taken for Advanced Learners

1. They are given access to additional learning and reference material.

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SHIVAM	12201084	p	P	A	P

Department of Mechanical Engineers
Action Taken Report for Slow and Advanced Learners

2. Faculty Name Mohinder Pal Garg

c. Course Name (Course Code): **Robotics and Automation (MEC 461B)**

Action taken for Slow Learners

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3. Hand written notes were also given. Links of NPTEL lectures are also shared.

Action taken for Advanced Learners

1. Students are advised to prepare for GATE and other competitive exams.

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Action taken for Advanced Learners: NIL: No advanced learner

e. Course Name: **Manufacturing Processes (MEC209)**

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Department of Mechanical Engineering
Action Taken Report for Slow and Advanced Learners

3. Faculty Name Harish Kumar Garg

f. Course Name Mechanics of Solids-I (MEC207)

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3. Motivated to prepare for GATE

g. Course Name Design of Machine Elements (MEC307B)

Action taken for Slow Learners

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2. Important questions marked

Action taken for Advanced Learners

1. Extra advance books given
2. Organized doubt session.

h. Course Name Engineering Drawing (MEC101A)

Action taken for Slow Learners

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2. Important questions and ppts shared
3. Personal interaction

Action taken for Advanced Learners

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2. Organized doubt session.

Department of Mechanical Engineering
Action Taken Report for Slow and Advanced Learners

4. Faculty Name: Dr Sharanjit Singh

i. Engineering materials and metallurgy (MEC210)

Action taken for Slow Learners

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2. Revision of topics

Action taken for Advanced Learners

1. Ask for case studies/Presentations

j. Machine Drawing (MEC211A)

Action taken for Slow Learners

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Action taken for Advanced Learners

1. Ask for assembly drawings

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Action taken for Slow Learners

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2. Revision of topics

Action taken for Advanced Learners

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Department of Mechanical Engineering
Action Taken Report for Slow and Advanced Learners

1. Faculty Name: Sumit Nijjar

a. Course Name: Kinematics of Machines: MEC201

Action taken for Slow Learners

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b. Course Name: Non-Conventional Machining Processes: MEC308B

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c. Course Name: Maintenance and Reliability: MEC451

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2. Revision of the topics.

Action taken for Advanced Learners

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2. Advised to plan the future in field of interest and start working on it.

Department of Mechanical Engineering
Action Taken Report for Slow and Advanced Learners

2. Faculty Name: Er Ved Raj Khullar

d. Course Name (Course Code) **Mechanics of Fluids (MEC306B)**

Action taken for Slow Learners

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2. Class doubt session
3. Personal counseling

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VIKAS	12000202	P	P	P	P	P
SUKHRAJ SINGH	12000408	P	P	P	P	P
CHAITANYA VASUDEVA	12000422	P	P	P	P	P
JASPREET BANSAL	12100854	P	P	P	P	P
MUNISH BHATIA	12100856	P	P	P	P	P
MANDEEP SINGH	12101348	P	P	P	P	P

Action taken for Advanced Learners

- * Extra books for numerical
- * Encouraged to prepare for GATE

b. Course Name (Course Code) Applied Thermodynamics (MEC208)

Action taken for Slow Learners

- Remedial classes
- Provide handwritten notes
- Motivate to study hard and read basic books

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VAIBHAV MANHAS	12100056	P	P	P	P	P	P
AYANESH CHAUHAN	12100184	P	P	P	P	P	P
RAHUL CHOUDHARY	12100049	P	P	P	P	P	P
SAMEER	12100220	P	P	P	P	P	P
AVTAR SINGH	12100247	P	P	P	P	P	P
DAVINDER SINGH	12100366	P	P	P	P	P	P
GAURAV SHARMA	12100401	P	P	P	P	P	P
NIXANDEEP SAINI	12100484	P	P	P	P	P	P
ANIKET JAKHU	12100650	P	P	P	P	P	P
AMNINDER SINGH	12101265	P	P	P	P	P	P

Action taken for Advanced Learners

- Motivate to attend Workshop.
- Provide Advance Lecture Video
- Motivate to crack GATE Exam

Department of Mathematics
Action Taken Report for Slow and Advanced Learners

1. Faculty Name: Dr. Raj Kumar

a. Course Name (Course Code): Linear Algebra (MTH553)

Action taken for Slow Learners

1. Assignment based upon fundamental concepts was given.
(See Assignment-1 below)
2. Provided links of video lectures for the related topics for better understanding.

<https://www.youtube.com/watch?v=kZwSqZuBMGg>

https://www.youtube.com/watch?v=ceIUu5aY6_Q

3. Arranged special doubt clearing classes.

Action taken for Advanced Learners

1. Assignment based upon questions of CSIR-NET was given.
(See Assignment-1I below)
2. Applications of linear algebra in machine learning, Online video lectures are provided to them and whose links are as follows:

https://www.youtube.com/watch?v=Qc19jQWHdL0&list=PLRDI2inPrWQW1QSWhBU0ki-jq_uElkh2a

Assignment-I (Slow Learners)					
Subject Name	Linear Algebra			Subject Code	MTH553
Faculty Name	Dr. Raj Kumar	Date of Issue	1-Dec-2022	Date of Submission	10-Dec-2022

Q.1 Which of the following is (are) vector subspace(s) of their corresponding vector spaces.

(i) The set of all solutions of the homogeneous system of linear equations.

(ii) The set continuous functions and solutions of the differential equation $2 \frac{d^2y}{dx^2} - 9 \frac{dy}{dx} + 2y = 0$.

(iii) The set $W = \{(a, b) : a^2 = b^2; a, b \in R\}$.

Q.2 Prove that Characteristic and Minimal polynomials of a matrix A have same roots.

Q.3 Any orthogonal set of non-zero vectors in an inner product space V is linearly Independent.

Q.4 Find the minimal polynomial for the real matrix $\begin{bmatrix} 4 & 3 & 0 \\ 2 & 1 & 0 \\ 5 & 7 & 9 \end{bmatrix}$.

Assignment-II (Advanced Learners)					
Subject Name	Linear Algebra			Subject Code	MTH553
Faculty Name	Dr. Raj Kumar	Date of Issue	1-Dec-2022	Date of Submission	10-Dec-2022

Q.1 Show that a necessary and sufficient condition that a linear transformation T on a unitary space be $\hat{0}$ is that $\langle Ta, a \rangle = 0, \forall a \in V$

Q.2 Prove that every complete orthonormal set in a finite dimensional inner product space V forms a basis for V .

Q.3 Discuss about dual space of a vector space.

Q.4 Discuss in details about self-adjoint operators.

b. Course Name (Course Code) : Real Analysis (MTH229)

Action taken for Slow Learners

1. Assignment based upon fundamental concepts was given.
(See Assignment-1 below)
2. Provided links of video lectures for the related topics for better understanding.
<https://youtu.be/u7cBLb0b7pk>
3. Arranged special doubt clearing classes.

Action taken for Advanced Learners

1. Assignment based upon questions of IIT-JAM was given.
(See Assignment-1I below)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/u7cBLb0b7pk>

Assignment-1 (Slow Learners)					
Subject Name	Real Analysis			Subject Code	MTH229
Faculty Name	Dr. Raj Kumar	Date of Issue	26-Nov-2022	Date of Submission	02-Dec-2022

Q.1 Discuss about derived set of a set.

Q.2 What you understand by open set.

Q.3 Show that $\sqrt{8}$ is not a rational number.

Q.4 Discuss about limit points of the set of rational numbers.

Assignment-II (Advanced Learners)					
Subject Name	Real Analysis			Subject Code	MTH229
Faculty Name	Dr, Raj Kumar	Date of Issue	26-Nov-2022	Date of Submission	02-Dec-2022

- Q.1** Discuss about countable-uncountable sets.
- Q.2** Discuss about convergence of a series of positive terms.
- Q.3** Discuss in details about ϵ, δ definition.
- Q.4** Discuss about limit points of the set of rational numbers.

c. Course Name (Course Code): Integral Transforms and Complex Analysis (MTH351A)

Action taken for Slow Learners

1. Assignment based upon fundamental concepts was given.
(See Assignment-1 below)
2. Provided links of video lectures for the related topics for better understanding.

https://www.youtube.com/watch?v=KqokoYr_h1A

3. Arranged special doubt clearing classes.

Action taken for Advanced Learners

1. Advanced Assignment given to them.
(See Assignment-II below)
2. Given a presentation on the topic complex numbers
Links are as follows:

<https://www.youtube.com/watch?v=T647CGsuOVU>

Assignment-1 (Slow Learners)					
Subject Name	Integral Transforms and Complex Analysis			Subject Code	MTH351A
Faculty Name	Dr. Raj Kumar	Date of Issue	26-Nov-2022	Date of Submission	02-Dec-2022

Q.1 Find $L\{f(t)\} = \begin{cases} \sin\left(t - \frac{\pi}{3}\right) & t > \frac{\pi}{3} \\ 0 & t < \frac{\pi}{3} \end{cases}$

Q.2 Find $L \left\{ \frac{2}{t} \times (1 - \cosh 2t) \right\}$

Q.3 Evaluate $L \left\{ \int_0^t \frac{\sin x}{x} dx \right\}$

Q.4 If n be a positive integer, prove that $(1 + \iota)^n + (1 - \iota)^n = 2^{\frac{n+2}{2}} \cos \frac{n\pi}{4}$.

Assignment-II (Advanced Learners)					
Subject Name	Integral Transforms and Complex Analysis			Subject Code	MTH351A
Faculty Name	Dr. Raj Kumar	Date of Issue	26-Nov-2022	Date of Submission	02-Dec-2022

Q. 1 Given $L \left\{ 2 \sqrt{\left(\frac{t}{\pi}\right)} \right\} = \frac{1}{s^2}$ then show that $L \left\{ \frac{1}{\sqrt{\pi t}} \right\} = \frac{1}{\sqrt{s}}$. Find $L \left\{ \frac{2}{t} \times (1 - \cosh 2t) \right\}$

Q.2 Apply Convolution theorem to evaluate $L^{-1} \left\{ \frac{s}{(s^2+a^2)^2} \right\}$.

Q.3 Evaluate $L^{-1} \left\{ \frac{s}{(s^2+1)(s^2+4)(s^2+9)} \right\}$.

2. Faculty Name: Dr. Shelly Garg

d. Course Name (Course Code): Group Theory-I (MTH222)

Action taken for Slow Learners

Assignment was given

Action taken for Advanced Learners

Assignment was given

e. Course Name (Course Code): Algebra-II (MTH662)

Action taken for Slow Learners

Assignment was given

Action taken for Advanced Learners

Assignment was given

f. Course Name (Course Code): Mathematics for Chemists-II (MTH662)

Action taken for Slow Learners

Assignment was given

Action taken for Advanced Learners

Assignment was given

Class/ Semester: B. Sc.(Hons.) Mathematics (3rd Semester)

Subject with Code: Group Theory-I (MTH222)

Regd. No. 12100219, 12100790, 12100848

Q. No.	Question	CO Mapped	RBT Level
1	Prove that every finite cyclic group of order n is isomorphic to $\mathbb{Z}/n\mathbb{Z}$.	CO4	L5
2	Show that if G is a group of order 91, it cannot have two subgroups of order 13.	CO3	L4
3	Let G be the group of real numbers under addition. Show that $\theta: G \rightarrow G$, defined by $\theta(x) = [x]$ is not an isomorphism, where $[x]$ denotes the greatest integer not greater than x .	CO4	L3
4	Prove that an infinite cyclic group is isomorphic to the group of integers.	CO4	L3

Regd. No. 12100053, 12100099, 12100140, 12100218, 12100252, 12100303, 12100388, 12100414, 12100515, 12100519, 12100520, 12100671, 12100707, 12100791, 12101119, 12101415.

Q. No.	Question	CO Mapped	RBT Level
1	Show that $2\mathbb{Z} \cong 3\mathbb{Z}$ by defining the homomorphism $f(2x) = 3x$.	CO4	L3
2	Let $f: \mathbb{C} \rightarrow \mathbb{C}$ be defined by $f(z) = \bar{z}$. Prove that f is an automorphism.	CO4	L3
3	Let $f: (\mathbb{Z}, +) \rightarrow (3\mathbb{Z}, +)$ be defined by $f(x) = 3x$. Prove that f is a group isomorphism.	CO4	L3
4	Prove that the group $G = \{-1, 1\}$ under multiplication is isomorphic to \mathbb{Z}_2 .	CO4	L3

Class/ Semester: M. Sc. (Hons) Mathematics (3rd Semester)

Subject with Code: Algebra-II (MTH662)

Regd. No. 12100889

Q. No.	Question	CO Mapped	RBT Level
1	Show that the Galois group of $x^4 - 2 \in \mathbb{Q}[x]$ is the group of symmetries of a square.	CO4	L5
2	Find condition on a and b such that the splitting field of $x^3 + ax + b \in \mathbb{Q}[x]$ has degree of extension 3 over \mathbb{Q} .	CO3	L4
3.	Let $E_i, i \in \Lambda$ be a family of normal extensions of a field F in some extension K of F . Show that $\bigcap_{i \in \Lambda} E_i$ is also a normal extension of F .	CO3	L3

Regd. No. 12100550, 12100783, 12101215

Q. No.	Question	CO Mapped	RBT Level
1	Which of the following extensions are normal over \mathbb{Q} ? (i) $\mathbb{Q}(\sqrt{-2})$ (ii) $\mathbb{Q}(5\sqrt{7})$ (iii) $\mathbb{Q}(\sqrt{-1})$ (iv) $\mathbb{Q}(x), x$ is not algebraic over \mathbb{Q} .	CO3	L3
2	Is $\mathbb{R}(\sqrt{-5})$ normal over \mathbb{R} ?	CO3	L3
3	Let $F = \mathbb{Q}(\sqrt{2})$ and $E = \mathbb{Q}^4\sqrt{2}$. Show that E is normal extension of F , F is normal extension of \mathbb{Q} . But E is not normal extension of \mathbb{Q} .	CO3	L3

Class/ Semester: B. Sc. (Hons) Chemistry(3rd Semester)

Subject with Code: Mathematics for Chemists-II (MTH260A)

Regd. No. 12100485

Q. No.	Question	CO Mapped	RBT Level
1	Solve the integration $\int \frac{xe^{2x}}{(1+2x)^2} dx$.	CO4	L5
2	Solve $\int x^2 e^{3x} dx$	CO4	L4
3.	Solve $\int \sqrt{3-2x-x^2} dx$	CO4	L5
4	Find $\int \frac{\sin 2x}{(1+\sin x)(2+\sin x)} dx$	CO4	L4

Regd. No. 12101422

Q. No.	Question	CO Mapped	RBT Level
1	Solve $\int x\sqrt{3x-2} dx$	CO4	L3
2	Solve $\int \frac{e^{2x}-e^{-2x}}{e^{2x}+e^{-2x}} dx$	CO4	L3
3	Solve $\int \frac{x}{9-4x^2} dx$	CO4	L3
4	Solve $\int x^3\sqrt{3+5x^4} dx$	CO4	L3

3. Faculty Name: Dr. Rajesh Joshi

a. Course Name (Course Code): Engineering Mathematics-I (MTH151A)

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows: <https://youtu.be/KaLA1cWhQIA> (One link contains the whole playlist).
3. Extra time 2:30pm to 3:30pm (Every Monday for clearing their doubts).

Action taken for Advanced Learners

1. Advanced Assignment given to them (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows: <https://youtu.be/DaMpZ3IEmwE> (One link contains the whole playlist).

Proof of Assignments

Instructions

MTH151A (Engineering Mathematics-I)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)					
Subject Name	Engineering Mathematics-I			Subject Code	MTH151A
Faculty Name	Dr. Rajesh Joshi	Date of Issue	19-Nov-2022	Date of Submission	26-Nov-2022

Q.1 Find the matrix P which transforms the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ to the diagonal form.

Q.2 Prove that the matrix $A = \begin{bmatrix} 1+i & -1+i \\ 2 & 2 \\ 1+i & 1-i \\ 2 & 2 \end{bmatrix}$ is unitary and find A^{-1} .

Q.3 If $u = \log(x^3 + y^3 + z^3 - 3xyz)$, show that $\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z}\right)^2 u = \frac{-9}{(x+y+z)^2}$.

Q.4 Expand $f(x, y) = x^y$ in powers of $(x-1)$ and $(y-1)$.

Q.5 Solve $2xy' = 10x^3y^5 + y$.

Assignment: 02 (Advanced Learners)					
Subject Name	Engineering Mathematics-I			Subject Code	MTH151A
Faculty Name	Dr. Rajesh Joshi	Date of Issue	19-Nov-2022	Date of Submission	26-Nov-2022

Q.1 Determine the values of p such that the rank of $A = \begin{bmatrix} 1 & 1 & -1 & 0 \\ 4 & 4 & -3 & 1 \\ p & 2 & 2 & 2 \\ 9 & 9 & p & 3 \end{bmatrix}$ is 3.

Q.2 A rectangular box open at the top is to have volume of 32 cubic ft. Find the dimension of the box requiring least material for its construction.

Q.3 Prove that necessary and sufficient condition for the differential equation $Mdx + Ndy = 0$ to be exact $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$.

Q.4 Solve, by the method of variation parameters, $y'' - 2y' + y = e^x \log x$.

b. Course Name (Course Code) : Engineering Mathematics-III (MTH252A)

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/HoGNkZclxDU> (One link contains the whole playlists).

Action taken for Advanced Learners

1. Advanced Assignment given to them. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/d7NF-8vVv4> (One link contains the whole playlists)

Proof of Assignments

Instructions

MTH252A (Engineering Mathematics-III)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)					
Subject Name	Engineering Mathematics-III			Subject Code	MTH252A
Faculty Name	Dr. Rajesh Joshi	Date of Issue	23-Nov-2022	Date of Submission	1-Dec-2022

- Write the Dirichlet's conditions for the existence of Fourier series of a function.
- Express $f(x) = \frac{x}{2}$ as a Fourier series in the interval $-\pi < x < \pi$.
- Obtain the Fourier series of $f(x) = e^{-x}$ in the interval $0 < x < 2\pi$.
- Evaluate $\int_{\alpha}^{\alpha+2\pi} \cos mx \sin nx \, dx$.
- Find the Fourier series to represent the function $f(x)$ given by $\begin{cases} x, 0 \leq x \leq \pi \\ 2\pi - x, \pi \leq x \leq 2\pi. \end{cases}$ Hence deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{\pi^2}{8}$.

Assignment: 02 (Advanced Learners)					
Subject Name	Engineering Mathematics-III			Subject Code	MTH252A
Faculty Name	Dr. Rajesh Joshi	Date of Issue	23-Nov-2022	Date of Submission	1-Dec-2022

- Expand $f(x) = \sqrt{1 - \cos x}$, $0 < x < 2\pi$ in a Fourier series and hence evaluate $\frac{1}{1.3} + \frac{1}{3.5} + \dots$
- Find the Fourier series to represent the function $f(x)$ given by $\begin{cases} x, 0 \leq x \leq \pi \\ 2\pi - x, \pi \leq x \leq 2\pi. \end{cases}$ Hence deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{\pi^2}{8}$.
- If $f(x) = \begin{cases} 0, -\pi < x < 0 \\ \sin x, 0 < x < \pi, \end{cases}$ prove that $f(x) = \frac{1}{\pi} + \frac{\sin x}{2} - \frac{2}{\pi} \sum_{m=1}^{\infty} \frac{\cos 2mx}{4m^2 - 1}$. Hence show that $\frac{1}{1.3} - \frac{1}{3.5} + \frac{1}{5.7} - \dots = \frac{1}{4}(\pi - 2)$.
- Apply Convolution theorem to evaluate $L^{-1} \left\{ \frac{s}{(s^2 + a^2)^2} \right\}$.
- Find the Fourier series for the function $f(t) = \begin{cases} -1, -\pi < t < -\frac{\pi}{2} \\ 0, -\frac{\pi}{2} < t < \frac{\pi}{2} \\ 1, \frac{\pi}{2} < t < \pi. \end{cases}$

c. Course Name (Course Code) : Real Analysis (MTH550)

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom).
2. Online lectures created by me whose links have been given so that they can study according to their suitable time and concern with me any time. Links are as follows:
<https://youtu.be/bWTmUWWZnhQ>

Action taken for Advanced Learners

1. Advanced Assignment given to them. (Assignment at the bottom)
2. Online lectures created by me whose links have been given so that they can study according to their suitable time and concern with me any time. Links are as follows:
<https://youtu.be/DOODzz07DNI>

Proof of Assignments

Instructions

MTH550 (Real Analysis)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)					
Subject Name	Real Analysis			Subject Code	MTH550
Faculty Name	Dr. Rajesh Joshi	Date of Issue	21-Nov-2022	Date of Submission	02-Dec-2022

1. Prove that the unit interval $[0, 1]$ is uncountable.
2. Prove that the set $\mathbb{N} \times \mathbb{N}$ is countable.
3. Prove that $(L(\mathbb{R}^n, \mathbb{R}^m), d)$ is a metric space where $d(A, B) = \|A - B\|$.
4. Prove that countable union of countable sets is countable.
5. If $\langle f_n \rangle, \langle g_n \rangle$, and $\langle h_n \rangle$ are three sequences such that (i). $\lim_{n \rightarrow \infty} \langle f_n \rangle = \lim_{n \rightarrow \infty} \langle h_n \rangle = L$, (ii). For some positive integer p $f_n \leq g_n \leq h_n \forall n \geq p$, then show that $\lim_{n \rightarrow \infty} g_n = L$.

Assignment: 02 (Advanced Learners)					
Subject Name	Real Analysis			Subject Code	MTH550
Faculty Name	Dr. Rajesh Joshi	Date of Issue	26-Nov-2022	Date of Submission	02-Dec-2022

- If f is continuous on $[a, b]$ then $f \in \mathcal{RS}(\alpha)$. Moreover, to every $\epsilon > 0$, there exists a $\delta > 0$ such that $\left| S(\mathbf{P}, f, \alpha) - \int_a^b f d\alpha \right| < \epsilon$ for all partitions $\mathbf{P} = \{a = x_0, x_1, x_2 \dots x_n = b\}$ of $[a, b]$ with $\mu(\mathbf{P}) < \delta$, and for every choice of $t_i \in \Delta x_i$, that is, $\lim_{\mu(\mathbf{P}) \rightarrow 0} S(\mathbf{P}, f, \alpha) = \int_a^b f d\alpha$.
- If f is a continuously differentiable mapping of an open set $E \subset \mathbb{R}^n$ into \mathbb{R}^n , $f'(a)$ is invertible for some $a \in E$, and $b = f(a)$. Then, prove that there exist open sets U and V in \mathbb{R}^n such that $a \in U, b \in V$, f is one-to-one on U , and $f(U) = V$.
- If f is a function bounded on $[-1, 1]$ and β be a function defined as $\beta(x) = \begin{cases} 0, & x < 0 \\ \frac{1}{2}, & x = 0 \\ 1, & x > 0 \end{cases}$. Prove that $f \in \mathcal{RS}(\beta)$ if and only if f is continuous at $x = 0$ and then $\int_{-1}^1 f d\beta = f(0)$.
- Prove that every monotonically increasing sequence which is bounded above converges to its least upper bound.
- Let Ω be the set of all invertible linear operators on \mathbb{R}^n .
 - If $A \in \Omega, B \in L(\mathbb{R}^n)$, and $\|B - A\| \cdot \|A^{-1}\| < 1$, then $B \in \Omega$.
 - Ω is an open subset of $L(\mathbb{R}^n)$, and the mapping $A \rightarrow A^{-1}$ is continuous on Ω .

4. Faculty Name: Dr. Vinod Kumar

a. Course Name (Course Code): Number Theory (MTH324)

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/u7cBLb0b7pk> (One link contains the whole playlist).
3. Extra time 2:30pm to 3:30pm (Every Monday for clearing their doubts).

Action taken for Advanced Learners

1. Advanced Assignment given to them (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/u7cBLb0b7pk> (One link contains the whole playlist).

Proof of Assignments

Instructions

MTH324 (Number Theory)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)					
Subject Name	Number Theory			Subject Code	MTH324
Faculty Name	Dr. Vinod Kumar	Date of Issue	18-Nov-2022	Date of Submission	25-Nov-2022

1. Find the greatest common divisor d of two numbers 275 and 200 and then find the integers m and n such that $d = m(275) + n(200)$ using Euclidean Algorithm.
2. If $S = \{x: (x, 0) = x\}$ and $V = \{y: (0, y) = 1\}$ then find the cardinality of sets S and V .

3. Check divisibility of integers is an equivalence relation or not? Specify your reason.
4. If $(a, b) = 1$ prove that $(a^2, b^2) = 1$.
5. Show that $n^7 - n$ is divisible by 42.

Assignment: 02 (Advanced Learners)					
Subject Name	Number Theory			Subject Code	MTH324
Faculty Name	Dr. Vinod Kumar	Date of Issue	18-Nov-2022	Date of Submission	25-Nov-2022

1. Find the remainder when $15!$ is divided by 17.
2. Show that $4(29!)+5!$ is divisible by 31.
3. Solve $x \equiv 5 \pmod{6}$, $x \equiv 4 \pmod{11}$, $x \equiv 3 \pmod{17}$.
4. Find the remainder when $2 \angle 26$ is divided by 29.
5. What is the remainder when 3^{287} is divided by 23?

b. Course Name (Course Code) : Discrete Mathematical Structures (CSA517)

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/WW7YO0b4QHs> (One link contains the whole playlists).

Action taken for Advanced Learners

1. Advanced Assignment given to them. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/WW7YO0b4QHs> (One link contains the whole playlists)

Proof of Assignments

Instructions

CSA517 (Discrete Mathematics)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)					
Subject Name	Discrete Mathematical Structures			Subject Code	CSA517
Faculty Name	Dr. Vinod Kumar	Date of Issue	26-Nov-2022	Date of Submission	02-Dec-2022

1. Check the divisibility is an equivalence relation on the set of Natural Numbers?
2. If $f: [0, 1] \rightarrow R$ defined by $f(x) = x^2$. Check f is bijective or not?
3. If R be a relation in the set of integers defined by $= \{(x, y): x \in Z, y \in Z, (x - y) \text{ is divisible by } 6\}$ then prove that R is an equivalence relation.
4. Consider the function $f: N \rightarrow N$ where N is the set of natural numbers and defined by $f(n) = n^2 + n + 1$. Check f is injective and surjective or not?
5. Find the inverse of a matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 2 & 9 \end{bmatrix}$.

Assignment: 02 (Advanced Learners)					
Subject Name	Discrete Mathematical Structures			Subject Code	CSA517
Faculty Name	Dr. Vinod Kumar	Date of Issue	26-Nov-2022	Date of Submission	02-Dec-2022

1. Prove that z_3 is an abelian group under addition modulo 3.
2. Consider the set of words $A = \{sugar, fast, sun, wipe, well, shy\}$. Find $|R|$, where R is the equivalence relation on A defined by "begins with the same letters as".

3. Consider $A = \{1,2,3, \dots, 9\}$ and let R be the relation on $A \times A$ defined by $(a, b)R(c, d)$ defined by $a + d = b + c$ then prove that R is an equivalence relation.
4. Consider the set of words $W = \{sugar, fast, sun, wipe, well, shy\}$. Find $|R|$, where R is the equivalence relation on W defined by “begins with the same letters as”.
5. Prove that $A \times (B \cap C) = (A \times B) \cap (A \times C)$.

c. Course Name (Course Code) : Mathematical Methods (MTH549)

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom).
2. Online lectures created by me whose links have been given so that they can study according to their suitable time and concern with me any time. Links are as follows:
<https://youtu.be/RgiaA1L7vJw>

Action taken for Advanced Learners

1. Advanced Assignment given to them. (Assignment at the bottom)
2. Online lectures created by me whose links have been given so that they can study according to their suitable time and concern with me any time. Links are as follows:
<https://youtu.be/RgiaA1L7vJw>

Proof of Assignments

Instructions

MTH549 (Mathematical Methods)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)					
Subject Name	Mathematical Methods			Subject Code	MTH549
Faculty Name	Dr. Vinod Kumar	Date of Issue	26-Nov-2022	Date of Submission	02-Dec-2022

- Find $L\{f(t)\} = \begin{cases} \sin\left(t - \frac{\pi}{3}\right) & t > \frac{\pi}{3} \\ 0 & t < \frac{\pi}{3} \end{cases}$
- Find $L\left\{\frac{2}{t} \times (1 - \cosh 2t)\right\}$
- Evaluate $L\left\{\int_0^t \frac{\sin x}{x} dx\right\}$
- Solve $(D^2 + 2)x - Dy = 1, Dx + (D^2 + 2)y = 0$ if $x = Dx = y = Dy = 0$ when $t = 0$.
- Obtain a half range cosine series for $f(x) = \begin{cases} kx, 0 \leq x \leq \frac{l}{2} \\ k(l-x), \frac{l}{2} \leq x \leq l \end{cases}$ and hence deduce that the sum of the series $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots \dots \dots \infty$

Assignment: 02 (Advanced Learners)

Assignment: 02 (Advanced Learners)					
Subject Name	Mathematical Methods			Subject Code	MTH549
Faculty Name	Dr. Vinod Kumar	Date of Issue	26-Nov-2022	Date of Submission	02-Dec-2022

- Given $L\left\{2\sqrt{\frac{t}{\pi}}\right\} = \frac{1}{s^{3/2}}$ then show that $L\left\{\frac{1}{\sqrt{\pi t}}\right\} = \frac{1}{\sqrt{s}}$. Find $L\left\{\frac{2}{t} \times (1 - \cosh 2t)\right\}$
- Apply Convolution theorem to evaluate $L^{-1}\left\{\frac{s}{(s^2+a^2)^2}\right\}$.
- Solve the simultaneous equations $(D^2 - 3)x - 4y = 0, x + (D^2 + 1)y = 0$ for $t > 0$, given that $x = y = \frac{dy}{dt} = 0$ and $\frac{dx}{dt} = 2$ at $t = 0$.
- Solve $ty'' + 2y' + ty = \cos t$ given that $y(0) = 1$.
- Find the Fourier series for the function $f(t) = \begin{cases} -1, -\pi < t < -\frac{\pi}{2} \\ 0, -\frac{\pi}{2} < t < \frac{\pi}{2} \\ 1, \frac{\pi}{2} < t < \pi. \end{cases}$

d. Course Name (Course Code) : Statistical Methods For Applied Sciences (MTH670)

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom).
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/zmyh7nCjmsg>

Action taken for Advanced Learners

1. Advanced Assignment given to them. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/zmyh7nCjmsg>

Proof of Assignments

Instructions

MTH670 (Statistical Methods For Applied Sciences)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)					
Subject Name	Statistical Methods For Applied Sciences			Subject Code	MTH670
Faculty Name	Dr. Vinod Kumar	Date of Issue	16-Nov-2022	Date of Submission	23-Nov-2022

Q1. The mean and the standard deviations of a sample of size 10 were found to be 9.5 and 2.5 respectively. Later on, an additional observation became available. This was 150.0 and was included in the original sample. Find the mean and the standard deviation of the 11 observations.

Q2 . Calculate the median for the following frequency distribution

Class Interval	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80
Frequency	15	20	25	24	10	33	71	51

Assignment: 02 (Advanced Learners)

Subject Name	Statistical Methods For Applied Sciences			Subject Code	MTH670
Faculty Name	Dr. Vinod Kumar	Date of Issue	16-Nov-2022	Date of Submission	23-Nov-2022

Q1. If X is a Poisson distribution variate such that $P(X = 2) = 9P(X = 4) + 90P(X = 6)$. Find the standard Deviation.

Q2. Find the probability distribution of the number of doublets in four throws of a pair of dice.

5. Faculty Name: Mr. ARUN KOCHAR

a. Course Name (Course Code): Operations Research-I (MTH664)

Action taken for Slow Learners

1. Simple and Basic assignments have been given to them. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/a2QgdDk4Xjw> (One link contains the whole playlist).

Action taken for Advanced Learners

1. Conceptual and competitive questions have been given to them. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/a2QgdDk4Xjw> (One link contains the whole playlist).

Proof of Assignments

Instructions

MTH664 (Operations Research-I)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)					
Subject Name	Operations Research-I			Subject Code	MTH664
Faculty Name	Mr. ARUN KOCHAR	Date of Issue	16-Nov-2022	Date of Submission	24-Nov-2022

Q.1 Use the Dual Simplex method to Maximize $-3x_1 - 2x_2$ subjected to constraints $x_1 + x_2 \geq 1$, $x_1 + x_2 \leq 7$, $x_1 + 2x_2 \geq 10$, $x_2 \leq 3$ where $x_1, x_2 \geq 0$.

Q.2 With the help of Simplex method, find optimum solution

Max $Z = 5x_1 + 4x_2$ subjected to constraints $x_1 \leq 7$, $x_1 - x_2 \leq 8$ where $x_1, x_2 \geq 0$.

Q.3 Using Simplex method, solve the LPP, Max $Z = 3x_1 + 2x_2$ subjected to constraints $2x_1 + x_2 \leq 2$, $3x_1 + 4x_2 \geq 12$ where $x_1, x_2 \geq 0$.

Q.4 Using graphical method to find optimum solution of the problem

Max $Z = 10x_1 + 5x_2$ subjected to constraints $4x_1 + 5x_2 \leq 100$, $5x_1 + 2x_2 \leq 80$ where $x_1, x_2 \geq 0$.

Q.5 Five persons have to assigned to five machines. The assignment costs are given in the table:

Operators	I	II	III	IV	V
A	5	5	4	2	6
B	7	4	2	3	4
C	9	3	5	4	3
D	7	2	6	7	2
E	6	5	7	9	1

For some technical reasons A cannot operate machine III and C cannot operate machine IV. Find the optimal assignment.

Assignment: 02 (Advanced Learners)					
Subject Name	Operations Research-I			Subject Code	MTH664
Faculty Name	Mr. ARUN KOCHAR	Date of Issue	16-Nov-2022	Date of Submission	24-Nov-2022

Q.1 Five persons have to assigned to five machines. The assignment costs are given in the table:

Operators	I	II	III	IV	V
E1	5	5	4	2	6
E2	7	4	2	3	4
E3	9	3	5	4	3
E4	7	2	6	7	2
E5	6	5	7	9	1

For some technical reasons E1 cannot operate machine III and E3 cannot operate machine IV. Find the optimal assignment.

Q.2 Find the initial feasible solution by VAM method and also check the optimality by MODI method of the following data:

Factories\Warehouses	A	B	C	Availability
X	5	3	22	2
Y	9	4.5	17	2
Z	3	20	5	4
Required	3	3	2	8

Q.3 Solve the following LPP by two phases simplex method

Max $Z = 2x_1 + x_2 + 3x_3$ subjected to conditions $x_1 + x_2 + 2x_3 \leq 5$, $2x_1 + 3x_2 + 4x_3 = 12$ where $x_1, x_2, x_3 \geq 0$.

Q.4 Write down the dual of the following primal problem

Min $Z = 2x_1 + x_2$ subjected to constraints $3x_1 + x_2 \geq 3$, $4x_1 + 3x_2 \geq 6$, $x_1 + 2x_2 \geq 2$ where $x_1, x_2 \geq 0$ and find its optimum solution.

Q.5 A person requires 10, 12 and 12 units chemicals A, B and C respectively for his garden. A liquid product contains 5, 2 and 1 units of A, B and C respectively per jar. A dry product contains 1, 2 and 4 units of A, B and C per carton. If the liquid product sells whose cost price is Rs. 3 per jar and the dry product cost for Rs. 2 per carton, how many of each should be purchased, in order to minimize the cost and meet the requirements?

Formulate the LPP.

b. Course Name (Course Code): CALCULUS (MTH121A)

Action taken for Slow Learners

1. Simple and Basic assignments have been given to them. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/tffrtzUhmw> (One link contains the whole playlist).

Action taken for Advanced Learners

1. Conceptual and competitive questions have been given to them. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/tffrtzUhmw> (One link contains the whole playlists)

Proof of Assignments

Instructions

MTH121A (CALCULUS)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)					
Subject Name	CALCULUS			Subject Code	MTH121A
Faculty Name	Mr. ARUN KOCHAR	Date of Issue	16-Nov-2022	Date of Submission	24-Nov-2022

Q.1 Find the points of inflexion of the function $y = (\sin 4x + \cos 4x) e^{4x}$ where $0 < x < \frac{\pi}{2}$.

Q.2 Find $\frac{dy}{dx}$, if $y = x^{\cos x} + (\text{Sinh}x)^{2x}$

Q.3 If $\lim_{y \rightarrow 0} \frac{ae^y - b \cos y + c e^{-y}}{y \tan y} = 3$, then find the values of a, b and c.

Q.4 Show that curve $y = x^2$ is concave upward for all real value of x.

Q.5 If $y = e^{a \sin^{-1} x}$, Prove that

$$(1 - x^2)y_{n+2} - (2n + 1)xy_{n+1} - (n^2 + a^2)y_n = 0. \text{ Also find } y_n(0).$$

Assignment: 02 (Advanced Learners)					
Subject Name	CALCULUS			Subject Code	MTH121A
Faculty Name	Mr. ARUN KOCHAR	Date of Issue	16-Nov-2022	Date of Submission	24-Nov-2022

Quest:01) Trace the curve $y = x + \frac{1}{x}$.

Quest:02) Trace the curve $r=a(1+\cos \theta)$.

Quest:03) Find all the asymptotes of the curve

$$(x + y - 1)(x - y + 2)(2x + y) + 3x^2 + 2xy + y^2 + 4x = 0.$$

Quest:04) Find the length of the curve $x = \cos t, y = (t + \sin t), 0 \leq t \leq \pi$.

Quest:05) Show that the line joining the two points of inflexion of the curve $y^2(x - a) = x^2(x + a), x \neq \pm a$ subtends an angle $\frac{\pi}{3}$ at the origin.

c. Course Name (Course Code): PARTIAL DIFFERENTIAL EQUATIONS (MTH231)

Action taken for Slow Learners

1. Simple and Basic assignments have been given to them. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:

<https://youtu.be/ycMkvnkhOYs>

<https://youtu.be/De-yi95YILE>

<https://youtu.be/btOCUmJkrrg>

Action taken for Advanced Learners

1. Conceptual and competitive questions have been given to them. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:

<https://youtu.be/ycMkvnkhOYs>

<https://youtu.be/De-yi95YILE>

<https://youtu.be/btOCUmJkrrg>

Proof of Assignments

Instructions

MTH231 (PARTIAL DIFFERENTIAL EQUATIONS)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)					
Subject Name	PARTIAL DIFFERENTIAL EQUATIONS			Subject Code	MTH231
Faculty Name	Mr. ARUN KOCHAR	Date of Issue	12-Nov-2022	Date of Submission	22-Nov-2022

Q.1 Solve $(x^2 - yz)p + (y^2 - zx)q = z^2 - xy$

Q.2 Find general solution of $\frac{\partial^3 z}{\partial x^3} - 2 \frac{\partial^3 z}{\partial x^2 \partial y} = 2e^{2x} + 3x^2 y$

Q.3 Find characteristic equations of $x^2 r + 2xys + y^2 t = 0$.

Q.4 Solve $(D^2 + DD' + D' - 1)z = \sin(x+2y)$.

Q.5 Use the method of separable of variable solve $\frac{\partial u}{\partial x} = 4 \frac{\partial u}{\partial y}$, given that $u(0,y) = 8e^{-3y}$

Assignment: 02 (Advanced Learners)					
Subject Name	PARTIAL DIFFERENTIAL EQUATIONS			Subject Code	MTH231
Faculty Name	Mr. ARUN KOCHAR	Date of Issue	12-Nov-2022	Date of Submission	22-Nov-2022

Quest:01) Solve the Laplace equation $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y^2} = 0$ subject to the condition $u(0,y)=u(L,y)=u(x,0)=0$ and $u(x,a) = \sin \frac{n\pi x}{L}$.

Quest:02) A string of length L has its ends $x=0$ and $x=L$ fixed. It is released from the rest in the position $y = \frac{4\lambda x(L-x)}{L^2}$. Find an expression for the displacement of the string at any subsequent time.

Quest:03)

A homogeneous rod of conducting material of length 100 cm has its ends kept at zero temperature and the temperature initially is

$$u(x, 0) = \begin{cases} x, & 0 \leq x \leq 50 \\ 100 - x, & 50 \leq x \leq 100. \end{cases}$$

Find the temperature $u(x, t)$ at any time.

(Bhopal, 2007 ; C.S.V.T.U., 2007 ; Kurukshetra, 2006)

Quest:04)

The diffusion equation

$$\frac{\partial^2 u}{\partial x^2} = \frac{\partial u}{\partial t}, u = u(x, t), u(0, t) = 0 = u(\pi, t),$$

$u(x, 0) = \cos x \sin 5x$ admits the solution

- (a) $\frac{e^{-36t}}{2} [\sin 6x + e^{20t} \sin 4x]$
- (b) $\frac{e^{-36t}}{2} [\sin 4x + e^{20t} \sin 6x]$
- (c) $\frac{e^{-20t}}{2} [\sin 3x + e^{15t} \sin 5x]$
- (d) $\frac{e^{-36t}}{2} [\sin 5x + e^{20t} \sin x]$

Quest:05)

Let $u(x, t)$ be the solution of the wave equation $\frac{\partial^2 u}{\partial t^2} - \frac{\partial^2 u}{\partial x^2} = 0, 0 < x < \pi, t > 0,$ with the initial conditions $u(x, 0) = \sin x + \sin 2x + \sin 3x,$ $\frac{\partial u}{\partial t}(x, 0) = 0, 0 < x < \pi$ and the boundary condition $u(0, t) = u(\pi, t) = 0, t \geq 0$ Then, the value of $u\left(\frac{\pi}{2}, \pi\right)$ is

- (a) $-1/2$
- (b) 0
- (c) $1/2$
- (d) 1

[2022 : 2 Marks]

d. Course Name (Course Code): MATHEMATICS FOR CHEMISTS (MTH160A)

Action taken for Slow Learners

1. Simple and Basic assignments have been given to them. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:

https://youtu.be/_RDF7My0Lfg

<https://youtu.be/h5urBuE4Xhg>

Action taken for Advanced Learners

1. Conceptual and competitive questions have been given to them. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:

https://youtu.be/_RDF7My0Lfg

<https://youtu.be/h5urBuE4Xhg>

Proof of Assignments

Instructions

MTH160A (MATHEMATICS FOR CHEMISTS)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)					
Subject Name	MATHEMATICS FOR CHEMISTS			Subject Code	MTH160A
Faculty Name	Mr. ARUN KOCHAR	Date of Issue	12-Nov-2022	Date of Submission	20-Nov-2022

Q.1 Express the matrix A as the sum of symmetric and skew symmetric matrix,

where $A = \begin{bmatrix} 3 & -2 & 6 \\ 2 & 7 & -1 \\ 5 & 4 & 0 \end{bmatrix}$.

Q.2 Show that $\begin{vmatrix} a & a+b & a+b+c \\ 2a & 3a+2b & 4a+3b+2c \\ 3a & 6a+3b & 10a+6b+3c \end{vmatrix} = a^3$

Q.3 Test the consistency and solve by Cramer's rule

$$x + 2y + 3z = 0$$

$$3x + 4y + 4z = 0$$

$$7x + 10y + 12z = 0$$

Q.4 Determine the eigen values and eigen vectors of the matrix $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$.

Q.5 Verify Cayley-Hamilton theorem for the matrix $A = \begin{bmatrix} 7 & -1 & 3 \\ 6 & 1 & 4 \\ 2 & 4 & 8 \end{bmatrix}$.

Assignment: 02 (Advanced Learners)					
Subject Name	MATHEMATICS FOR CHEMISTS			Subject Code	MTH160A
Faculty Name	Mr. ARUN KOCHAR	Date of Issue	12-Nov-2022	Date of Submission	20-Nov-2022

Q.1 Show that the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 5 & 2 & 6 \\ -2 & -1 & -3 \end{bmatrix}$ is nilpotent and find its index.

Q.2 If $A = \begin{bmatrix} 1 & 2 & 3 \\ 5 & 1 & -9 \\ -2 & 0 & -1 \end{bmatrix}$ then verify that $AA^T = A^T A = I$.

Q.3 Find non-trivial solution of the system of equations

$$x - 2y - 3z = 0, -2x + 3y + 5z = 0, 3x + y - 2z = 0 \text{ if possible.}$$

Q.4 Without expanding prove that $\begin{vmatrix} (a+b)^2 & ca & bc \\ ca & (c+b)^2 & ab \\ bc & ab & (a+c)^2 \end{vmatrix} = 2ab(a+b+c)^3$

Q.5 Find characteristic roots and characteristic vectors of the matrix $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$.

e. Course Name (Course Code): DIFFERENTIAL EQUATIONS AND FOURIER SERIES (MTH255B)

Action taken for Slow Learners

1. Simple and Basic assignments have been given to them. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:

<https://youtu.be/vqJuFD0GdJA>

<https://youtu.be/De-vi95YILE>

Action taken for Advanced Learners

1. Conceptual and competitive questions have been given to them. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/vqJuFD0GdJA>
<https://youtu.be/De-yi95YILE>

Proof of Assignments

Instructions

MTH255B (DIFFERENTIAL EQUATIONS AND FOURIER SERIES)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)					
Subject Name	DIFFERENTIAL EQUATIONS AND FOURIER SERIES			Subject Code	MTH255B
Faculty Name	Mr. ARUN KOCHAR	Date of Issue	15-Nov-2022	Date of Submission	25-Nov-2022

- Q.1 Solve $y(2xy + 1)dx + x(1 + 2xy - y^3x^3)dy = 0$
- Q.2 Solve $(x^2 D^2 + 7xD + 13)y = \log x$
- Q.3 Solve $(D^2 - 2D + 1)y = x e^x \sin x$
- Q.4 Find Fourier series to represent $f(x) = x^2 - 2$, when $-2 \leq x \leq 2$
- Q.5 Solve the differential equation $(D^2 + 1)y = \tan x$, by method of variation of parameters.

Assignment: 02 (Advanced Learners)					
Subject Name	DIFFERENTIAL EQUATIONS AND FOURIER SERIES			Subject Code	MTH255B
Faculty Name	Mr. ARUN KOCHAR	Date of Issue	15-Nov-2022	Date of Submission	25-Nov-2022

Q.1 Find the Fourier series expansion of $f(x) = 2x - x^2$ in $(0,3)$ and hence deduce that

$$\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots \infty = \frac{\pi}{12}.$$

Q.2 Solve $(D^4 - 1)y = (\cos x \cosh x)$.

Q.3 Find Fourier expansion of function $f(x) = |x|$, $-\pi < x < \pi$.

Q.4 Solve $(xy^3 + y)dx + 2(x^2y^2 + x + y^4)dy = 0$.

Q.5 Solve $(x^2 D^2 + 7xD + 13)y = \log x$.

6. Faculty Name: Mr. Anmol Bajaj

a. Course Name (Course Code): Number Theory (MTH341)

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/nGfVTNfNwnk> (One link contains the whole playlist).
3. Extra time 2:30pm to 3:30pm (Every Monday for clearing their doubts).

Action taken for Advanced Learners

1. Advanced Assignment given to them (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/nGfVTNfNwnk>(One link contains the whole playlist).

Proof of Assignments

Instructions

MTH341 (Mechanics II)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)					
Subject Name	Mechanics I			Subject Code	MTH341
Faculty Name	Mr. Anmol Bajaj	Date of Issue	18-Nov-2022	Date of Submission	25-Nov-2022

1. If magnitude of one of the two forces acting on a particle be double than that of the other, and if θ be the angle between the resultant and greater force, show that $\theta \leq \pi/6$.
2. A, B and C are three points on a circle. Forces inversely proportional to AB and BC act along AB and BC respectively. Show that their resultant acts along the tangent to the circle at B.
3. Two strings of lengths 4m and 5m are fastened to a particle of weight W kg, their ends being fastened to the points at same level 6m apart. Find tensions in the strings.
4. ABCD is a triangle with AB and BC of a and b units respectively. Forces of magnitude P, P act along AB and CD and forces of magnitude Q, Q act along AD and CB, where $P > Q$. Prove that the perpendicular distance between the resultant of forces P, Q at A and resultant of force P, Q at C is $(Pb - Qa) / \sqrt{P^2 + Q^2}$.

Assignment: 02 (Advanced Learners)

Subject Name	Mechanics I		Subject Code	MTH341
Faculty Name	Mr. Anmol Bajaj	Date of Issue	18-Nov-2022	Date of Submission
				25-Nov-2022

- (1) Two blocks W_1 and W_2 , resting on two inclined planes, are connected by a horizontal bar AB, as shown in Fig. 8.5. If W_1 equals 1000 N, determine the maximum value of W_2 for

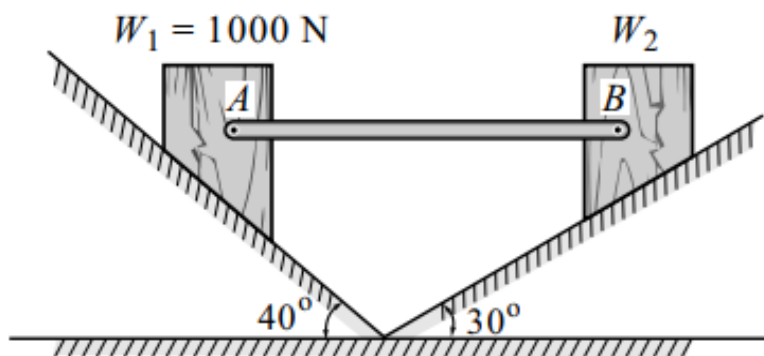


Fig. 8.5

which the equilibrium can exist. The angle of limiting friction is 20° at all rubbing faces.

Quest:02) A cupboard of 750 N weight is placed over an inclined plane with $\mu = 0.20$, as shown in Fig. 8.E31. Find the range of values of h where force P may be applied parallel to inclined plane to hold it in equilibrium.

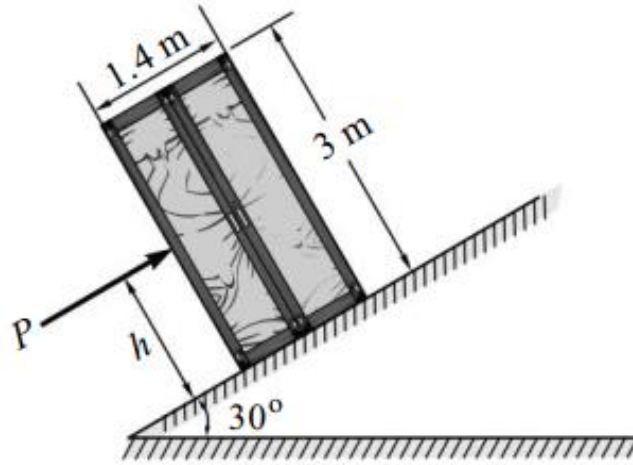


Fig. 8.E31

b. Course Name: Group Theory II

(Course Code) : MTH322

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/o2wGOOc5HxY> (One link contains the whole playlists).

Action taken for Advanced Learners

1. Advanced Assignment given to them. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/o2wGOOc5HxY> (One link contains the whole playlists)

Proof of Assignments

Instructions

MTH322(Group Theory II)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)

Subject Name	Group Theory II			Subject Code	MTH322
Faculty Name	Mr. Anmol Bajaj	Date of Issue	26-Nov-2022	Date of Submission	02-Dec-2022

1. State and prove Fundamental theorem on Finite abelian group.
2. State and prove converse of Langrange theorem.
3. State and prove Sylow 3rd theorem.

Assignment: 02 (Advanced Learners)

Subject Name	Discrete Mathematical Structures			Subject Code	CSA517
Faculty Name	Dr. Vinod Kumar	Date of Issue	26-Nov-2022	Date of Submission	02-Dec-2022

Quest:01) State and prove the Cauchy Theorem for Finite abelian groups.

Quest:02) Prove that the group $(Z \oplus Z)/\langle(2, 2)\rangle$ is generated by the two elements $(1, 0) + \langle(2, 2)\rangle$ and $(1, 1) + \langle(2, 2)\rangle$. That is, every element of $(Z \oplus Z)/\langle(2, 2)\rangle$ can be written in the form $a(1, 0) + \langle(2, 2)\rangle + b(1, 1) + \langle(2, 2)\rangle$ where $b = 0$ or 1 . To which external direct product of cyclic groups is $(Z \oplus Z)/\langle(2, 2)\rangle$ isomorphic? To which external direct product of cyclic groups is $(Z \oplus Z)/\langle(n, n)\rangle$ isomorphic?

Quest:03) Explain why there cannot exist a group G such that $[G : Z(G)] = 15$.

c. **Course Name: Topology**

Course Code : MTH661

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom).
2. Online lectures created by me whose links have been given so that they can study according to their suitable time and concern with me any time. Links are as follows:
<https://youtu.be/XHKcrs8YaSo>

Action taken for Advanced Learners

1. Advanced Assignment given to them. (Assignment at the bottom)
2. Online lectures created by me whose links have been given so that they can study according to their suitable time and concern with me any time. Links are as follows:
<https://youtu.be/XHKcrs8YaSo>

Proof of Assignments

Instructions

MTH661 (Topology)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)					
Subject Name	Topology			Subject Code	MTH661
Faculty Name	Mr. Anmol Bajaj	Date of Issue	26-Nov-2022	Date of Submission	02-Dec-2022

1. What is Topologist Sine curve?
2. Give two examples of connected spaces which are not path connected.
3. Give two examples of path connected spaces.

Assignment: 02 (Advanced Learners)

Subject Name	Topology			Subject Code	MTH661
Faculty Name	Mr. Anmol Bajaj	Date of Issue	26-Nov-2022	Date of Submission	02-Dec-2022

- (1) What is Infinite broom in topology?
- (2) Give two examples of Discrete topological spaces.
- (3) Give some examples of indiscrete topological spaces.

d. Course Name: Differential Geometry

Course Code: MTH558

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom).
2. Online NPTEL video lectures are provided to them and whose links are as follows:
https://youtu.be/EVeOcl8as_k

Action taken for Advanced Learners

1. Advanced Assignment given to them. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
https://youtu.be/EVeOcl8as_k

Proof of Assignments

Instructions

MTH558 (Differential Geometry)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)					
Subject Name	Differential Geometry			Subject Code	MTH558
Faculty Name	Mr. Anmol Bajaj	Date of Issue	16-Nov-2022	Date of Submission	23-Nov-2022

- Q1. Define Homeomorphism.
 Q2. Define geodesic differential equation.
 Q3. Define Flat curves.

Assignment: 02 (Advanced Learners)					
Subject Name	Differential Geometry			Subject Code	MTH558
Faculty Name	Mr. Anmol Bajaj	Date of Issue	16-Nov-2022	Date of Submission	23-Nov-2022

- Q1. Define Curvature and signed curvatures.
 Q2. Derive Formula of curvature for space curves.

e. **Course Name: Elementary Mathematics**

Course Code: AGS118A

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom).
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/0lzOAW8yMTc>

Action taken for Advanced Learners

1. Advanced Assignment given to them. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/0lzOAW8yMTc>

Proof of Assignments

Instructions

AGS118A(Elementary Mathematics)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)					
Subject Name	Elementary Mathematics			Subject Code	AGS118A
Faculty Name	Mr. Anmol Bajaj	Date of Issue	16-Nov-2022	Date of Submission	23-Nov-2022

Q1. What is continuity?

Q2. What is differentiability?

Q3. Find derivative of $\sin x + x^3$.

Assignment: 02 (Advanced Learners)					
Subject Name	Elementary Mathematics			Subject Code	AGS118A
Faculty Name	Mr. Anmol Bajaj	Date of Issue	16-Nov-2022	Date of Submission	23-Nov-2022

Q1. What are application of derivative in daily life. Elaborate.

Q2. Find derivative of $\sqrt{a^2 - x^2}$.

7. Faculty Name : Ms. Anita Devgan

a. Course Name (Course Code) : Riemann Integration and Series of Functions (MTH345)

Action taken for Slow Learners

1. Work Sheets were provided to them and level was basic
2. Work Sheets were discussed in the class and students shared their solutions

Action taken for Advanced Learners

1. Work Sheets were provided to them and level was advanced
2. Work Sheets were discussed in the class and they were also guided by the classmates

Work Sheets

Work Sheet 1

Q. No.	Statement	Level
1	Find radius of convergence of power series $\sum(5 + 12i)z^n$	Advanced
2	Find radius of convergence and interval of convergence of $\sum_{n=2}^{\infty} \left(\frac{1}{\log n}\right)x^n$	Basic
3	Find radius of convergence of $\sum_{n=1}^{\infty} \frac{(n-1)!}{n^n} x^n$	Basic
4	Find radius of convergence and interval of convergence of $\sum \frac{(x-1)^n}{2^n}$	Advanced
5	Find radius of convergence and interval of convergence of $\sum \frac{(-1)^n}{n} (z - 2i)^n$	Advanced

Work Sheet 2

Q. No.	Statement	Level
1	Identify the polynomial $\sum_{k=0}^n \binom{n}{k} x^k (1-x)^{n-k} f\left(\frac{k}{n}\right)$, $n = 1, 2, 3, \dots$ and $x \in [0, 1]$	Basic
2	Find the value of $\sum_{k=0}^n \binom{n}{k} x^k (1-x)^{n-k}$	Basic
3	Prove that $\sum_{k=0}^n \binom{n}{k} x^k (1-x)^{n-k} (k-nx)^2 = nx(1-x)$	Advanced

b. Course Name (Course Code) : Algebra (MTH123A)

Action taken for Slow Learners


1. Work Sheets were provided to them and level was basic
2. Work Sheets were discussed in the class and students shared their solutions

Action taken for Advanced Learners

1. Work Sheets were provided to them and level was advanced
2. Work Sheets were discussed in the class and they were also guided by the classmates

Work Sheets

Work Sheet 1

Q. No.	Statement	Level
1	The Cartesian product $P \times P$ has 9 elements among which are found $(-2,0)$ and $(0,2)$. What is the set P and the remaining elements of $P \times P$	Basic
2	Which graph represents a function  (a) (b)	Basic
3	$R = \{ (x, y) / y < 3x + 1 \}$ is a function ? Justify	Advanced
4	Given the relation $R = \{ (6, 4), (8, -1), (x, 7), (-3, -6) \}$. Which of the following values for x will make relation R a function (a) 8 (b) 6 (c) -3 (d) 1	Advanced
5	If $f(x) = x^3 - (1/x^3)$ then what is the value of $f(x) + f(1/x)$	Basic
6	If $f(x) = ax^2 + b^2$ and $f = \{ (1, 7), (2, 16), (3, 31) \}$ then find values of a and b	Basic
7	If $f(x) = 5x - 2$, $g(x) = 2x - 3$ then find value of $f(g(x))$	Basic

Work Sheet 2

Q. No.	Statement	Level
1.	Similar matrices have same eigenvalues	Advanced
2.	An eigenvector can-not correspond to two distinct eigenvalues	Advanced

c. Course Name (Course Code) : Ordinary Differential Equations (MTH663)

Action taken for Slow Learners

1. Work Sheets were provided to them and level was basic
2. Work Sheets were discussed in the class and students shared their solutions

Action taken for Advanced Learners

1. Work Sheets were provided to them and level was advanced
2. Work Sheets were discussed in the class and they were also guided by the classmates

Work Sheet

Explain the following :

1. Picard's Method of Successive Approximations
2. Fundamental Set of Solutions
3. Fundamental Matrix
4. Orthogonality of functions
5. Sturm Liouville Boundary Value Problems
6. Green's Function for Boundary Value Problems
7. Power series solution of differential equation about an ordinary point
8. Methods to solve simultaneous differential equations

d. Course Name (Course Code) : Engineering Mathematics (MTH151A)

Action taken for Slow Learners

1. Work Sheets were provided to them and level was basic
2. Work Sheets were discussed in the class and students shared their solutions

Action taken for Advanced Learners

1. Work Sheets were provided to them and level was advanced
2. Work Sheets were discussed in the class and they were also guided by the classmates

Work Sheets

Work Sheet 1

Q. No.	Statement	Level
1	Solve $\frac{d^2y}{dx^2} + 2y = 0$	Basic
2	Solve $\frac{d^2y}{dx^2} + 2y = e^{3x}$	Basic
3	Solve $\frac{d^2y}{dx^2} + 2y = x^2$	Basic
4	Solve $\frac{d^2y}{dx^2} + 2y = e^x$	Basic
5	Solve $\frac{d^2y}{dx^2} + 2y = \cos 2x$	Basic
6	Solve $\frac{d^2y}{dx^2} + 2y = x^2 e^{3x}$	Advanced
7	Solve $\frac{d^2y}{dx^2} + 2y = e^x \cos 2x$	Advanced
8	Solve $\frac{d^2y}{dx^2} + 2y = x^2 e^{3x} + e^x \cos 2x$	Advanced

Work Sheet 2

Q. No.	Statement	Level
1	Solve $(D - 2)^2 y = 0$	Basic
2	Solve $(D - 2)^2 y = e^{2x}$	Basic
3	Solve $(D - 2)^2 y = \sin 2x$	Basic
4	Solve $(D - 2)^2 y = x^2$	Basic
5	Solve $(D - 2)^2 y = e^{2x} + \sin 2x$	Advanced
6	Solve $(D - 2)^2 y = e^{2x} + \sin 2x + x^2$	Advanced
7	Solve $(D - 2)^2 y = 8(e^{2x} + \sin 2x + x^2)$	Advanced



Students giving presentation to the class mates

e. **Course Name (Course Code) : Numerical Methods/ Analysis (MTH256A / MTH551A)**

Action taken for Slow Learners

1. Work Sheets were provided to them and level was basic
2. Work Sheets were discussed in the class and students shared their solutions

Action taken for Advanced Learners

1. Work Sheets were provided to them and level was advanced
2. Work Sheets were discussed in the class and they were also guided by the classmates

Work Sheet

Write the formulas for the following Numerical Methods :

1. Bisection Method
2. Regula Falsi Method
3. Secant method
4. Newton Raphson Method
5. Iteration Method
6. Newton's Forward , Backward and divided difference
7. Gauss's Forward and Backward difference
8. Stirling and Bessel interpolation
9. Lagrange and Hermite interpolation
10. Trapezoidal, Simpson's 1/3, Simpson's 3/8, Boole's and Weddle's rule
11. Picard's Method , Taylor Series Method, Euler's Method and Runge - Kutta Method
12. Gauss elimination and Gauss Jordan Method
13. Jacobi and Gauss Seidal Method
14. Power Method

Department of Chemistry
Session-22232
Action Taken Report for Slow and Advanced Learners

1. Faculty Name: Dr. Sapna Sethi

Course Code and Course name: CHE 385A and Instrumental Methods of Analysis

Action taken for Slow Learners

Assignments given on more challenging topics (Open-ended assignment)

Extra classes taken

Action taken for Advanced Learners

Assignments given on more challenging topics (Open-ended assignment)

Extra classes taken

Course Code and Course name: CHE 510C and Spectroscopy-I

Action taken for Slow Learners

Assignments given on more challenging topics (Open-ended assignment)

Action taken for Advanced Learners

Assignments given on more challenging topics (Open-ended assignment)

2. Faculty Name: Dr. Rekha Gaba

Course Code and Course name: CHE221A and Physical Chemistry -IV

Action taken for Slow Learners

The student has not come for extra classes.

Action taken for Advanced Learners

Assignment was given.

3. Faculty Name: Dr. Ahmad Husain

Course Code and Course name:CHE315A and Inorganic Chemistry IV

Action taken for Slow Learners

Action taken for Advanced Learners

1. Assignment was given and received from students
2. Extra Lectures were conducted

Course Code and Course name:CHE613B and Supramolecular Chemistry

Action taken for Slow Learners

Action taken for Advanced Learners

1. Assignment was given and received from students
2. Extra Lectures were conducted

4. Faculty Name: Dr Ankush Gupta

Course Code and Course name: CHE117A and Physical Chemistry-II

Action taken for Slow Learners

Assignment was given and received from students

Action taken for Advanced Learners

Assignment was given and received from students

Faculty Name: Dr Ankush Gupta

Course Code and Course name: EDu168 and Physical Chemistry-I

Action taken for Slow Learners

Nil

Action taken for Advanced Learners

Assignment was given and received from students

5. Faculty Name: Dr Bandna Bharti

Course Code and Course name: CHE611B and Biophysical Chemistry

Action taken for Slow Learners

Extra classes were conducted

Action taken for Advanced Learners

Assignment was given and received from the students

Course Code and Course name: CHE381A and Green Chemistry

Action taken for Slow Learners

Nil

Action taken for Advanced Learners

Assignment was given and received from students

Course Code and Course name: CHE151A and Chemistry

Action taken for Slow Learners

Extra classes were conducted

Action taken for Advanced Learners

Project model was given.

6. Faculty Name: Dr Gagandeep Kaur

Course Code and Course name: CHE115A and Organic Chemistry I

Action taken for Slow Learners

Assignment was given and received from students

Action taken for Advanced Learners

Assignment was given and received from students

Course Code and Course name: CHE219A and Organic Chemistry III

Action taken for Slow Learners

Assignment was given and received from students

Action taken for Advanced Learners

Assignment was given and received from students

7. Faculty Name: Dr. Samriti Thakur

Course Code and Course name: CHE217 and Inorganic Chemistry -III

Action taken for Slow Learners

The student has not come for extra classes.

Action taken for Advanced Learners

Assignment was given along with extra classes.

Course Code and Course name: CHE624 and Electroanalytical Chemistry

Action taken for Slow Learners

Assignment was given along with extra classes.

Action taken for Advanced Learners

Assignment was given along with extra classes.

8. Faculty Name: Dr. Harminder Singh

Course Code and Course name: EDU 302 and Organic Chemistry -II

Action taken for Slow Learners

Assignment was given

Action taken for Advanced Learners

Assignment was given

Course Code and Course name: CHE 509B and Physical Chemistry -II

Action taken for Slow Learners

No slow learners in this course

Action taken for Advanced Learners

Assignment was given

Course Code and Course name: CHE 615B and Chemistry of Materials

Action taken for Slow Learners

No slow learners in this course

Action taken for Advanced Learners

Assignment was given

9. Faculty Name: Dr. Gurpreet Kaur and Prof. K. N. Kaul

Course Code and Course name CHE610B and Bioinorganic Chemistry

Action taken for Slow Learners

Assignment was given and received from students

Action taken for Advanced Learners

Assignment was given and received from students

Course Code and Course name CHE508B and Inorganic Chemistry-II

Action taken for Slow Learners

Assignment was given and received from students

Action taken for Advanced Learners

Assignment was given and received from students

Course Code and Course name EDU242 and Inorganic Chemistry-II

Action taken for Slow Learners

Assignment was given and received from students

Action taken for Advanced Learners

Assignment was given and received from students

10. Faculty Name: Dr. Nisha Devi

Course Code and Course name: CHE 157 and General Chemistry I

Action taken for Slow Learners

Assignments given and received from students

Extra classes taken

Action taken for Advanced Learners

Assignments given on more challenging topics

Extra classes taken

Course Code and Course name: CHE 257 and General Chemistry II

Action taken for Slow Learners

Assignments given and received from students

Extra classes taken

Action taken for Advanced Learners

Assignments given on more challenging topics

Extra classes taken

Course Code and Course name: CHE 151A and Chemistry

Action taken for Slow Learners

Assignments given and received from students

Extra classes taken

Action taken for Advanced Learners

Assignments given on more challenging topics

Extra classes taken

11. Faculty Name: Dr. Ekta

Course Code and Course name: CHE609B and Organic Chemistry VI

Action taken for Slow Learners

No slow learner

Action taken for Advanced Learners

Assignments given on more challenging topics

Extra classes taken

Course Code and Course name: CHE317A and Organic Chemistry V

Action taken for Slow Learners

No slow learner

Action taken for Advanced Learners

Assignments given on more challenging topics

Extra classes taken

Course Code and Course name: CHE507B and Organic Chemistry II

Action taken for Slow Learners

Assignments of important topics were to given

Extra classes were taken

Action taken for Advanced Learners

Assignments of advanced topics were given to students

Extra classes were taken

Department of Mathematics

Action Taken Report for Slow and Advanced Learners

Faculty Name: Dr. Shelly Garg

a. Course Name (Course Code): Theory of Equations (MTH127)

Action taken for Slow Learners

1. Assignment was given
2. Provided links of video lectures for better understanding

<https://www.youtube.com/watch?v=4RNTicU7h18>

<https://www.youtube.com/watch?v=VualtuINKdU>

Action taken for Advanced Learners

Assignment was given with advanced calculations

Assignment for Slow Learners

Q. No.	Question	CO Mapped	RBT Level
1	Find superior and inferior limit of positive roots of the equation $x^4 - 4x^3 + 33x^2 - 2x + 18 = 0$	CO3	L3
2	Evaluate $(1 + \sqrt{3}i)^5 + (1 - \sqrt{3}i)^5$.	CO3	L3
3	Using Sturm's theorem, find the nature of the roots of the equation $x^4 - 5x^3 + 9x^2 - 7x + 2 = 0$	CO4	L3
4	Diminish the roots of equation $2x^5 - x^3 + 10x - 8 = 0$ by 5 and write down new equation.	CO2	L3

Assignment for Advanced Learners

Q. No.	Question	CO Mapped	RBT Level
1	Find the nature of roots of the equation $x^6 - 7x^5 + 16x^4 - 40x^2 + 48x - 16 = 0$, using Sturm's theorem.	CO4	L3
2	Find superior and inferior limit of positive roots of the equation $x^5 + 4x^4 - 7x^3 - 35x^2 + 3x - 8 = 0$	CO3	L5

3	Find the nature and situation of real roots of the equation $x^4 + 3x^3 + 7x^2 + 10x + 1 = 0$	CO4	L5
4	Find the condition so that all roots of the equation $z^4 + 6Hz^2 + 4Gz + a^2I - 3H^2 = 0$ are real.	CO4	L5

Course Outcomes (COs): After successfully completing this course the students will be able to
CO1: Learn general properties of polynomials and equations, nature of roots of an equation and relation between roots and coefficients.
CO2: Solve the reciprocal equations. Transform the equation according to various given conditions and to solve cubic and biquadratic equations
CO3: Find the sum of the power of the roots of an equation using Newton's Method.
CO4: Location and nature of roots by Sturm's method. Condition for an equation to have real roots. Obtain integral and real roots of an equation.

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
	L1	L2	L3	L4	L5	L6
RBT Level No.						
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

b. Course Name (Course Code): Mathematics for Chemists (MTH580)

Action taken for Slow Learners

1. Assignment having basic problems was given
2. Provided links of video lectures for better understanding
<https://www.youtube.com/watch?v=URvh5GOgzQ0>

Action taken for Advanced Learners

1. Advanced Assignment was given
2. Provided links of video lectures
<https://archive.nptel.ac.in/courses/106/106/106106183/>
<https://archive.nptel.ac.in/courses/111/106/111106146/>

Assignment for Slow Learners

Q. No.	Question	CO Mapped	RBT Level
1	In how many ways can the letters of the word PERMUTATIONS be arranged if the words start with P and end with S?	CO3	L3
2	How many 4 digit numbers are there with no digit repeated?	CO3	L3
3	Evaluate the integral $\int e^x \cos(e^x) dx$	CO4	L3
4	Evaluate the integral $\int \frac{1}{(x+5)(x-7)} dx$	CO4	L3

Assignment for Advanced Learners

Q. No.	Question	CO Mapped	RBT Level
1	How many words, with or without meaning, each of 3 vowels and 2 consonants can be formed from the letters of the word INVOLUTE?	CO4	L3
2	In how many ways can 5 girls and 3 boys be seated in a row so that no two boys are together?	CO4	L3
3	Evaluate the integral $\int \frac{x^5}{1+x^{12}} dx$	CO3	L5
4	Evaluate the integral $\int \frac{\cos x}{(2+\sin x)(3+\sin x)} dx$	CO3	L5

Course Outcomes (COs): After successfully completing this course the students will be able to
CO1: dealing with the basic properties of Matrices and determinants and to find the eigen values, eigen vectors.
CO2: Learn different formulas to find derivative of a given function
CO3: Different methods to find integration, definite integrals
CO4: learn the concepts of permutation and combination along with the basic probability techniques.

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
	L1	L2	L3	L4	L5	L6
RBT Level No.						
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

1. Faculty Name: Dr. Raj Kumar

a. Course Name (Course Code): Theory of Real Functions (MTH221A)

Action taken for Slow Learners

1. Arranged remedial classes.
2. Motivated to solve fundamental problems through assignments.
3. Motivated to go through the content of NPTEL related to the subject.

Action taken for Advanced Learners

1. Discussed advanced problems related to the subject concern.
2. Motivated for online courses related to the subject.

Class/Semester: B.Sc. (Hons) Mathematics/IVth

Subject with Code: Theory of Real Functions (MTH221A)

Assignment No. 1 (Slow Learners)

Date of Issue: 20/03/2023

Due date of Submission: 30/03/2023

Q. No.	Question	CO Mapped	RBT Level
1	Discuss about continuity and uniform continuity of a function.	CO1	L2
2	Write a note about Cauchy's criterion for finite limit of functions.	CO1	L3
3	Discuss about various types of discontinuities.	CO3	L2

Assignment No. 2 (Advanced Learners)

Date of Issue: 20/03/2023

Due date of Submission: 30/03/2023

Q. No.	Question	CO Mapped	RBT Level
1	Find the points of continuity and discontinuity, if any, of the function $f(x) = \begin{cases} x: & x \text{ is rational} \\ -x: & x \text{ is irrational} \end{cases}$	CO1	L4
2	Discuss about the inverse of a monotonic continuous function.	CO1	L5
3	Write a detailed note about chain rule of derivative.	CO3	L4

Course Outcomes (COs): After successfully completing this course the students will be able to

CO1: Students will be able to demonstrate competence with the concepts of limit and continuity of functions of real variable.
CO2: Students will be able to demonstrate competence with the concepts of uniform continuity and derivative of functions of real variable.
CO3: Students will be able to demonstrate competence with the applications of the continuous functions such as Rolle's Theorem, Mean Value Theorem, Extreme Values etc.
CO4: Students will be able to demonstrate competence with the series expansion of continuous functions.

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
	L1	L2	L3	L4	L5	L6
RBT Level No.						
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

b. Course Name (Course Code): Ordinary Differential Equations (MTH128)

Action taken for Slow Learners

- 1 Arranged remedial classes.
- 2 Motivated to solve fundamental problems through assignments.
3. Motivated to go through the content of NPTEL related to the subject.

Action taken for Advanced Learners

1. Discussed advanced problems related to the subject concern.
2. Motivated for online courses related to the subject.

Class/Semester: B.Sc.(Hons)Mathematics/2nd

Subject with Code:): Ordinary Differential Equations(MTH128)

Assignment No. 1 (Slow Learners)

Date of Issue: 20/03/2023

Due date of Submission: 27/03/2023

Max marks: 10

Q. No.	Question	CO Mapped	RBT Level
1	Write a short note about differential equations.	CO2	L3
2	Discuss about order, degree and types of differential equations.	CO1	L2
3	Solve $(1 + x^2) \frac{dy}{dx} = xy - y^2$.	CO2	L3

Assignment No. 2 (Advanced Learners)

Date of Issue: 20/03/2023

Due date of Submission: 27/03/2023

Q. No.	Question	CO Mapped	RBT Level
1	Discuss about Singular Solutions.	CO2	L4
2	Discuss about extraneous loci.	CO1	L6
3	Write a detailed note about Wronskian.	CO1	L5

Course Outcomes (COs): After successfully completing this course the students will be able to
CO1: Students will be able to demonstrate competence in finding solutions of first order first degree differential equations.
CO2: Students will be able to demonstrate competence in finding solutions of first order but not of first degree differential equations.
CO3: Students will be able to demonstrate competence in finding solutions of higher order differential equations.
CO4: Students will be able to demonstrate competence in making models of real world problems using differential equations.

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
	L1	L2	L3	L4	L5	L6
RBT Level No.						
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

Department of Mathematics

Action Taken Report for Slow and Advanced Learners

1. Faculty Name : Dr. Vinod Kumar

a. Course Name (Course Code): Discrete Mathematics (MTH666A)

Action taken for Slow Learners (No Slow Learner)

- 1.
- 2.
- 3.

Action taken for Advanced Learners

1. Advanced Assignment given to them.
2. NPTEL video lecture given to them. Link is given below

<https://youtu.be/WW7YO0b4QHs>

Class/Semester: M.Sc. (Hons) Mathematics/4th

Subject with Code: Discrete Mathematics (MTH666A)

Assignment No. 1

Date of Issue: 17/03/2023

Due date of Submission: 24/03/2023

Q. No.	Question	CO Mapped	RBT Level
1	Solve the recurrence relation using the method of generating functions $a_n = \begin{cases} a_{n-1} + n, n \geq 1 \\ 1 \text{ if } n = 0 \end{cases}$	CO2	L5
2	Without using generating function, find the solution of the recurrence relation $a_n = 5a_{n-1} - 6a_{n-2} + 7^n$.	CO2	L5
3	If 20 candidates appear in a competitive examination then show that there exists at least two among them whose roll number differ by a multiple of 19. (Use Pigeonhole principle)	CO2	L6
4	In a class of 80 students, 50 students know English, 55 know French and 46 know German, 37 students know English and French, 28 students know French and German, 7 students know none of the language. Find how many know only one language.	CO1	L5
5	Let $B = \{1,5,7,35\}$ be the set of all positive factors of 35. Two binary operations '+' and '.' Are defined as follows: $a + b = lcm(a, b)$, $a \cdot b = hcf(a, b) \forall a, b \in B$. A unary operation '′' on B is defined as $a' = \frac{35}{a} \forall a, b \in B$.	CO3	L4

Course Outcomes (COs): After successfully completing this course the students will be able to

CO1: Learn fundamental of logics, truth tables, quantifiers and counting techniques.

CO2: Learn Pigeonhole principle, solution of recurrence relations and generating functions.
CO3: Learn graph theory, Handshaking theorem, Planar and Non-planar graph.
CO4: Boolean Algebra, Logic Gates and Lattice theory.

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
	RBT Level No.	L1	L2	L3	L4	L5
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

b. Course Name (Course Code): Number Theory(MTH668)

Action taken for Slow Learners (No Slow Learner)

- 1.
- 2.
- 3.

Action taken for Advanced Learners

1. Advanced Assignment given to them.
2. NPTEL video lecture given to them. Link is given below

<https://youtu.be/qWPMc6dusbM>

Class/Semester: M.Sc.(Hons)Mathematics/4th

Subject with Code: Number Theory (MTH668)

Assignment No. 1

Date of Issue: 16/03/2023

Due date of Submission: 23/03/2023

Max marks: 10

Q. No.	Question	CO Mapped	RBT Level
1	Using the Euclidean Algorithm, find the values of x and y which satisfy $71x - 50y = 1$.	CO1	L4
2	Prove that if p is a prime number and $p a^k$ then show that $p^k a^k$.	CO1	L6
3	Find the remainder when 4444^{4444} is divided by 9.	CO1	L5
4	Show that $2^{15} \cdot 14^{40} + 1$ is divisible by 11.	CO1	L5
5	Find integers x, y, z satisfying $(198,288,512) = 198x + 288y + 512z$	CO1	L6

Course Outcomes (COs): After successfully completing this course the students will be able to
CO1: Learn Division Algorithm, Congruences and reduced residue system.
CO2: Learn Chinese Remainder theorem, Euler's theorem and Arithmetic functions
CO3: Learn Quadratic residues and twin primes and Fermat's numbers.
CO4: Learn Diophantine Linear Equations and Continued fractions.

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
	L1	L2	L3	L4	L5	L6
RBT Level No.						
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

c. Course Name (Course Code): Numerical Analysis (MTH562A)**Action taken for Slow Learners (No Slow Learner)**

- 1.
- 2.
- 3.

Action taken for Advanced Learners

1. Advanced Assignment given to them.
2. NPTEL video lecture given to them. Link is given below

<https://youtu.be/qWPMc6dusbM>

Class/Semester: M.Sc.(Hons)Mathematics/2nd

Subject with Code: Numerical Analysis (MTH562A)

Assignment No. 1

Date of Issue: 16/03/2023

Due date of Submission: 23/03/2023

Max marks: 10

Q. No.	Question	CO Mapped	RBT Level
1	Evaluate $\sqrt{29}$ to five decimal places by Newton Raphson Method, taking $x_0 = 5.3$.	CO1	L6
2	Using, False Position Method, find the real root of $x \tan x = -1$.	CO1	L5
3	Using Muller's Method, find a root of the equation $x^3 + 2x^2 + 10x - 20 = 0$ taking $x_0 = 0$, $x_1 = 1$ and $x_2 = 2$.	CO1	L6
4	Find the root of the equation $x^3 - 2x - 5 = 0$ using the Secant method correct to three decimal places.	CO1	L5
5	Using Bisection Method, find the root of the equation $x^3 - 4x - 8.95 = 0$.	CO1	L5

Course Outcomes (COs): After successfully completing this course the students will be able to
CO1: Find the solution of algebraic as well as transcendental equations using various methods.
CO2: Do Interpolation using various methods.
CO3: Find the solution of system of equations, eigen values & eigen vectors, Curve fitting.
CO4: Do Numerical integration and able to find solution of differential equations.

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
	L1	L2	L3	L4	L5	L6
RBT Level No.	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

Class/ Semester: M.Sc.(Hons)Mathematics/2nd

Subject with Code: Numerical Analysis (MTH562A)

Assignment No. 2

Date of Issue: 20/03/2023

Due date of Submission: 27/03/2023

Q. No.	Question	CO Mapped	RBT Level										
1	Apply Gauss Jordan method to solve the equations $x + 3y + 3z = 16, z + 4y + 3z = 18, x + 3y + 4z = 19.$	CO3	L5										
2	Apply Factorization method to solve the equations $x + 2y + 3z = 14, 2x + 3y + 4z = 20, 3x + 4y + z = 14.$	CO3	L3										
3	Using Given's method, reduce the following matrix to the tri-diagonal form $A = \begin{bmatrix} 2 & 1 & 3 \\ 1 & 4 & 2 \\ 3 & 2 & 3 \end{bmatrix}.$	CO3	L6										
4	Use the Power method to evaluate the eigen values of the matrix $A = \begin{bmatrix} 10 & -4 & 0 \\ -6 & 9 & -3 \\ 0 & -6 & 6 \end{bmatrix}.$	CO3	L6										
5	Fit a curve of the form $y = ae^{bx}$ to the following data: <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>x</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>y</td> <td>1.05</td> <td>2.10</td> <td>3.85</td> <td>8.30</td> </tr> </table>	x	0	1	2	3	y	1.05	2.10	3.85	8.30	CO3	L5
x	0	1	2	3									
y	1.05	2.10	3.85	8.30									

Course Outcomes (COs): After successfully completing this course the students will be able to
CO1: Find the solution of algebraic as well as transcendental equations using various methods.
CO2: Do Interpolation using various methods.
CO3: Find the solution of system of equations, eigen values & eigen vectors, Curve fitting.
CO4: Do Numerical integration and able to find solution of differential equations.

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTS)			Higher Order Thinking Levels (HOTS)		
RBT Level No.	L1	L2	L3	L4	L5	L6
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

d. Course Name (Course Code): Ring Theory & Linear Algebra-I(MTH347)

Action taken for Slow Learners

1. Basic assignment given to them.
2. NPTEL video lecture given to them. Link is given below
<https://youtu.be/yKRbG9Y5pYY>

Action taken for Advanced Learners

1. Advanced Assignment given to them.
2. NPTEL video lecture given to them. Link is given below
<https://youtu.be/yKRbG9Y5pYY>

MTH347 (Ring Theory and Linear Algebra)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Class/ Semester: B.Sc.(Hons)Mathematics/6th

Subject with Code: Ring Theory and Linear Algebra-I (MTH347)

Assignment No. 2 (Slow Learner)

Date of Issue: 16/03/2023

Due date of Submission: 23/03/2023

Q. No.	Question	CO Mapped	RBT Level
1	Show that the set of all matrices of order 2×2 of the form $\begin{bmatrix} a & 0 \\ b & c \end{bmatrix}$, where a, b, c are integers of the ring M of all matrices of order 2×2 with integral elements.	CO1	L5
2	Show that characteristic of an integral domain is either zero or prime number.	CO1	L6
3	Show that z_7 is an integral domain.	CO1	L6
4	Find all prime ideals of Z .	CO1	L6
5	Find the non-trivial ring homomorphism of $\psi: z_{12} \rightarrow z_{28}$.	CO2	L5

Course Outcomes (COs): After successfully completing this course the students will be able to
CO1: Learn about rings, subrings, factor ring, integral domain, ideals, prime ideals and maximal ideals.
CO2: Learn about ring homomorphism, properties of ring homomorphism, Isomorphism theorems, Field of quotients.
CO3: Vector spaces, subspaces, basis and dimension, Linear combination of vectors, Linear span, L.D. and L.I.
CO4: Linear transformation, rank and nullity, Isomorphism theorems.

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
	L1	L2	L3	L4	L5	L6
RBT Level No.						
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

Class/Semester: B.Sc.(Hons)Mathematics/6th

Subject with Code: Ring Theory and Linear Algebra-I (MTH347)

Assignment No. 1 (Advance Learner)

Date of Issue: 16/03/2023
23/03/2023

Due date of Submission:

Max marks: 10

Q. No.	Question	CO Mapped	RBT Level
1	$R = \mathbb{Z}_7[i]$ is an integral domain then $(\mathbb{Z}_7[i]^*, \cdot) \cong ?$	CO1	L6
2	If \mathbb{Z}_{12} is commutative ring with unity then find its all prime ideals.	CO1	L5
3	If \mathbb{Z}_{12} is commutative ring with unity then find its all maximal ideals.	CO1	L5
4	Show that the set of numbers of the form $a + b\sqrt{2}$, where a and b are rational numbers, is a field with respect to addition and multiplication.	CO1	L5
5	If ϕ is a homomorphism of a ring R into a ring R' and let S be an ideal of R then show that $\phi(S)$ is an ideal of $\phi(R)$.	CO2	L6

Course Outcomes (COs): After successfully completing this course the students will be able to
CO1: Learn about rings, subrings, factor ring, integral domain, ideals, prime ideals and maximal ideals.
CO2: Learn about ring homomorphism, properties of ring homomorphism, Isomorphism theorems, Field of quotients.
CO3: Vector spaces, subspaces, basis and dimension, Linear combination of vectors, Linear span, L.D. and L.I.
CO4: Linear transformation, rank and nullity, Isomorphism theorems.

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
RBT Level No.	L1	L2	L3	L4	L5	L6
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

Class/ Semester: B.Sc.(Hons)Mathematics/6th
Subject with Code: Ring Theory and Linear Algebra-I (MTH347)

Assignment No. 2 (Slow Learner)

Date of Issue: 16/03/2023
23/03/2023

Due date of Submission:

Q. No.	Question	CO Mapped	RBT Level
1	Show that the set of all matrices of order 2×2 of the form $\begin{bmatrix} a & 0 \\ b & c \end{bmatrix}$, where a, b, c are integers of the ring M of all matrices of order 2×2 with integral elements.	CO1	L5
2	Show that characteristic of an integral domain is either zero or prime number.	CO1	L6
3	Show that z_7 is an integral domain.	CO1	L6
4	Find all prime ideals of Z .	CO1	L6
5	Find the non-trivial ring homomorphism of $\psi: z_{12} \rightarrow z_{28}$.	CO2	L5

Course Outcomes (COs): After successfully completing this course the students will be able to
CO1: Learn about rings, subrings, factor ring, integral domain, ideals, prime ideals and maximal ideals.
CO2: Learn about ring homomorphism, properties of ring homomorphism, Isomorphism theorems, Field of quotients.
CO3: Vector spaces, subspaces, basis and dimension, Linear combination of vectors, Linear span, L.D. and L.I.
CO4: Linear transformation, rank and nullity, Isomorphism theorems.

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
	L1	L2	L3	L4	L5	L6
RBT Level No.						
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

Department of Mathematics

Action Taken Report for Slow and Advanced Learners

1. Faculty Name: Dr. Rajesh Joshi

a. Course Name (Course Code): Engineering Mathematics-II (MTH152A)

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/gFjIBKW8aZU>, <https://youtu.be/mPZh-D4Drj4>, <https://youtu.be/qNZxf0j41tw>
3. Extra time 2:30pm to 3:30pm (Every Monday for clearing their doubts).

Action taken for Advanced Learners

1. Advanced Assignment given to them (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/gFjIBKW8aZU>, <https://youtu.be/mPZh-D4Drj4>, <https://youtu.be/qNZxf0j41tw>

Proof of Assignments

Instructions

MTH152A (Engineering Mathematics-II)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)					
Subject Name	Engineering Mathematics-II			Subject Code	MTH152A
Faculty Name	Dr. Rajesh Joshi	Date of Issue	10/03/2023	Date of Submission	17/03/2023

Assignment for Slow Learners:

1. Find all the values of $\left(\frac{1}{2} + \frac{i\sqrt{3}}{2}\right)^{\frac{3}{4}}$ and show that the continued product of these values is 1.
2. Find the length of the arc of the parabola $x^2 = 4ay$ measured from the vertex to one extremity of the latus-rectum.
3. Find the area of a loop of the curve $r = a \sin 3\theta$.
4. Find the length of one arch of the cycloid $x = a(t - \sin t), y = a(1 - \cos t)$.
5. Find the area enclosed between one arch of the cycloid $x = a(\theta - \sin \theta), y = a(1 - \cos \theta)$; and its base.

- Expand $\sin^7 \theta \cos^3 \theta$ in a series of sines of multiples of θ .
- Find the area common to the circles $r = a\sqrt{2}$ and $r = 2a \cos \theta$.
- Find the volume of the solid generated by revolving the lemniscate $r^2 = a^2 \cos 2\theta$ about the line $\theta = \frac{\pi}{2}$.
- Find the sum to infinity of the series $1 - \frac{1}{2} \cos \theta + \frac{1.3}{2.4} \cos 2\theta - \frac{1.3.5}{2.4.6} \cos 3\theta + \dots$ ($-\pi < \theta < \pi$).

Assignment: 01 (Advanced Learners)					
Subject Name	Engineering Mathematics-II			Subject Code	MTH152A
Faculty Name	Dr. Rajesh Joshi	Date of Issue	10/03/2023	Date of Submission	17/03/2023

Assignment for Advanced Learners:

- Find all the values of $\left(\frac{1}{2} + \frac{i\sqrt{3}}{2}\right)^{\frac{3}{4}}$ and show that the continued product of these values is 1.
- Find the length of the arc of the parabola $x^2 = 4ay$ measured from the vertex to one extremity of the latus-rectum.
- Find the area of a loop of the curve $r = a \sin 3\theta$.
- Find the length of one arch of the cycloid $x = a(t - \sin t), y = a(1 - \cos t)$.
- Find the area enclosed between one arch of the cycloid $x = a(\theta - \sin \theta), y = a(1 - \cos \theta)$; and its base.
- If $\theta_1, \theta_2, \theta_3$ be three values of θ which satisfy the equation $\tan 2\theta = \lambda \tan(\theta + \alpha)$ and as such that no two of them differ by a multiple of π , show that $\theta_1 + \theta_2 + \theta_3 + \alpha$ is a multiple of π .
- Find the entire length of the cardioid $r = a(1 + \cos \theta)$. Also show that upper half is bisected by $\theta = \frac{\pi}{3}$.
- Find the surface of the solid formed by revolving the cardioid $r = a(1 + \cos \theta)$.
- State and prove De-Moivre's theorem.

b. Course Name (Course Code): Engineering Mathematics-III (MTH252A)

Action taken for Slow Learners

- Basic Assignment given to them as per their knowledge. (Assignment at the bottom)
- Extra time 2:30pm to 3:30pm (Every Monday for clearing their doubts).
- Online NPTEL video lectures are provided to them and whose links are as follows:
https://youtu.be/LGxE_yZYigI , <https://youtu.be/c9NibpoQjDk> , <https://youtu.be/NL-nGACP3Ws> .

Action taken for Advanced Learners

- Advanced Assignment given to them. (Assignment at the bottom)
- Online NPTEL video lectures are provided to them and whose links are as follows:
https://youtu.be/LGxE_yZYigI , <https://youtu.be/c9NibpoQjDk> , <https://youtu.be/NL-nGACP3Ws>, <https://youtu.be/NL-nGACP3Ws>

Proof of Assignments

MTH252A (Engineering Mathematics-III)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)					
Subject Name	Engineering Mathematics-III			Subject Code	MTH252A
Faculty Name	Dr. Rajesh Joshi	Date of Issue	11/03/2023	Date of Submission	18/03/2023

Assignment for Slow Learners:

1. If $f(x) = \begin{cases} -\pi, & -\pi < x < 0 \\ x, & 0 < x < \pi \end{cases}$, find b_n .
2. Compute $L(t^3 e^{-3t})$.
3. If $L(f(t)) = f(s)$, then $L(f(at)) = \frac{1}{a} f\left(\frac{s}{a}\right)$.
4. Compute $L(e^{-3t}(2 \cos 5t - 3 \sin 5t))$.
5. If $f'(t)$ be continuous and $L(f(t)) = f(s)$, then prove that $L(f'(t)) = sf(s) - f(0)$.
6. Express $f(x) = x^2$ in the interval $(-l, l)$.
7. Find the Laplace transform of $\frac{\cos at - \cos bt}{t}$.
8. Evaluate $L\left\{\int_0^t \frac{e^t \sin t}{t} dt\right\}$.
9. If $f(x) = |\cos x|$, expand $f(x)$ as a Fourier series in the interval $(-\pi, \pi)$.

Assignment: 01 (Advanced Learners)					
Subject Name	Engineering Mathematics-III			Subject Code	MTH252A
Faculty Name	Dr. Rajesh Joshi	Date of Issue	11/03/2023	Date of Submission	18/03/2023

Assignment for Advanced Learners:

1. If $f(x) = \begin{cases} -\pi, & -\pi < x < 0 \\ x, & 0 < x < \pi \end{cases}$, find b_n .
2. Compute $L(t^3 e^{-3t})$.
3. If $L(f(t)) = f(s)$, then $L(f(at)) = \frac{1}{a} f\left(\frac{s}{a}\right)$.
4. Compute $L(e^{-3t}(2 \cos 5t - 3 \sin 5t))$.
5. If $f'(t)$ be continuous and $L(f(t)) = f(s)$, then prove that $L(f'(t)) = sf(s) - f(0)$.
6. Express $f(x) = x$ as a half-range sine series in $0 < x < 2$.
7. Evaluate $\int_0^\infty t e^{-2t} \sin t dt$.
8. Find the Laplace transform of $f(t)$ defined as $f(t) = \begin{cases} \frac{t}{\tau}, & \text{when } 0 < t < \tau \\ 1, & \text{when } t > \tau \end{cases}$
9. Expand $f(x) = e^{-x}$ as a Fourier series in the interval $(-l, l)$

c. Course Name (Course Code): Metric Space and Complex Analysis (MTH343)

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom)
2. Extra time 2:30pm to 3:30pm (Every Monday for clearing their doubts).
3. Online NPTEL video lectures are provided to them and whose links are as follows:
https://youtu.be/r2x23g_5rhc , <https://youtu.be/gFjIBKW8aZU>

Action taken for Advanced Learners

1. Advanced Assignment given to them. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as
https://youtu.be/r2x23g_5rhc , <https://youtu.be/gFjIBKW8aZU>

Proof of Assignments

Instructions

MTH343 (Metric Space and Complex Analysis)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)					
Subject Name	Metric Space and Complex Analysis			Subject Code	MTH343
Faculty Name	Dr. Rajesh Joshi	Date of Issue	13/03/2023	Date of Submission	20/03/2023

Assignment for Slow Learners:

1. Let $X = \mathbb{R}$, be the set of real numbers. Define $d(x, y) = |x - y|, x, y \in X$. Prove that (X, d) is a metric space.
2. Give an example proving that arbitrary intersection of open sets need not be open.
3. Prove that $(A \cap B)^o \supset A^o \cup B^o$ where A^o, B^o are interior of A and B .
4. Give an example proving that every Cauchy sequence in a metric space need not be convergent.
5. Prove that usual metric space \mathbb{R}_d is not compact.
6. Let (X, d) be a metric space. Prove that each open sphere in X is an open set.
7. Prove that in a metric space, every convergent sequence has a unique limit.
8. Prove that a compact metric space has Bolzano-Weierstrass Property.
9. Let (X, d) be a compact metric space. Then a closed subset of X is compact.

Assignment: 01 (Advanced Learners)					
Subject Name	Metric Space and Complex Analysis			Subject Code	MTH343
Faculty Name	Dr. Rajesh Joshi	Date of Issue	13/03/2023	Date of Submission	20/03/2023

Assignment for Advanced Learners:

1. Let $X = \mathbb{R}$, be the set of real numbers. Define $d(x, y) = |x - y|, x, y \in X$. Prove that (X, d) is a metric space.
2. Give an example proving that arbitrary intersection of open sets need not be open.
3. Prove that $(A \cap B)^o \supset A^o \cup B^o$ where A^o, B^o are interior of A and B .
4. Give an example proving that every Cauchy sequence in a metric space need not be convergent.
5. Prove that usual metric space \mathbb{R}_x is not compact.
6. Let (X, d) be a metric space, and $A \subset X$. Then prove that A is closed if and only if its complement $(X - A)$ is open.
7. Prove that the metric space $C[0,1]$ is not complete with respect to metric defined by $d(x, y) = \int_0^1 |x(t) - y(t)| dt$.
8. Prove that a compact subset of a metric space is closed and bounded.
9. A metric space is sequentially compact if and only if it has Bolzano-Weierstrass Property.

d. Course Name (Course Code): Functional Analysis (MTH667)

Action taken for Slow Learners

No Slow Learner.

Action taken for Advanced Learners

1. Advanced Assignment given to them. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are
3. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/1D3d7ZxoTe4>

Proof of Assignments

Instructions

MTH343 (Metric Space and Complex Analysis)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment:					
Subject Name	Functional Analysis			Subject Code	MTH667
Faculty Name	Dr. Rajesh Joshi	Date of Issue	15/03/2023	Date of Submission	22/03/2023

Assignment:

1. In a normed linear space (X, d) , prove that $|\|x\| - \|y\|| \leq \|x - y\|, \forall x, y \in X$.
2. Let T be a bounded linear operator. Then, prove that $N(T)$ (null space of T) is closed.
3. Let X and Y be the normed spaces over the field K and $T: X \rightarrow Y$ be a linear operator. Then, T is continuous on X if and only if T is continuous at any point in X .
4. Give an example of unbounded linear operator.
5. Let X and Y be normed spaces over the field K and $T: X \rightarrow Y$ be a continuous linear operator. Then prove that T is bounded.
6. State and prove Holder's inequality.
7. A subspace Y of a Banach space X is complete if and only if the set Y is closed in X .
8. If a normed linear space X is finite-dimensional then every linear operator on X is bounded.
9. Let X and Y be normed spaces over the field K and $T: X \rightarrow Y$ be a linear operator. Then, T is bounded if and only if T maps bounded sets in X into bounded sets in Y .
10. Let T be a linear operator. Prove that if $\dim(D(T)) = n < \infty$, then $\dim R(T) \leq n$.
11. Let \mathbb{R}^n be the real normed space with the usual norm and $a = (a_1, a_2, \dots, a_n)$ be a fixed non-zero vector in \mathbb{R}^n . Define the functional $f: \mathbb{R}^n \rightarrow \mathbb{R}$ by $f(x) = x \cdot a$ where $x = (\xi_1, \xi_2, \dots, \xi_n) \in \mathbb{R}^n$ and $x \cdot a$ denotes the scalar product of x and a . Then, prove that f is a bounded linear functional on \mathbb{R}^n with $\|f\| = \|a\|$.
12. State and prove F. Riesz's Lemma.
13. Every finite dimensional normed linear space is complete.

Department of Mathematics

Action Taken Report for Slow and Advanced Learners

1. Faculty Name: Mr. Arun Kochar

a. Course Name (Course Code): Algebra-I (MTH552)

Action taken for Slow Learners

1. Simple and Basic assignments have been given to them.
2. Online NPTEL video lectures are provided to them and whose links are as follows:

<https://youtu.be/-tP-cxErI-A>

<https://youtu.be/S0hA-iWCp4g>

Action taken for Advanced Learners

1. Conceptual and competitive questions have been given to them.
2. Online NPTEL video lectures are provided to them and whose links are as follows:

<https://youtu.be/6rCR0A1gYUI>

<https://youtu.be/I3tJXbgJXoE>

<https://youtu.be/LNYaIdZTqDs>

Class/Semester: M.Sc. (Hons) Mathematics/IInd

Subject with Code: Algebra-I (MTH552)

Assignment No. 1 (Slow Learners)

Date of Issue: 16/03/2023

Due date of Submission: 22/03/2023

Q. No.	Question	CO Mapped	RBT Level
1	Give an example of an infinite group in which every element is of finite order.	CO1	L6
2	Show that any infinite cyclic group is isomorphic to $\langle \mathbb{Z}, + \rangle$ the group of integers.	CO1	L3
3	A homomorphism $f: G \rightarrow G'$ is one-one iff $\text{Ker } f = \{e\}$.	CO3	L4
4	State and prove Sylow's third theorem.	CO3	L4

Assignment No. 2 (Advanced Learners)

Date of Issue: 16/03/2023

Due date of Submission: 22/03/2023

Q. No.	Question	CO Mapped	RBT Level
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1	State and prove Lagrange's theorem for groups and for what type of groups its converse also exist? Explain it.	CO1	L6
2	Prove that every homomorphic image of a group G is isomorphic to a quotient group of G.	CO1	L3
3	Prove that G is abelian group iff $Z(G)=G$, where $Z(G)$ is the Centre of G	CO3	L4
4	State and prove second theorem of Isomorphism.	CO3	L4

Course Outcomes (COs): After successfully completing this course the students will be able to
CO1: illustrate the dihedral groups, symmetric groups, cyclic groups and analyze the applications of Lagrange's theorem.
CO2: understand the subnormal and normal series for the solvable groups.
CO3: understand the fundamental concepts of Sylow p-subgroups, Sylow theorems and their application in non-simplicity of groups.
CO4: connect the fundamental concepts of rings, subrings and ideals.

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
	L1	L2	L3	L4	L5	L6
RBT Level No.						
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

b. Course Name (Course Code): Partial Differential Equations (MTH677)

Action taken for Slow Learners

1. Simple and Basic assignments have been given to them. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:

<https://youtu.be/De-vi95YILE>
<https://youtu.be/btOCUmJkrrg>

Action taken for Advanced Learners

1. Advanced Assignment given to them.
2. NPTEL video lecture given to them. Link is given below

<https://youtu.be/De-vi95YILE>

Class/Semester: M.Sc.(Hons)Mathematics/4th

Subject with Code:): Partial Differential Equations(MTH677)

Assignment No. 1 (Slow Learners)

Date of Issue: 20/03/2023

Due date of Submission: 27/03/2023

Max marks: 10

Q. No.	Question	CO Mapped	RBT Level
1	Find general solution of $(D^3 - 6D^2D' + 11DD'^2 - 6D'^3)z = e^{5x+6y}$	CO2	L3
2	Solve $x(y^2 - z^2)p + y(z^2 - x^2)q - z(x^2 - y^2) = 0$.	CO1	L4
3	Solve $(D^3 - 4D^2D' + 4DD'^2)z = 4\sin(2x + y)$.	CO2	L5
4	Find a complete, singular and general integrals of $(p^2 + q^2)y - qz = 0$	CO1	L5

Assignment No. 2 (Advanced Learners)

Date of Issue: 20/03/2023

Due date of Submission: 27/03/2023

Q. No.	Question	CO Mapped	RBT Level
1	Solve $(D^2 + 3DD' + 2D'^2)z = (x+y)$.	CO2	L3
2	Find the integral surface of the partial differential equation $(x - y)p + (y - x - z)q = z$ through the circle $z = 1, x^2 + y^2 = 1$.	CO1	L4
3	Find a complete, singular and general integrals of $(p^2 + q^2)y - qz = 0$	CO1	L5
4	Find the general solution of partial differential equation $px(x + y) - qy(x + y) + (x - y)(2x + 2y + z) = 0$.	CO2	L5

Course Outcomes (COs): After successfully completing this course the students will be able to

CO1: describe theoretical aspects to solve linear and non-linear partial differential equations.

CO2: enumerate methods for solving second order and higher order partial differential equations.

CO3: describe model of physical phenomena using partial differential equations such as the heat equation, wave equation and Laplace equation.

CO4: analyze the fundamental solutions and applications of heat equation, wave equation and Laplace equation.

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
	L1	L2	L3	L4	L5	L6
RBT Level No.						
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

c. Course Name (Course Code): Multivariate Calculus (MTH321)

Action taken for Slow Learners

1. Simple and Basic assignments have been given to them. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:

<https://youtu.be/KgItZSst2sU>

https://youtu.be/w_KiHgultbM

Action taken for Advanced Learners

1. Advanced Assignment given to them.
2. NPTEL video lecture given to them. Link is given below

<https://youtu.be/4diXS8zbi3w>

<https://youtu.be/ArQ-aT3GVm0>

https://youtu.be/ksS_yOK1vtk

<https://youtu.be/mPZh-D4Drj4>

Class/Semester: B.Sc. (Hons) Mathematics/6th

Subject with Code: Multivariate Calculus (MTH321)

Assignment No. 1 (Slow Learners)

Date of Issue: 18/03/2023

Due date of Submission: 25/03/2023

Q. No.	Question	CO Mapped	RBT Level
1	If $z = \tan^{-1}\left(\frac{x^3+y^3}{x-y}\right)$, then prove that $x^2 \frac{\partial^2 z}{\partial x^2} + 2xy \frac{\partial^2 z}{\partial x \partial y} + y^2 \frac{\partial^2 z}{\partial y^2} = (1 - 4\sin^2 z)\sin 2z$.	CO1	L4
2	Evaluate $\iint \sqrt{x^2 y^2} \, dx \, dy$, over a region $A = \{(x, y): x \geq 0, x^2 + y^2 \leq 1\}$.	CO3	L3
3	Find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$ if $z = u^2 + v^2 + w^2$, where $u = ye^x, v = xe^{-y}, w = \frac{y}{x}$.	CO1	L3
4	Evaluate $\iint \sqrt{\frac{1-x^2-y^2}{1+x^2+y^2}} \, dx \, dy$, over the positive quadrant of the circle $x^2 + y^2 = 1$.	CO3	L5

Assignment No. 2 (Advanced Learners)

Date of Issue: 18/03/2023

Due date of Submission: 25/03/2023

Q. No.	Question	CO Mapped	RBT Level
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1	Evaluate $\iint y \, dx \, dy$, over a region bounded by the parabolas $y^2 - 2x = 0$ and $x^2 - 2y = 0$.	CO1	L4
2	For the function $f(x, y) = \sqrt{x^2 + y^2}$, calculate $f_x(x_0, y_0)$, $f_y(x_0, y_0)$ for $(x_0, y_0) \neq (0, 0)$. Check whether $f_x(0, 0)$ and $f_y(0, 0)$ exist or not.	CO3	L3
3	Find the extreme values of the function $f(x, y) = x^3 + y^3 - 3x - 12y + 20$.	CO1	L3
4	Evaluate by changing the order of the integration of $\int_0^1 \int_x^{\sqrt{2-x^2}} \frac{xy \, dx \, dy}{\sqrt{x^2+y^2}}$.	CO3	L5

Course Outcomes (COs): After successfully completing this course the students will be able to
CO1: understand basic concepts of limits, continuity, partial derivatives and applications of multivariate functions.
CO2: get in depth Knowledge of techniques for the evaluation of extreme value of multivariate functions.
CO3: learn various applications of double and triple integrals.
CO4: understand basics of vector calculus and its applications in interdisciplinary fields.

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
	L1	L2	L3	L4	L5	L6
RBT Level No.						
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

Faculty Name: Mr. Anmol Bajaj

a. Course Name (Course Code): Classical Mechanics (MTH152A)

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom)

2. Online video lectures are provided to them and whose links are as follows:

https://youtube.com/playlist?list=PLKS7ZMKnbPrS_-g4FAI-URADpCSOes1bg

(One link contains the whole playlist for unit-01).

<https://youtube.com/playlist?list=PLKS7ZMKnbPrRB35X151NvqpOwWW1NLcmL>

(One link contains the whole playlist for unit-02).

https://youtube.com/playlist?list=PLhSp9OSVmeyIY6IQGr-Z6LQO8_gMyk5R

(One link contains the whole playlist for unit-03).

<https://youtube.com/playlist?list=PLATr6JN15ruiKzyauE49SIqdfV5r8Wqam>

(One link contains the whole playlist for unit-04).

3. Extra time 1:30pm to 2:30pm (Every Tuesday for clearing their doubts).

Action taken for Advanced Learners

1. Advanced Assignment given to them (Assignment at the bottom)

2. Online NPTEL video lectures are provided to them and whose links are as follows:

https://youtube.com/playlist?list=PLKS7ZMKnbPrS_-g4FAI-URADpCSOes1bg

(One link contains the whole playlist for unit-01).

<https://youtube.com/playlist?list=PLKS7ZMKnbPrRB35X151NvqpOwWW1NLcmL>

(One link contains the whole playlist for unit-02).

https://youtube.com/playlist?list=PLhSp9OSVmeyIY6IQGr-Z6LQO8_gMyk5R

(One link contains the whole playlist for unit-03).

<https://youtube.com/playlist?list=PLATr6JN15ruiKzyauE49SIqdfV5r8Wqam>

(One link contains the whole playlist for unit-04).

Proof of Assignments

Instructions

MTH152A(Engineering Mathematics II)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)

Subject Name	Engineering Mathematics ii			Subject Code	MTH152A
Faculty Name	Mr. Anmol Bajaj	Date of Issue	18-Mar-2023	Date of Submission	25-Mar-2023

Very Short Answer Type: All Questions are compulsory. Each question should be answered within 5-8 lines.

Q. No.	Question	COs	RBT Level
Q1	i. Find all the values of $\left(\frac{1}{2} + \frac{i\sqrt{3}}{2}\right)^{\frac{3}{4}}$ and show that the continued product of these values is 1.	CO1	L3
	ii. Find the length of the arc of the parabola $x^2 = 4ay$ measured from the vertex to one extremity of the latus-rectum.	CO1	L4
	iii. Find the area of a loop of the curve $r = a \sin 3\theta$.	CO2	L1
	iv. Find the length of one arch of the cycloid $x = a(t - \sin t), y = a(1 - \cos t)$.	CO2	L3
	v. Find the area enclosed between one arch of the cardioid $x = a(\theta - \sin \theta), y = a(1 - \cos \theta)$; and its base.	CO2	L3

Section – B

Short Answer Type: Attempt all the 3 Questions with given internal choice. Each question should be answered in maximum 2 pages.

Q. No.	Question	COs	RBT Level
Q2	Expand $\sin^7 \theta \cos^3 \theta$ in a series of sines of multiples of θ .	CO1	L4
	Or		
	If $\theta_1, \theta_2, \theta_3$ be three values of θ which satisfy the equation $\tan 2\theta = \lambda \tan(\theta + \alpha)$ and as such that no two of them differ by a multiple of π , show that $\theta_1 + \theta_2 + \theta_3 + \alpha$ is a multiple of π .		
Q3	Find the area common to the circles $r = a\sqrt{2}$ and $r = 2a \cos \theta$.	CO2	L3
	Or		
	Find the entire length of the cardioid $r = a(1 + \cos \theta)$. Also show that upper half is bisected by $\theta = \frac{\pi}{3}$.		
Q4	Find the volume of the solid generated by revolving the lemniscate $r^2 = a^2 \cos 2\theta$ about the line $\theta = \frac{\pi}{2}$.	CO2	L3
	Or		
	Find the surface of the solid formed by revolving the cardioid $r = a(1 + \cos \theta)$.		

Section – C

Long Answer Type: Attempt 1 Question with given internal choice. Each question should be answered in maximum 4 pages.

Q. No.	Question	COs	RBT Level
Q5	Find the sum to infinity of the series $1 - \frac{1}{2} \cos \theta + \frac{1.3}{2.4} \cos 2\theta - \frac{1.3.5}{2.4.6} \cos 3\theta + \dots (-\pi < \theta < \pi)$.	CO1	L5
	Or		
	State and prove DeMoivre's theorem.		

Assignment: 02 (Advanced Learners)

Subject Name	Engineering Mathematics ii			Subject Code	MTH152A
Faculty Name	Mr. Anmol Bajaj	Date of Issue	18-Mar-2023	Date of Submission	25-Mar-2023
Q. No.	Question	COs	RBT Level		
1	What is Cauchy root test? Test the convergence of $\frac{1}{2} + \frac{2}{3}x + \left(\frac{3}{4}\right)^2 x^2 + \dots$	CO4	L4		
	What is Leibnitz test? Test the convergence of $\frac{1}{\log 2} - \frac{1}{\log 3} + \frac{1}{\log 4} - \dots$	CO4	L4		

3	What is Ratio test? Test the convergence of $1 + \frac{2!}{2^2} + \frac{3!}{3^3} + \dots$.	CO4	L4
4	What is Integral Test? Test the convergence of $\sum \frac{1}{n^p}$.	CO4	L4
5	State Green Theorem. Discuss the application of Green Theorem.	CO3	L5

b. Course Name (Course Code): Classical Mechanics (MTH675)

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtube.com/playlist?list=PLq-Gm0yRYwTjpY9BIDxFGNXIaQJIOQRdo>
 (One link contains the whole playlist).
3. Extra time 3:30pm to 4:30pm (Every Tuesday for clearing their doubts).

Action taken for Advanced Learners

1. Advanced Assignment given to them (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtube.com/playlist?list=PLq-Gm0yRYwTjpY9BIDxFGNXIaQJIOQRdo>
 (One link contains the whole playlist).

Proof of Assignments

Instructions

MTH675(Classical Mechanics)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)

Subject Name	Classical Mechanics			Subject Code	MTH675
Faculty Name	Mr. Anmol Bajaj	Date of Issue	18-Mar-2023	Date of Submission	25-Mar-2023

Section – A

(Marks: 1 x 5 = 5)

Very Short Answer Type: All Questions are compulsory. Each question should be answered within 5-8 lines.

Q. No.	Question	COs	RBT Level
Q1	i. Define spherical pendulum. Find generalized momentum in case of spherical pendulum.	CO1	L1
	ii. Derive Lagrange equation of motion in case of Linear harmonic oscillator.	CO1	L3
	iii. Define cyclic coordinates. Give an example.	CO2	L1
	iv. What is Hamiltonian H for a holonomic conservative system?	CO2	L1
	v. Prove that a co-ordinate q_j is ignorable in a holonomic conservative system, then the corresponding generalized momentum is conserved.	CO2	L2

Section – B

(Marks: 4 x 3 = 12)

Short Answer Type: Attempt all the 3 Questions with given internal choice. Each question should be answered in maximum 2 pages.

Q. No.	Question	COs	RBT Level
Q2	A bead slides on a wire in the shape of cycloid described by equation $x = a(\theta - \sin \theta)$, $y = a(1 + \cos \theta)$ Where $0 \leq \theta \leq 2\pi$. Neglecting friction between the bead and the wire, find equation of the motion of the bead.	CO1	L3
	Or		
	Give an example of a dynamical system in which constraint is time dependent. Also find the equation of motion for this system.		
Q3	Find Hamilton equation of motion of system simple pendulum.	CO2	L4
	Or		
	Find Hamilton equation of motion of system Atwood machine.		
Q4	State and prove the conservation theorem on Linear Momentum.	CO2	L1
	Or		
	State and prove the conservation theorem on Angular Momentum.		

Section – C

(Marks: 8 x 1 = 8)

Long Answer Type: Attempt 1 Question with given internal choice. Each question should be answered in maximum 4 pages.

Q. No.	Question	COs	RBT Level
Q5	If T is kinetic energy of a holonomic system, then it can be written as sum of homogeneous functions of generalized velocities i.e. $T = T_0 + T_1 + T_2$ where T_0 is independent of generalized velocities, T_1 is linear and T_2 is quadratic in generalized velocities. Further, if time is not explicitly involved, then $2T = \sum_j p_j \dot{q}_j$	CO1	L1
	Or		
	Derive Lagrange's equations of motion for holonomic non-conservative system.		

Assignment: 02 (Advanced Learners)

Subject Name	Classical Mechanics			Subject Code	MTH675
Faculty Name	Mr. Anmol Bajaj	Date of Issue	18-Mar-2023	Date of Submission	25-Mar-2023

Question-1) What is Compound Pendulum?	CO4	L4
Question-2) Derive Lagrange equation of motion for Compound Pendulum?	CO4	L4

Question-3) Derive Hamilton equation of motion for Compound Pendulum?	CO4	L4

c. Course Name (Course Code): Number Theory (MTH557A)

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtube.com/playlist?list=PLbMVogVj5nJQrzbAweTVvnH6-vG5A4aN5> (One link contains the whole playlist).
3. Extra time 3:30pm to 4:30pm (Every Tuesday for clearing their doubts).

Action taken for Advanced Learners

1. Advanced Assignment given to them (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtube.com/playlist?list=PLbMVogVj5nJQrzbAweTVvnH6-vG5A4aN5> (One link contains the whole playlist).

Proof of Assignments

Instructions

MTH557A(Mathematical Statistics)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)					
Subject Name	Mathematical Statistics			Subject Code	MTH557A
Faculty Name	Mr. Anmol Bajaj	Date of Issue	18-Mar-2022	Date of Submission	25-Mar-2022

Section – A

Very Short Answer Type: All Questions are compulsory. Each question should be answered within 5-8 lines.

Q. No.	Question	COs	RBT Level
Q1	i. Find the moment generating function of random variable whose moments are $\mu'_r = (r + 1)! 2^r$.	CO1	L1
	ii. Let X be a r.v. with mean μ and variance σ^2 . Show that $E(X - b)^2$, as a function of b, is minimized when $b = \mu$.	CO1	L3

iii.	Discuss about additive property of binomial distribution. If $X \sim B\left(3, \frac{1}{3}\right)$ and $Y \sim B\left(5, \frac{1}{3}\right)$ then what is $P(X + Y \geq 1)$?	CO2	L1
iv.	Show that in poisson distribution with unit mean, mean deviation about mean is $\left(\frac{2}{e}\right)$ times the standard deviation.	CO2	L1
v.	Comment on the following: The mean of a binomial distribution is 3 and variance is 4.	CO2	L2

Section – B

Short Answer Type: Attempt all the 3 Questions with given internal choice. Each question should be answered in maximum 2 pages.

Q. No.	Question	COs	RBT Level
Q2	What is <i>moment generating function</i> . What are its properties?	CO1	L3
	Or		
	What is distribution function for continuous random variables? What are its properties?		
Q3	Find mode of Binomial Distribution. Find the mode of binomial distribution for which the mean is 4 and variance is 3.	CO2	L4
	Or		
	Find mode of Poisson Distribution. A poisson distribution has a double mode at $x = 1$ and $x = 2$. What is the probability that x will have one or the other of these two values?		
Q4	State Renosvky formula for Binomial distribution. Hence find skewness and kurtosis.	CO2	L1
	Or		
	State Renosvky formula for Poisson distribution. Hence find skewness and kurtosis.		

Section – C

Long Answer Type: Attempt 1 Question with given internal choice. Each question should be answered in maximum 4 pages.

Q. No.	Question	COs	RBT Level
Q5	Suppose that two-dimensional continuous random variable (X, Y) has joint p.d.f given by: $f(x, y) = \begin{cases} e^{-(x+y)}, & 0 < x < \infty, 0 < y < \infty \\ 0, & \text{elseswhere} \end{cases}$ Find (i) $P(X > 1)$ (ii) $P(1 < X + Y < 2)$ (iii) $P(X < Y X < 2Y)$	CO1	L1
	Or		
	The p.d.f. of a r.v. X follows the following probability law: $p(x) = \frac{1}{2\theta} \exp\left(\frac{- x-\theta }{\theta}\right), -\infty < x < \infty, \theta > 0.$ Find its m.g.f. Hence or otherwise, find $E(X)$ and $V(X)$.		

Assignment: 02 (Advanced Learners)

Subject Name	Mathematical Statistics			Subject Code	MTH557A
Faculty Name	Mr. Anmol Bajaj	Date of Issue	18-Mar-2023	Date of Submission	25-Mar-2022

Question-1) What is Chebychev's inequality? Prove it.	CO2	L4
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Question-2) Give some applications of Chebychev's inequality.	CO2	L4
Question-3) What is weak Law of Large number? Give some applications.	CO2	L6

d. Course Name (Course Code): Number Theory (MTH344)

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
https://youtu.be/o_f1nQDtOOK (One link contains the whole playlist).
3. Extra time 3:30pm to 4:30pm (Every Saturday for clearing their doubts).

Action taken for Advanced Learners

1. Advanced Assignment given to them (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
https://youtu.be/o_f1nQDtOOK (One link contains the whole playlist).

Proof of Assignments

Instructions

MTH344 (Mechanics II)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)

Subject Name	Mechanics II		Subject Code	MTH344	
Faculty Name	Mr. Anmol Bajaj	Date of Issue	18-Mar-2022	Date of Submission	25-Mar-2022

Section – A

(Marks: 1 x 5 = 5)

Very Short Answer Type: All Questions are compulsory. Each question should be answered within 5-8 lines.

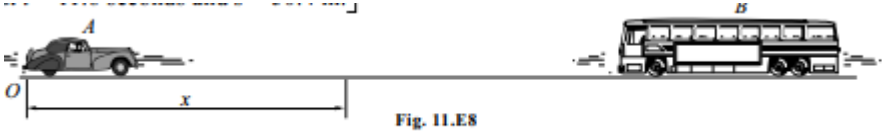
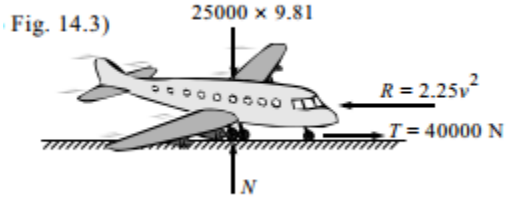
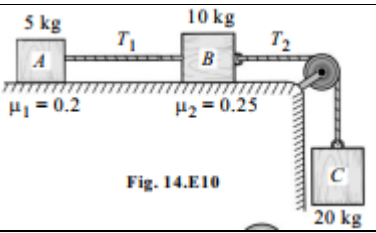
Q. No.	Question	COs	RBT Level
Q1	i. A particle starts moving along a straight line with initial velocity of 25 m/s, from O under uniform acceleration of -2.5 m/s^2 . Determine velocity, displacement and the distance travelled at $t = 5 \text{ sec}$,	CO1	L1
	ii. What is slope of velocity time graph?	CO1	L3

iii.	Two scale pans each of mass 4kg are connected by a light string passing over a pulley. Show how to divide a mass 10kg in two scale pans so heavier pan may descends 2.18 meters in first two seconds.	CO2	L1
iv.	The motion of the particle along a straight line is governed by the relation $a = t^3 - 2t^2 + 7$ where a is the acceleration in m/s^2 and t is the time in seconds. At time $t = 1$ sec. the velocity of the particle is 3.58 m/s and the displacement is 9.39 m. Calculate the velocity at time $t = 2$ sec.	CO2	L1
v.	Two masses m_1 and m_2 ($m_1 > m_2$) are suspended by a light inextensible and flexible string over a smooth, fixed, light pulley. Prove that tension in the string is H.M. between the weights of two bodies.	CO2	L2

Section – B

(Marks: 4 x 3 = 12)

Short Answer Type: Attempt all the 3 Questions with given internal choice. Each question should be answered in maximum 2 pages.

Q. No.	Question	COs	RBT Level
Q2	<p>Automobile A shown in Fig. 11.E8 starts from O and accelerates at the constant rate of $0.75 m/s^2$. A short time later it is passed by bus B which is travelling in the opposite direction at constant speed of 6 m/s. Knowing that bus B passes point O, 20 sec after automobile A started from there. Determine when and where the vehicles passed each other.</p>  <p style="text-align: center;">Fig. 11.E8</p>	CO1	L3
	<p style="text-align: center;">Or</p> <p>Two ships A and B leave a port at the same time. The ship A is travelling N-W at 32 kmph and ship B, 40° South of West at 24 km/hr. Determine (a) the speed of ship B relative to ship A and (b) at what time, they will be 150 km apart.</p>		
Q3	<p>An aeroplane has a mass of 25000 kg and its engines develop a total thrust of 40 kN along the run way. The force of air resistance to motion of is given by $R = 2.25v^2$ where v is in m/s and R is in Newton. Determine the length of runway required if the plane takes off and becomes airborne at a speed of 240 km/hr.</p>  <p style="text-align: center;">Fig. 14.3 : FBD of Plane</p>	CO2	L4
	<p style="text-align: center;">Or</p>  <p style="text-align: center;">Fig. 14.E10</p> <p>Three blocks A, B and C are connected as shown in Fig. 14.E10. Find acceleration of the masses and the tension T_1 and T_2 in the strings.</p>		
Q4	<p>Two heavy particles are attached together by a string passing over a pulley. If the string can only support a tension equal to one quarter of the sum of the weights at its two ends, show that the least possible acceleration is $\frac{1}{2}g\sqrt{2}$.</p>	CO2	L1
	<p style="text-align: center;">Or</p> <p>Two particles of masses m_1 and m_2 are connected by a light inextensible string which passes over a smooth fixed pulley. If $m_1 > m_2$ and m_1 descends with an acceleration f, show that the mass which must be taken from it so that it can ascend with same acceleration is $\frac{4m_1fg}{(f+g)^2}$</p>		

Section – C

(Marks: 8 x 1 = 8)

Long Answer Type: Attempt 1 Question with given internal choice. Each question should be answered in maximum 4 pages.

Q. No.	Question	COs	RBT Level
	<p>The acceleration-time diagram for the linear motion is shown in Fig. 11.30(a). Construct velocity time and displacement time diagrams for the motion assuming that the motion starts with initial velocity of 5 m/s from the starting point.</p> <p style="text-align: center;">Fig. 11.30(a)</p>		
Q5	Or		
	<p>A stone after falling 5 sec from rest breaks a glass pan and in breaking it loses 30 % of its velocity. How far will it fall in the next second?</p> <p style="text-align: center;">Fig. 11.23</p>	CO1	L1

Assignment: 02 (Advanced Learners)

Subject Name	Mechanics II		Subject Code	MTH344	
Faculty Name	Mr. Anmol Bajaj	Date of Issue	18-Mar-2023	Date of Submission	25-Mar-2022

Question-1) Prove $v = u + at$ graphically in rectilinear uniform acceleration motion.	CO1	L5
Question-2) Prove $v^2 = u^2 + as$ graphically in rectilinear uniform acceleration motion.	CO1	L5
Question-3) Prove $s = ut + \frac{1}{2}at^2$ graphically in rectilinear uniform acceleration motion.	CO1	L5

Faculty Name : Anita Devgan

a. Course Name (Course Code) : Engineering Mathematics II (MTH152)

Action taken for Slow Learners

1. Work Sheets were provided to them and level was basic
2. Work Sheets were discussed in the class and they were also guided by the classmates

Work Sheet

Sr. No.	Question
1.	Find the 5 th root of -1
2.	Find the 7 th root of 1
3.	Find unit normal to the surface $x^2y + 2xz = 4$ at point (2,-2,3)
4.	What is the value of div curl A
5.	Volume of sphere and ellipsoid using integration

Action taken for Advanced Learners

1. Work Sheets were provided to them and level was advanced
2. Work Sheets were discussed in the class and students shared their solutions

Work Sheet

Sr. No.	Question
1.	Find the value of α so that $r^\alpha R$ is solenoidal
2.	Area of cardioid, cycloid, ellipse using integration
3.	Change of order in double integration
4.	Convergence of $\sum \frac{1}{n(\log n)^2}$
5.	Convergence of G.P. Series

b. Course Name (Course Code) : Mathematical Foundations Of Computer Science (MTH190A)

Action taken for Slow Learners

1. Work Sheets were provided to them and level was basic
2. Work Sheets were discussed in the class and they were also guided by the classmates

Work Sheet

Sr. No.	Question
1.	Solve derivative of $x^2 + 1$
2.	Solve $\int \frac{1}{5x+7} dx$
3.	Solve $\int \frac{2x}{x^2+1} dx$
4.	Solve derivative of 5^x
5.	Solve $\int \sin 2x dx$
6.	Solve derivative of $\tan 2x$
7.	Solve $\int (5x + 9)^{10} dx$

Action taken for Advanced Learners

1. Work Sheets were provided to them and level was advanced
2. Work Sheets were discussed in the class and students shared their solutions

Work Sheet

Sr. No.	Question
1.	Solve derivative of $(\log x + e^x)$
2.	Solve $\int (x^2 + 2x + 9\sin x) dx$
3.	Solve $\int a dx$
4.	Draw Venn diagram to represent $(A \cap B)^c$ and $A^c \cup B^c$
5.	Which sets are null sets 1. $A = \{x: x < 1 \text{ and } x > 3\}$ 2. $B = \{x: x^2 = 9 \text{ and } 3x = 7\}$ 3. $C = \{x: x^2 - 1 = 0 \text{ and } x \in R\}$ 4. $D = \{x: x = 1 \text{ and } x \in Z\}$
6.	Solve derivative of $5^{\sqrt{x^2+1}} + (\sqrt{x^2+1})^5$
7.	Solve derivative of $\log(x + \sqrt{a^2 + x^2})$

c. Course Name : Analytical Geometry (MTH234)

Action taken for Slow Learners

1. Work Sheets were provided to them and level was basic
2. Work Sheets were discussed in the class and they were also guided by the classmates

Work Sheet

Sr. No.	Question
1.	If a line makes angles 90° , 60° and 30° with the positive direction of x, y and z-axis. Find the direction cosines
2.	If a line has direction ratios 2, -1, -2 Find its direction cosines
3.	Find the equation of the line passing through the points (-1, 0, 2) and (3, 4, 6)
4.	Find the shortest distance between the lines $\frac{x-1}{2} = \frac{y-1}{-1} = \frac{z}{1}$ and $\frac{x-2}{3} = \frac{y-1}{-5} = \frac{z+1}{2}$
5.	Draw the shapes of paraboloid, ellipsoid and hyperboloid

Action taken for Advanced Learners

1. Work Sheets were provided to them and level was advanced
2. Work Sheets were discussed in the class and students shared their solutions

Work Sheet

Sr. No.	Question
1.	What are Cartesian and polar co-ordinates.
2.	What is the relation between Cartesian and polar co-ordinates.
3.	What is the location of a moving point from a fixed point at a constant distance.
4.	Identify the curve : $x^2 + 2xy + y^2 - 2x - 1 = 0$
5.	Identify the curve : $8x^2 - 4xy + 5y^2 - 16x - 14y + 17 = 0$

d. Course Name : Theory of Measure and Integration (MTH556A)

Action taken for Slow Learners

1. Work Sheets were provided to them and level was basic
2. Work Sheets were discussed in the class and they were also guided by the classmates

Work Sheet

Sr. No.	Question
1.	A continuous function is of bounded variation iff it can be expressed as a difference of two continuous monotonically increasing functions.
2.	Show that the function defined on \mathbb{R} by $f(x) = \begin{cases} x + 5 & \text{if } x < -1 \\ 2 & \text{if } -1 \leq x < 0 \\ x^2 & \text{if } x \geq 0 \end{cases}$ is a measurable function by showing that $\{x \in \mathbb{R} : f(x) \leq \alpha\}$ is measurable $\forall \alpha \in \mathbb{R}$
3.	Show that every function defined on a set of measure zero is measurable
4.	Outer measure of a null set is zero
5.	Countable sets have outer measure zero
6.	Union of two measurable sets is measurable
7.	Intersection and difference of two measurable sets is measurable
8.	Symmetric difference of two measurable sets is measurable
9.	Bounded Linear Spaces

Advanced Learners : NIL

Faculty Name: Akansha Mehta

a. Course Name (Course Code): Complex Analysis (MTH555)

Action taken for Slow Learners

No Slow Learners

Action taken for Advanced Learners

1. Advanced Assignment given to them (Assignment at the bottom)

2. Online NPTEL video lectures are provided to them and whose links are as follows:

[Complex Analysis - Course.html](#)

Proof of Assignments

Assignment: (Advanced Learners)					
Subject Name	Complex Analysis			Subject Code	MTH555
Faculty Name	Ms. Akansha Mehta	Date of Issue	27-04-2023	Date of Submission	01-05-2023

1. State and prove Liouville's Theorem.
2. What is a conformal transformation. Discuss the following elementary transformations along with their sketches by choosing an example. Also, discuss their conformality.
 - a) Translation
 - b) Magnification
 - c) Rotation
3. Show that under the inversion map, circles passing through origin are mapped to circles and to straight lines if not passing through origin.

b. Course Name (Course Code): Numerical Methods (MTH225A)

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the

bottom)

2. Online NPTEL video lectures are provided to them and whose links are as follows: [\Numerical Methods - Course.html](#)

Action taken for Advanced Learners

1. Advanced Assignment given to them (Assignment at the bottom)

2. Online NPTEL video lectures are provided to them and whose links are as

follows: [\Matrix Analysis With Applications - Course.html](#)

[\Numerical Methods - Course.html](#)

Proof of Assignments

Assignment: (Slow Learners)					
Subject Name	Numerical Methods			Subject Code	MTH225A
Faculty Name	Ms. Akansha Mehta	Date of Issue	27-04-2023	Date of Submission	01-05-2023

1. Write and derive Newton's general Quadrature formula.
2. Derive trapezoidal rule form general formula.
3. Obtain the order of error in case of Trapezoidal rule.
4. Write a short note on errors in numerical approximations. What are the ways to compute errors practically. Give one example.
5. Using Gauss Elimination method, solve the system of equations:
 $6x+y+z=20$, $x+4y-z=6$, $x-y+5z=7$.

Assignment: (Advanced Learners)

Subject Name	Numerical Methods			Subject Code	MTH225A
Faculty Name	Ms. Akansha Mehta	Date of Issue	27-04-2023	Date of Submission	01-05-2023

1. Write and derive Newton's general Quadrature formula.
2. Derive Simpson's 3/8 rule form general formula.
3. Obtain the order of error in case of Simpson's 3/8 rule.
4. Write a short note on errors in numerical approximations. What are the ways to compute errors practically. Give one example.
5. Using Gauss Jacobi and Seidal method, solve the system of equations:
 $6x+y+z=20$, $x+4y-z=6$, $x-y+5z=7$. Also suggest which method is better and why?

c. Course Name(Course Code): Numerical Methods (MTH256A)

Action taken for Slow Learners

1. **Basic Assignment given to them as per their knowledge. (Assignment at the bottom)**
2. **Online NPTEL video lectures are provided to them and whose links are as follows: [\Numerical Methods - Course.html](#)**

Action taken for Advanced Learners

No Advanced Learner.

Proof of Assignments

Assignment: (Slow Learners)					
Subject Name	Numerical Methods			Subject Code	MTH256A
Faculty Name	Ms. Akansha Mehta	Date of Issue	27-04-2023	Date of Submission	01-05-2023

1. Find the approximate root of the equation $x = e^{-x}$ correct up to three decimal places.
2. Using Lagrange's interpolation, find a polynomial which satisfying the function $y=\log x$ at the input values $x= 2,2.5,3$ and 3.5 . Find the value at $x=2.7$.
3. Write a short note on errors in numerical approximations. What are the ways to compute errors practically. Give one example.

4. Using Gauss Jordan method, solve the system of equations: $6x+y+z=20$, $x+4y-z=6$, $x-y+5z=7$.

d. Course Name (Course Code): Engineering Mathematics (MTH252A)

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows: [Advanced Engineering Mathematics - Course.html](#)

Action taken for Advanced Learners

1. Advanced Assignment given to them (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows: [Laplace Transform - Course.html](#)

Proof of Assignments

Assignment: (Slow Learners)					
Subject Name	Engineering Mathematics-III			Subject Code	MTH252A
Faculty Name	Ms. Akansha Mehta	Date of Issue	27-04-2023	Date of Submission	01-05-2023

1. Find the Fourier transform of $f(x) = e^{-x}$ in the interval $(0, 2\pi)$.
2. Solve Wave equation by method of separation of variables.
3. Solve: $z(x + y)p + z(x - y)q = x^2 + y^2$.
4. Show that the function $f(z) = \sqrt{xy}$ is not analytic at origin, but satisfies Cauchy Riemann equations at origin.

Assignment: (Advanced Learners)
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Subject Name	Engineering Mathematics-III			Subject Code	MTH252A
Faculty Name	Ms. Akansha Mehta	Date of Issue	27-04-2023	Date of Submission	01-05-2023

1. Expand $f(x) = x \sin x$ in $0 < x < 2\pi$ as a Fourier series.
2. Solve Laplace equation by method of separation of variables.
3. Solve: $(x^2 - y^2 - z^2)p + 2xyzq = 2xz$.
4. Show that the function $f(z) = \sqrt{xy}$ is not analytic at origin, but satisfies Cauchy Riemann equations at origin.

e. **Course Name (Course Code): Mathematical Foundations of Computer Science (MTH190A)**

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom)

2. Online NPTEL video lectures and weblinks are provided to them and whose links are as

follows: [Calculus Of One Real Variable - Course.html](https://www.edx.org/course/calculus-1b-integration?index=product&search_index=product&webview=false&campaign=Calculus+1B%3A+Integration&source=edX&product_category=course&placement_url=https%3A%2F%2Fwww.edx.org%2Flearn%2Fcalculus)

https://www.edx.org/course/calculus-1b-integration?index=product&search_index=product&webview=false&campaign=Calculus+1B%3A+Integration&source=edX&product_category=course&placement_url=https%3A%2F%2Fwww.edx.org%2Flearn%2Fcalculus

Action taken for Advanced Learners

1. Advanced Assignment given to them (Assignment at the bottom)

2. Online NPTEL video lectures are provided to them and whose links are as

follows: [Calculus Of One Real Variable - Course.html](https://www.edx.org/course/calculus-1b-integration?index=product&search_index=product&webview=false&campaign=Calculus+1B%3A+Integration&source=edX&product_category=course&placement_url=https%3A%2F%2Fwww.edx.org%2Flearn%2Fcalculus)

Assignment: (Slow Learners)

Subject Name	Mathematical Foundations of Computer Science			Subject Code	MTH190A
Faculty Name	Ms. Akansha Mehta	Date of Issue	27-04-2023	Date of Submission	01-05-2023

1. Differentiate x^x .
2. Integrate $x^2 \sin x$.
3. Find mean using step deviation and median of the series:

Class Interval	0-10	10-20	20-30	30-40	40-50
Frequency	7	8	20	10	5

4. Solve the system of equations using matrix Inversion method:
 $6x+y+z=20$, $x+4y-z=6$, $x-y+5z=7$.

Assignment: (Advanced Learners)					
Subject Name	Mathematical Foundations of Computer Science			Subject Code	MTH190A
Faculty Name	Ms. Akansha Mehta	Date of Issue	27-04-2023	Date of Submission	01-05-2023

1. Differentiate $\log x^{\cos x}$.
2. Integrate $e^x \sin x$.
3. Calculate mode, standard deviation and variance of the data:

Class Interval	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	15	17	19	27	19	12

4. Define rank. Find the rank of the matrix $\begin{bmatrix} 1 & 1 & 2 \\ 1 & 2 & 2 \\ 2 & 2 & 3 \end{bmatrix}$ by reducing it to echlon form.

Action Taken Report for Slow and Advanced Learners

1. Faculty Name : Dr. Vinod Kumar

a. Course Name (Course Code): Number Theory (MTH324)

Action taken for Slow Learners (No Slow Learner)

1. Basic Assignment given to them.

Action taken for Advanced Learners

1. Advanced Assignment given to them.

2. NPTEL video lecture given to them. Link is given below

https://youtu.be/u7cBLb0b7pk?si=ZBVFDln1_QWWY28X

Class/Semester: B.Sc. (Hons) Mathematics & B.Sc. (CS)/5th

Subject with Code: Number Theory (MTH324)

Assignment No. 1

Date of Issue: 11/10/2023

Due date of Submission: 25/10/2023

Max marks: 10

Q. No.	Question	CO Mapped	RBT Level
1	Find the greatest common divisor d of two numbers 275 and 200 and then find the integers m and n such that $d = m(275) + n(200)$ using Euclidean Algorithm.	CO1	L5
2	If $S = \{x: (x, 0) = x\}$ and $V = \{y: (0, y) = 1\}$ then find the cardinality of sets S and V .	CO1	L4
3	Check divisibility of integers is an equivalence relation or not? Specify your reason.	CO1	L4
4	If $(a, b) = 1$ prove that $(a^2, b^2) = 1$.	CO1	L3
5	Find integers x, y, z satisfying $(198, 288, 512) = 198x + 288y + 512z$	CO1	L6

Course Outcomes (COs): After successfully completing this course the students will be able to
CO1: Learn Division Algorithm, Congruences and reduced residue system.
CO2: Learn Chinese Remainder theorem, Euler's theorem and Arithmetic functions.
CO3: Learn Quadratic residues and twin primes and Fermat's numbers.
CO4: Learn Diophantine Linear Equations and Continued fractions.

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
	L1	L2	L3	L4	L5	L6
RBT Level No.						
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

b. Course Name (Course Code): Ordinary Differential Equations (MTH663)

Action taken for Slow Learners

1. Basic Assignment given to them.

Action taken for Advanced Learners (No student in advance learner)

Assignment No. 1

Date of Issue: 14/10/2023

Due date of Submission: 23/10/2023

Max marks: 10

Q. No.	Question	CO Mapped	RBT Level
1	Solve by series $y'' + x^2y = 2 + x + x^2$ about $x = 0$.	CO4	L6
2	Solve using Frobenius Method, $2x(1-x)y'' + (1-x)y' + 3y = 0$ about $x = 0$.	CO4	L5
3	Solve using Frobenius Method, $(1-x^2)y'' + 2xy' - y = 0$ about $x = 0$.	CO4	L5
4	Solve $4(x^4 - x^2)y'' + x^3y' - y = 0$.	CO4	L5

Course Outcomes (COs): After successfully completing this course the students will be able to
CO1: Understand IVP and its existence as well as its solution.
CO2: Understand Linear system of differential equations and Strum theory.
CO3: Understand Strum Liouville's boundary value problem and its solution, eigen values and eigen functions.
CO4: Understand Solution by Power series method as well as Frobenius method.

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
	L1	L2	L3	L4	L5	L6
RBT Level No.						
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

c. Course Name (Course Code): Numerical Methods (MTH256A)

Action taken for Slow Learners

1. Basic Assignment given to them.

Action taken for Advanced Learners (No student in advance learner)

Class/Semester: B.Tech. (ME)/7th

Subject with Code: Numerical Methods (MTH256A)

Assignment No. 1

Date of Issue: 30/10/2023

Due date of Submission: 09/11/2023

Max marks: 10

Q. No.	Question	CO Mapped	RBT Level
1	Find the cubic polynomial which takes the following values	CO3	L5

	x	0	1	2	3			
	$f(x)$	1	2	1	10			
	And hence evaluate $f(4)$.							
2	Using Lagrange's interpolation, evaluate $f(9)$ from the following data						CO3	L5
	x	5	7	11	13	17		
	$f(x)$	150	392	1452	2366	5202		
3	Evaluate $\sqrt{29}$ to five decimal places by Newton Raphson Method, taking $x_0 = 5.3$.						CO1	L6
4	Apply Gauss elimination method to solve the equations $x + 4y - z = -5$, $x + y - 6z = -12$, $3x - y - z = 4$.						CO2	L3
5	Apply Gauss Jordan method to solve the equations $x + 3y + 3z = 16$, $z + 4y + 3z = 18$, $x + 3y + 4z = 19$.						CO2	L6

Course Outcomes (COs): After successfully completing this course the students will be able to
CO1: Find the solution of algebraic as well as transcendental equations using various methods.
CO2: Find the solution of linear equations with direct and indirect methods.
CO3: Do interpolation using various methods.
CO4: Do Numerical integration and able to find solution of differential equations.

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
	L1	L2	L3	L4	L5	L6
RBT Level No.						
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

d. Course Name (Course Code): Numerical Analysis (MTH551A)

Action taken for Slow Learners (No student in slow learner)

Action taken for Advanced Learners (No student in advance learner)

2. Faculty Name: Dr. Rajesh Joshi

a. Course Name (Course Code): Engineering Mathematics-I (MAT151)

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/KaLA1cWhQIA> (One link contains the whole playlist).
3. Extra time 2:30pm to 3:30pm (Every Monday for clearing their doubts).

Action taken for Advanced Learners

1. Advanced Assignment given to them (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/DaMpZ3IEmwE> (One link contains the whole playlist).

Proof of Assignments

Instructions

MTH151A (Engineering Mathematics-I)					
Assignment: 01 (Slow Learners)					
Marks			Assignment		
Subject Name	Engineering Mathematics-I	07-10	Assignment 1	Subject Code	MAT151
	11 – 25		Assignment 2		
Faculty Name	Dr. Rajesh Joshi	Date of Issue	19-Nov-2023	Date of Submission	26-Nov-2023

- Find the eigen values of the matrix $A = \begin{bmatrix} -1 & 4 \\ 2 & 3 \end{bmatrix}$.
- Find the first and second order partial derivatives of $z = \sin(xy)$.
- If $u = \cos\left(\frac{x}{y}\right)$, $x = e^t$, $y = t^2$, find $\frac{du}{dt}$ as a function of t .
- If $u = \cos^{-1}\left(\frac{x+y}{\sqrt{x}+\sqrt{y}}\right)$, prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = -\frac{1}{2}\cot u$.
- State Euler's theorem.
- Using Gauss-Jordan method, find the inverse of the matrix $A = \begin{bmatrix} 2 & 3 & 4 \\ 4 & 3 & 1 \\ 1 & 2 & 4 \end{bmatrix}$.
- If $u = \log(x^3 + y^3 + z^3 - 3xyz)$, show that $\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z}\right)^2 u = \frac{-9}{(x+y+z)^2}$.
- If $z = f(x+ct) + \phi(x-ct)$, prove that $\frac{\partial^2 z}{\partial t^2} = c^2 \frac{\partial^2 z}{\partial x^2}$.
- Reduce the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ to the diagonal form.

Assignment: 02 (Advanced Learners)					
Subject Name	Engineering Mathematics-I	Date of Issue		Subject Code	MAT151
Faculty Name	Dr. Rajesh Joshi	19-Nov-2023	Date of Submission	26-Nov-2023	

- Reduce the matrix $A = \begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$ into its normal form and hence find its rank.
- If $u = \frac{x^3 y^3 z^3}{x^3 + y^3 + z^3} + \log\left(\frac{xy+yz+zx}{x^2+y^2+z^2}\right)$, find the value of $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z}$.
- If $u = \cos^{-1}\left(\frac{x+2y+3z}{x^8+y^8+z^8}\right)$, find the value of $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z}$.
- Investigate the values of λ and μ so that the system of equations $x + y + z = 6$; $x + 2y + 3z = 10$; $x + 2y + \lambda z = \mu$ have (i). Unique solution, (ii). No solution.
- Find the eigen values of the matrix $A = \begin{bmatrix} -1 & 4 \\ 2 & 3 \end{bmatrix}$.
- Find the first and second order partial derivatives of $z = \sin(xy)$.
- If $u = \cos\left(\frac{x}{y}\right)$, $x = e^t$, $y = t^2$, find $\frac{du}{dt}$ as a function of t .
- If $u = \cos^{-1}\left(\frac{x+y}{\sqrt{x}+\sqrt{y}}\right)$, prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = -\frac{1}{2}\cot u$.
- State Euler's theorem.

b. Course Name (Course Code) : Algebra (MAT171)

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom).
2. Online lectures created by me whose links have been given so that they can study according to their suitable time and concern with me any time. Links are as follows:

<https://youtu.be/bWTmUWWZnhQ>

Action taken for Advanced Learners

1. Advanced Assignment given to them. (Assignment at the bottom)
2. Online lectures created by me whose links have been given so that they can study according to their suitable time and concern with me any time. Links are as follows:

<https://youtu.be/DO0Dzz07DNI>

Proof of Assignments

Instructions

MTH550 (Real Analysis)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)					
Subject Name	Algebra			Subject Code	MAT151
Faculty Name	Dr. Rajesh Joshi	Date of Issue	10-Nov-2023	Date of Submission	20-Nov-2023

1. Determine the rank of the matrix $A = \begin{bmatrix} 1 & 4 & 5 \\ 2 & 6 & 8 \\ 3 & 7 & 22 \end{bmatrix}$.
2. Find the values of k for which the system of equations $(3k - 8)x + 3y + 3z = 0; 3x + (3k - 8)y + 3z = 0; 3x + 3y + (3k - 8)z = 0$ has a non-trivial solution.
3. Define elementary transformations of a matrix.
4. Find the solution of system of equations $x - 5y = 1; 2x - y = 3$.
5. Define rank of a matrix.
6. Investigate the values of λ and μ so that the equations $x + y + z = 6; x + 2y + 3z = 10; x + 2y + \lambda z = \mu$ have a unique solution.
7. Determine the rank of the matrix $\begin{bmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{bmatrix}$.
8. Find the characteristic equation of the matrix $A = \begin{bmatrix} 2 & 0 & 1 \\ 0 & 2 & 0 \\ 1 & 0 & 2 \end{bmatrix}$ and hence find its inverse.
9. Solve the equations $x + y + z = 4, x - y + z = 0, 2x + y + z = 5$ using Cramer's rule.

If and only if Assignment: 02 (Advanced Learners)					
Subject Name	Algebra			Subject Code	MAT171
Faculty Name	Dr. Rajesh Joshi	Date of Issue	10-Nov-2023	Date of Submission	20-Nov-2023

1. Determine the rank of the matrix $A = \begin{bmatrix} 1 & 4 & 5 \\ 2 & 6 & 8 \\ 3 & 7 & 22 \end{bmatrix}$.

2. Find the values of k for which the system of equations $(3k - 8)x + 3y + 3z = 0; 3x + (3k - 8)y + 3z = 0; 3x + 3y + (3k - 8)z = 0$ has a non-trivial solution.
3. Define elementary transformations of a matrix.
4. Find the solution of system of equations $x - 5y = 1; 2x - y = 3$.
5. Define rank of a matrix.
6. Test the consistency of the system of equations $4x - 2y + 6z = 8; x + y - 3z = -1; 15x - 3y + 9z = 21$.
7. Find the rank of the matrix $\begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ -6 & -3 & 0 & 7 \end{bmatrix}$.
8. Verify Cayley-Hamilton theorem for the matrix $A = \begin{bmatrix} 4 & 3 \\ 2 & 9 \end{bmatrix}$ and find its inverse.
9. Find the eigen values and eigen vectors of the matrix $\begin{bmatrix} -1 & 2 & -2 \\ 1 & 2 & 1 \\ -1 & -1 & 0 \end{bmatrix}$.

c. Course Name (Course Code) : Real Analysis (MTH550)

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom).
2. Online lectures created by me whose links have been given so that they can study according to their suitable time and concern with me any time. Links are as follows:
<https://youtu.be/bWTmUWWZnhQ>

Action taken for Advanced Learners

1. Advanced Assignment given to them. (Assignment at the bottom)
2. Online lectures created by me whose links have been given so that they can study according to their suitable time and concern with me any time. Links are as follows:
<https://youtu.be/DO0Dzz07DNI>

Proof of Assignments

Instructions

MTH550 (Real Analysis)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)					
Subject Name	Real Analysis			Subject Code	MTH550
Faculty Name	Dr. Rajesh Joshi	Date of Issue	20-Nov-2023	Date of Submission	27-Nov-2023

10. Define metric space.
11. Give an example of incomplete metric space.
12. Prove that (R, u) is not compact.
13. In a metric space, prove that every convergent sequence has a unique limit.
14. Define norm of a partition.

15. Let (X, d) and (Y, ρ) be metric spaces and $f: X \rightarrow Y$ be a function. Then, f is continuous if and only if $f^{-1}(G)$ is open in X whenever G is open in Y .
16. Prove that the set $\mathbb{N} \times \mathbb{N}$ is countable, where \mathbb{N} is the set of natural number.
17. If P^* is a refinement of P , then prove that $L(P^*, f, \alpha) \geq L(P, f, \alpha)$.
18. Prove that a function f is integrable with respect to α on $[a, b]$ if and only if there exists a partition P of $[a, b]$ such that $(U(P, f, \alpha) - L(P, f, \alpha)) < \epsilon$.

If and only if Assignment: 02 (Advanced Learners)					
Subject Name	Real Analysis			Subject Code	MTH550
Faculty Name	Dr. Rajesh Joshi	Date of Issue	20-Nov-2023	Date of Submission	27-Nov-2023

1. Define metric space.
 2. Give an example of incomplete metric space.
 3. Prove that (\mathbb{R}, u) is not compact.
 4. In a metric space, prove that every convergent sequence has a unique limit.
 5. Define norm of a partition.
 6. Let (X, d) and (Y, ρ) be metric spaces and $f: X \rightarrow Y$ be a function. Then, f is continuous if and only if $f^{-1}(F)$ is closed in X whenever F is closed in Y .
 7. Prove that the unit interval $[0, 1]$ is uncountable.
 8. If P^* is a refinement of P , then prove that $U(P^*, f, \alpha) \leq U(P, f, \alpha)$.
 9. If $f_1 \in R(\alpha)$ and $f_2 \in R(\alpha)$ over $[a, b]$, then $f_1 + f_2 \in R(\alpha)$ and $\int_a^b (f_1 + f_2) d\alpha = \int_a^b f_1 d\alpha + \int_a^b f_2 d\alpha$.
- d. Course Name (Course Code) : Engineering Mathematics-III (MTH252A)**

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/HoGNkZclxDU> (One link contains the whole playlists).

Action taken for Advanced Learners

1. Advanced Assignment given to them. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/d7NF-8vVv4> (One link contains the whole playlists)

Proof of Assignments

Instructions

MTH252A (Engineering Mathematics-III)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)					
Subject Name	Engineering Mathematics-III			Subject Code	MTH252A
Faculty Name	Dr. Rajesh Joshi	Date of Issue	20-Nov-2023	Date of Submission	27-Nov-2023

1. Write the Dirichlet's conditions for the existence of a Fourier series of a function.
2. Define unit step function and find its Laplace Transform.
3. Compute $L(\sin 2t \sin 3t)$.
4. If $L\{f(t)\} = \bar{f}(s)$, then $L\{f(at)\} = \frac{1}{a}\bar{f}\left(\frac{s}{a}\right)$.
5. Find the Laplace transform of $t^3 e^{-3t}$.
6. Find a Fourier series to represent x^2 in the interval $(-l, l)$.
7. Find the inverse Laplace transform of $\frac{2s^2-6s+5}{s^3-6s^2+11s-6}$.
8. Find the Laplace transform of $\frac{\cos at - \cos bt}{t} + t \sin at$.
9. Obtain the Fourier series for $f(x) = e^{-x}$ in the interval $0 < x < 2\pi$.

Assignment: 02 (Advanced Learners)					
Subject Name	Engineering Mathematics-III			Subject Code	MTH252A
Faculty Name	Dr. Rajesh Joshi	Date of Issue	20-Nov-2023	Date of Submission	27-Nov-2023

1. Write the Dirichlet's conditions for the existence of a Fourier series of a function.
2. Define unit step function and find its Laplace Transform.
3. Compute $L(\sin 2t \sin 3t)$.
4. If $L\{f(t)\} = \bar{f}(s)$, then $L\{f(at)\} = \frac{1}{a}\bar{f}\left(\frac{s}{a}\right)$.
5. Find the Laplace transform of $t^3 e^{-3t}$.
6. Express $f(x) = x$ as a half-range sine series in $0 < x < 2$.
7. Find the inverse Laplace transform of $\log\left(\frac{s+1}{s-1}\right)$.
8. Evaluate $\int_0^\infty e^{-t} \left(\frac{\cos at - \cos bt}{t}\right) dt$.
9. Find the Fourier series expansion of $f(x) = 2x - x^2$ in $(0, 3)$ and hence deduce that $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots = \frac{\pi}{12}$.

3. Faculty Name: Mr. Anmol Bajaj

e. Course Name (Course Code): Group Theory II (MTH322)

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/flQsH3UYRsA> (One link contains the whole playlist).
3. Extra time 1:30pm to 2:30pm (Every Monday for clearing their doubts).

Action taken for Advanced Learners

1. Advanced Assignment given to them (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/flQsH3UYRsA> (One link contains the whole playlist).

Proof of Assignments

Instructions

MTH322 (Group Theory II)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)					
Subject Name	Group Theory II			Subject Code	MTH322
Faculty Name	Mr. Anmol Bajaj	Date of Issue	18-Nov-2023	Date of Submission	25-Nov-2023

1. Find the automorphism group of infinite cyclic group. Hence determine order of $Aut(Z(G))$.
2. State and prove Fundamental Theorem on finite abelian group.
3. State and prove Sylow 3rd theorem.
4. State and prove Sylow 2nd Theorem.

Assignment: 02 (Advanced Learners)					
Subject Name	Group Theory II			Subject Code	MTH322
Faculty Name	Mr. Anmol Bajaj	Date of Issue	18-Nov-2023	Date of Submission	28-Nov-2023

Quest:01) Let \mathbb{R}^+ denote the multiplicative group of positive reals and let $T = \{a + bi \in \mathbb{C} \mid a^2 + b^2 = 1\}$ be the multiplicative group of complex numbers of norm 1. Show that \mathbb{C}^* is the internal direct product of \mathbb{R}^+ and T .

Quest:02) Prove that $\frac{D_4}{Z(D_4)}$ is isomorphic to $\mathbb{Z}_2 \oplus \mathbb{Z}_2$.

Quest: 03) How many Sylow-3 subgroup of S_5 are there? Exhibit five.

Quest: 04) Find all sylow-3 subgroup of S_4 .

Course Name: Elementary Algebra

Course Code : MAT101

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
https://youtu.be/nH05UiErAX4?si=kJ1_PtX97lvfpfpG (One link contains the whole playlists).

Action taken for Advanced Learners

1. Advanced Assignment given to them. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
https://youtu.be/nH05UiErAX4?si=kJ1_PtX97lvfpfpG (One link contains the whole playlists)

Proof of Assignments

Instructions

MAT101(Elementary Algebra)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)					
Subject Name	Elementary Algebra			Subject Code	MAT101
Faculty Name	Mr. Anmol Bajaj	Date of Issue	26-Nov-2023	Date of Submission	02-Dec-2023

1. If $\xi = cis \frac{2\pi}{n}$ and $k \in \mathbb{Z}$ such that $(k, n) = d$, then ξ^k is a primitive $\left(\frac{n}{d}\right)$ th root of unity.
2. If n is any integer, then $(\cos \theta + i \sin \theta)^n = \cos n\theta + i \sin n\theta$.
3. Sum the series upto n terms $\tan^{-1} \frac{1}{3} + \tan^{-1} \frac{2}{9} + \tan^{-1} \frac{4}{33} + \dots$ and deduce the sum upto infinity.

Assignment: 02 (Advanced Learners)					
Subject Name	Elementary Algebra			Subject Code	MAT101
Faculty Name	Mr. Anmol Bajaj	Date of Issue	10-Nov-2023	Date of Submission	20-Nov-2023

1. Determine the value of λ so that the equations

$$\begin{aligned} 2x + y + 2z &= 0 \\ x + y + 3z &= 0 \\ 4x + 3y + \lambda z &= 0 \end{aligned}$$

Have a non-zero solution.

2. Find the row rank of the matrix $A = \begin{bmatrix} 1 & 2 & -1 & 3 \\ 4 & 1 & 2 & 1 \\ 3 & -1 & 1 & 2 \\ 1 & 2 & 0 & 1 \end{bmatrix}$.
3. Is the system of vectors $[1,3,2]$, $[1,-7,-8]$, $[2,1,-1]$ linearly dependent? Justify.
4. Sum the series upto n terms

$$\tan^{-1} \frac{1}{3} + \tan^{-1} \frac{2}{9} + \tan^{-1} \frac{4}{33} + \dots$$

And deduce the sum upto infinity.

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom).
2. Online lectures created by me whose links have been given so that they can study according to their suitable time and concern with me any time. Links are as follows:

<https://youtu.be/XHKcrs8YaSo>

Action taken for Advanced Learners

1. Advanced Assignment given to them. (Assignment at the bottom)
2. Online lectures created by me whose links have been given so that they can study according to their suitable time and concern with me any time. Links are as follows:

<https://youtu.be/XHKcrs8YaSo>

Proof of Assignments**Instructions**

MTH661 (Topology)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)					
Subject Name	Topology			Subject Code	MTH661
Faculty Name	Mr. Anmol Bajaj	Date of Issue	15-Nov-2023	Date of Submission	25-Nov-2023

1. Let X be a topological space and A, B are two subspaces of X such that $A \subseteq B \subseteq \bar{A}$. Suppose that A is connected. Prove that B is also connected.
2. The union of a collection of connected subspaces of a topological space having non empty intersection is connected under subspace topology. Prove it.
3. Show that \mathbb{R}_k is strictly finer than \mathbb{R}_s .

Assignment: 02 (Advanced Learners)

Subject Name	Topology			Subject Code	MTH661
Faculty Name	Mr. Anmol Bajaj	Date of Issue	10-Nov-2023	Date of Submission	25-Nov-2023

Question 1:

Which of the following is a T_0 -space.

- (a) $X = \{a, b, c\}$ with topology $\mathcal{T}' = \{\phi, \{a\}, \{a, b\}, \{a, c\}, X\}$
- (b) $X = \{a, b, c\}$ with topology $\mathcal{T}'' = \{\phi, \{a\}, \{c\}, \{a, c\}, X\}$
- (c) $X = \{a, b\}$ with topology $\mathcal{T}''' = \{\phi, \{a\}, X\}$
- (d) All of these

Question 2:

Which of the following is a T_1 -space.

- (a) $X = \{a, b, c\}$ with topology $\mathcal{T}' = \{\phi, \{a\}, \{a, b\}, \{a, c\}, X\}$
- (b) $X = \{a, b, c\}$ with topology $\mathcal{T}'' = \{\phi, \{a\}, \{c\}, \{a, c\}, X\}$
- (c) $X = \{a, b\}$ with topology $\mathcal{T}''' = \{\phi, \{a\}, \{b\}, X\}$
- (d) All of these

Question 3:

Which of the following is a T_2 -space.

- (a) A discrete space with at least two points.
- (b) $X = \{a, b, c\}$ with topology $\mathcal{T}' = \{\phi, \{a\}, \{c\}, \{a, c\}, X\}$
- (c) $X = \{a, b\}$ with topology $\mathcal{T}'' = \{\phi, \{b\}, X\}$
- (d) All of these

Question 4:

Which of the following is a T_3 -space.

- (a) Discrete space with at least two points.
- (b) $X = \{a, b, c\}$ with topology $\mathcal{T}' = \{\phi, \{a\}, \{c\}, \{a, c\}, X\}$
- (c) $X = \{a, b\}$ with topology $\mathcal{T}'' = \{\phi, \{a\}, X\}$
- (d) All of these

Question 5:

State whether the following statement is true or false:

“If the topological space (X, \mathcal{T}) is a regular space, then every single point subset of X is closed”.

- (a) True
- (b) False

Question 6:

Consider the following statements:

1. If every singleton subset $\{p\}$ of a topological space (X, \mathcal{T}) is closed, then it is a T_1 -space.
2. If \mathcal{T} be the cofinite topology on X , then (X, \mathcal{T}) is a T_1 -space.

Then which of the above statements is/are true?

- (a) Only (1)
- (b) Only (2)
- (c) Both (1) and (2)
- (d) Neither (1) nor (2)

Question 7:

Which of the following is not a T_1 -space ?

- (a) \mathbb{R} endowed with the usual topology.
- (b) \mathbb{R} endowed with cofinite topology.
- (c) Indiscrete topological space (X, \mathcal{T}) , with $|X| \geq 2$.
- (d) Metrizable spaces.

Question 8:

State whether the following statement is true or false:

“An infinite set with cocountable topology is a T_1 -space”.

- (a) True
- (b) False

Question 9:

Which of the following statements is/are true?

1. Continuous image of a T_1 -space is T_1 .
2. Continuous image of a T_2 -space is T_2 .

- (a) Only (1)
- (b) Only (2)
- (c) Both (1) and (2)
- (d) Neither (1) nor (2)

Question 10:

Consider the following statements:

1. Every discrete space is a T_1 -space.
2. Every finite T_1 -space is discrete.

Which of the above statements is/are true?

- (a) Only (1)
- (b) Only (2)
- (c) Both (1) and (2)
- (d) Neither (1) nor (2)

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom).
2. Online NPTEL video lectures are provided to them and whose links are as follows:
https://youtu.be/EVeOcL8as_k

Action taken for Advanced Learners

1. Advanced Assignment given to them. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
https://youtu.be/EVeOcL8as_k

Proof of Assignments

Instructions

MTH558 (Differential Geometry)	
Marks	Assignment
0 – 10	Assignment 1
11 – 25	Assignment 2

Assignment: 01 (Slow Learners)					
Subject Name	Differential Geometry			Subject Code	MTH558
Faculty Name	Mr. Anmol Bajaj	Date of Issue	16-Nov-2023	Date of Submission	23-Nov-2023

- Q1.** A unit speed curve γ on a surface S is a geodesic iff its geodesic curvature K_g is zero everywhere.
- Q2.** Find the second Fundamental Form of Catenoid $\sigma(u, v) = (\cosh u \cos v, \cosh u \sin v, u)$.
- Q3.** Show that the quadric $x^2 + y^2 - 2z^2 - \frac{2}{3}xy + 4z = c$ is a hyperboloid of one sheet if $c > 2$.

Assignment: 02 (Advanced Learners)					
Subject Name	Differential Geometry			Subject Code	MTH558
Faculty Name	Mr. Anmol Bajaj	Date of Issue	16-Nov-2023	Date of Submission	23-Nov-2023

2.14 Compute κ , τ , \mathbf{t} , \mathbf{n} and \mathbf{b} for each of the following curves, and verify that the Frenet-Serret equations are satisfied:

(i) $\gamma(t) = \left(\frac{1}{3}(1+t)^{3/2}, \frac{1}{3}(1-t)^{3/2}, \frac{t}{\sqrt{2}} \right)$;

(ii) $\gamma(t) = \left(\frac{4}{5} \cos t, 1 - \sin t, -\frac{3}{5} \cos t \right)$.

2.15 Show that the curve

$$\gamma(t) = \left(\frac{1+t^2}{t}, t+1, \frac{1-t}{t} \right)$$

is planar.

2.16 Show that the curve in Exercise 2.14(ii) is a circle, and find its centre, radius and the plane in which it lies.

4. Faculty Name : Dr. Bharti

a. Course Name (Course Code): Calculus (MAT102)

Action taken for Slow Learners

1. Revision of topics has been done.

Action taken for Advanced Learners

1. Advanced Assignment given to them.

2. Youtube video lecture given to them. One of the Link is given below

<https://youtu.be/EGnI8WyYb3o?si=1c86KSAsuqr1TRt9>

Class/Semester: B.Sc. Mathematics/1st

Subject with Code: Calculus (MAT102)

Assignment No. 1

Date of Issue: 13/10/2023

Due date of Submission: 25/10/2023

Q. No.	Question	CO Mapped	RBT Level

1	If $y = e^x \sin x$, find $\frac{d^2y}{dx^2}$.	CO1	L2
2	If $y = e^{ax} \cosh bx$, then prove that $\frac{d^2y}{dx^2} - 2a \frac{dy}{dx} + (a^2 - b^2)y = 0$.	CO1	L3
3	Find n th derivative of (i) $e^x \sin \sqrt{3}x$ (ii) $\sqrt{2-3x}$, $x < \frac{3}{2}$.	CO1	L5
4	If $y = e^{\tan^{-1}x}$, show that $(1+x^2)y_{n+2} + \{2(n+1)x-1\}y_{n+1} + n(n+1)y_n = 0$.	CO1	L5
5	Evaluate limits (i) $\lim_{x \rightarrow 0} \frac{1-\cos^2 x}{x^2 \sin x^2}$ (ii) $\lim_{x \rightarrow \pi} \frac{1+\cos x}{\tan^2 x}$ (iii) $\lim_{x \rightarrow 0} \frac{3^x - 2^x}{\sqrt{x}}$.	CO1	L5

Revised Blooms Taxonomy (RBT)

Course Outcomes (COs): After successfully completing this course the students will be able to						
CO1: Understand limit, continuity, derivatives, Leibnitz's theorem and applications, L 'Hospital' s rule.						
CO2: Learn Concavity and convexity of curve, inflexion points, asymptotes of curves and curve tracing in Cartesian coordinates.						
CO3: Learn parameterizing a curve, evaluate arc length of curves, area of surface of revolution, rotation of axis, second degree equations of conics, polar equations of conics.						
CO4: Understand vector functions, triple product, limit, continuity, differentiation and integration of vector valued functions, tangent and normal components of acceleration.						
RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
RBT Level No.	L1	L2	L3	L4	L5	L6
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

Class/Semester: B.Sc. Mathematics/1st
Subject with Code: Calculus (MAT102)

Assignment No. 2

Date of Issue: 27/11/2023

Due date of Submission: 03/12/2023

Q. No.	Question	CO Mapped	RBT Level
1	Transform the equation $x^2 + 2\sqrt{3}xy - y^2 = 2a^2$ when the axes are rotated through 30°	CO3	L3
2	Through what angle should the axes be rotated so that the term in xy may disappear from $6x^2 + 24xy - y^2 = 1$? Also find the transformed equation.	CO3	L5
3	Identify the conic $5x^2 - 2xy + 5y^2 + 2x - 10y - 7 = 0$.	CO3	L2
4	What is represented by the equation $x^2 - 4xy - 2y^2 + 10x + 4y = 0$	CO3	L2
5	If $\vec{r} = (\sin t)\hat{i} + (\cos t)\hat{j} + t\hat{k}$, find $\frac{d\vec{r}}{dt}$, $\left \frac{d^2\vec{r}}{dt^2}\right $.	CO4	L3

Revised Blooms Taxonomy (RBT)

Course Outcomes (COs): After successfully completing this course the students will be able to						
CO1: Understand limit, continuity, derivatives, Leibnitz's theorem and applications, L 'Hospital' s rule.						
CO2: Learn Concavity and convexity of curve, inflexion points, asymptotes of curves and curve tracing in Cartesian coordinates.						
CO3: Learn parameterizing a curve, evaluate arc length of curves, area of surface of revolution, rotation of axis, second degree equations of conics, polar equations of conics.						
CO4: Understand vector functions, triple product, limit, continuity, differentiation and integration of vector valued functions, tangent and normal components of acceleration.						

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
	L1	L2	L3	L4	L5	L6
RBT Level No.						
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

b. Course Name (Course Code): Mechanics-I (MTH341)

Action taken for Slow Learners

1. Revision of topics has been done.

Action taken for Advanced Learners

1. Advanced Assignment given to them.

2. Youtube video lecture given to them. One of the Link is given below

https://youtu.be/R9zb_les7fU?si=NTfldKac5Nqd5XuV

Class/Semester: B.Sc.(Hons)Mathematics/5th

Subject with Code: Mechanics-I (MTH341)

Assignment No. 1

Date of Issue: 12/10/2023

Due date of Submission: 23/10/2023

Max marks: 10

Q. No.	Question	CO Mapped	RBT Level
1	Three forces acting on a particle are in equilibrium, the angle between the first and second force is 105° , and that between second and third is 120° . Find the ratio of the magnitudes of the forces.	CO1	L3
2	A body of weight 25 N is suspended by two strings of lengths 30 cm and 40 cm . The other ends of the strings are fastened to two points in the same horizontal line 50 cm apart. Find the tensions in the strings.	CO1	L5
3	A load of 50 kg is carried by two persons on a plank AB , 5 metres long, supported at A and B such that distance of A and B from weight are $3m$ and $2m$. Find vertical forces applied at A and B .	CO1	L3
4	$ABCD$ is a rectangle in which $AB = 3m$ and $BC = 2m$. Forces of magnitudes $2, 3, 5, 6, \sqrt{13}$ newtons acts along AB, BC, CD, AD, AC respectively. Find the algebraic sum of their moments about A and about B .	CO2	L5
5	The horizontal roadway of a bridge AB , $12m$ long and weight $56000N$ rests on two supports at its ends. What is the pressure on each support when a lorry of weight $33600N$, starting from A , is at a point two-third of the way on the bridge.	CO2	L6
6	Forces of magnitudes $P, 3P, 2P$ and $5P$ along the sides AB, BC, CD and DA of a square $ABCD$. Find the magnitude and direction of their resultant and prove that it meets AD produced at a point E such that $AE:ED = 5:4$.	CO2	L5
7	Forces of magnitudes $P, 2P$ and $4P$ act along the sides AB, BC and CA of an equilateral triangle ABC taken in order. Find their resultant.	CO2	L5

Course Outcomes (COs): After successfully completing this course the students will be able to
CO1: Understand forces and system of forces, triangle law, Lami's theorem, Parallel forces.
CO2: Learn moments, Varignon;s theorem, couples, resultant of a force and a couple.
CO3: Understand equilibrium of a rigid body acted on by three coplanar forces, m-n theorem, Virtual work, principle of virtual work and related problems.

CO4: Centre of gravity of different rigid bodies, friction, types and laws of friction, coefficient of friction.

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
	L1	L2	L3	L4	L5	L6
RBT Level No.						
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

c. Course Name (Course Code): Algebra-II (MTH662)

Action taken for Slow Learners

1. Revision of topics has been done.

Action taken for Advanced Learners

1. Advanced Assignment given to them.

2. Youtube video lecture given to them. One of the Link is given below

<https://youtu.be/AP5jDPB-esQ?si=qghvrV8Huj5dq-8F>

Class/Semester: M.Sc.(Hons)Mathematics/3rd

Subject with Code: Algebra-II (MTH662)

Assignment No. 1

Date of Issue: 18/10/2023

Due date of Submission: 26/10/2023

Max marks: 10

Q. No.	Question	CO Mapped	RBT Level
1	Find minimal polynomial of α over Q or Prove that α is algebraic over Q where (i) $\alpha = 2 + \sqrt[3]{6}$ (ii) $\alpha = \sqrt{1 + \sqrt{3}}$ (iii) $\alpha = \sqrt{2} - \sqrt{3}$ (iv) $\alpha = \sqrt{2} - 3\sqrt{3}$	CO2	L6
2	Find inverse of $2 - \sqrt[3]{4}$ in $Q(\sqrt[3]{2})$	CO2	L5
3	Find inverse of $2 + \sqrt{2}$ in $Q(\sqrt{2})$	CO2	L6
4	Express $\frac{1}{3(1+a+a^2)}$ in polynomial of 'a', where $a = \sqrt[3]{3}$	CO2	L5
5	Find inverse of $1 + \sqrt[3]{2} + 6. \sqrt[3]{4}$ in $Q(\sqrt[3]{2})$	CO2	L5

Course Outcomes (COs): After successfully completing this course the students will be able to

CO1: Understand polynomial rings, unique factorization domain, Euclidean domain and principal ideal domain.

CO2: Learn Gauss lemma, Eisenstein's irreducibility criterion, fields, algebraic and transcendental elements, degree of a field extension, finite extensions.

CO3: Understand adjunction of roots, splitting fields, normal extensions, finite fields, algebraically closed fields.

CO4: Learn Galois extensions, Fundamental theorem of Galois Theory, Separable and purely inseparable extensions, perfect fields.

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
	L1	L2	L3	L4	L5	L6
RBT Level No.						
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

d. Course Name (Course Code): Elementary Mathematics (AGS118A)

Action taken for Slow Learners

1. Revision of topics has been done.

Action taken for Advanced Learners

1. Advanced Assignment given to them.

Class/Semester: B.Sc. Agriculture Science/1st

Subject with Code: Elementary Mathematics (AGS118A)

Assignment No. 1

Date of Issue: 13/10/2023

Due date of Submission: 25/10/2023

Q. No.	Question	CO Mapped	RBT Level
1	Find derivative of $\sin x$ by method of first principle.	CO3	L3
3	Find the center and radius of the circle which passes through the points (2,-1), (-4,3) and (-2,6).	CO2	L5
4	Find determinant of $\begin{bmatrix} 1 & -1 & 2 \\ 0 & 0 & 5 \\ -3 & 2 & 4 \end{bmatrix}$.	CO4	L3
4	Find angle between the lines $x + 3y + 5 = 0$ and $x - 2y + 7 = 0$.	CO1	L3
5	Find y , if area of triangle whose vertices are $(-1, y)$, $(2,4)$ and $(-2,5)$.	CO2	L5

Revised Blooms Taxonomy (RBT)

Course Outcomes (COs): After successfully completing this course the students will be able to						
CO1: Understand the different forms of lines and related notions.						
CO2: Learn angle bisector of lines, area of triangle, circle, different equations of circles and related notions.						
CO3: Understand the differentiation by first principle as well as by direct formulae and their application.						
CO4: understand the fundamental of integration and matrices and their application.						
RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
RBT Level No.	L1	L2	L3	L4	L5	L6
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

e. Course Name (Course Code): Engineering Mathematics (MAT151A)

Action taken for Slow Learners

1. Revision of topics has been done.

Action taken for Advanced Learners

1. Advanced Assignment given to them.

Class/Semester: B.Tech. (CS+AI (A))/1st

Subject with Code: Engineering Mathematics (MAT151A)

Assignment No. 1

Date of Issue: 14/10/2023

Due date of Submission: 25/10/2023

Q. No.	Question	CO Mapped	RBT Level
1	Find rank of $A = \begin{bmatrix} 2 & 3 & -1 \\ 1 & -1 & -2 \\ 3 & 1 & 3 \end{bmatrix}$	CO1	L5
3	Find value of λ , so that the system of equations has non-trivial solution $2x + y + 2z = 0$ $x + y + 3z = 0$ $4x + 3y + \lambda z = 0$	CO1	L5
4	Test for consistency. If consistent, solve for x, y and z $x - y + z = 5$ $2x + y - z = -2$ $3x - y - z = 7$	CO1	L3
4	Find spectrum of $A = \begin{bmatrix} -3 & -9 & -12 \\ 1 & 3 & 4 \\ 0 & 0 & 1 \end{bmatrix}$	CO1	L3
5	Verify Cayley Hamilton's theorem for $A = \begin{bmatrix} 0 & 0 & 1 \\ 3 & 1 & 0 \\ -2 & 1 & 4 \end{bmatrix}$ and hence evaluate A^{-1} .	CO1	L5

Revised Blooms Taxonomy (RBT)

Course Outcomes (COs): After successfully completing this course the students will be able to						
CO1: Understand the theory of matrices used in solving the problems in mechanics and other streams.						
CO2: Understand the concept of partial differentiation, Euler's theorem and its extension, total derivative, maxima and minima of a function of two variables, and Lagrange's method of multipliers.						
CO3: Understand the concept of ordinary differential equation and their solutions (Homogeneous, differential equation, Exact differential equations).						
CO4: Understand the solution of differential equations with constant coefficients by method of variation of parameters and simultaneous linear differential equations.						
RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
RBT Level No.	L1	L2	L3	L4	L5	L6
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

5. Faculty Name: Mrs. Indu Bala

a. Course Name (Course Code): Riemann Integration and series of functions (MTH345)

Action taken for Slow Learners

- 1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom)**
- 2. Extra lectures have been taken for revision.**

Action taken for Advanced Learners

- 1. Advanced Assignment given to them (Assignment at the bottom)**

Proof of Assignments

Assignment: (Slow Learners)					
Subject Name	Riemann Integration and series of functions			Subject Code	MTH555
Faculty Name	Mrs. Indu Bala	Date of Issue	15-11-2023	Date of Submission	20-11-2023

1. Prove that $L(P, f) \leq U(P, f)$
2. Show that function f defined by $f(x) = \begin{cases} 0, & \text{when } x \text{ is rational} \\ 1, & \text{when } x \text{ is irrational} \end{cases}$ Is not a Riemann integrable
3. Evaluate $\Gamma(5)$.
4. Solve $\int_0^{\frac{\pi}{2}} \sin^{\frac{1}{2}} x \cos^{\frac{1}{2}} x \, dx$
5. Test for the convergence of $\int_0^1 \frac{dx}{\sqrt{1-x^3}}$.
6. Compute $\int_{-1}^1 f dx$ where $x = |x|$ by calculating $L(P, f)$ and $U(P, f)$.
7. Show that function $f(x) = x^2$ is integrable on any interval $[0, k]$.
8. Prove that $\beta(m, n) = \frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$; $m, n > 0$.
9. A function f is bounded and integrable on $[a, b]$ and there exist a function F such that $F' = f$ on closed interval $[a, b]$ then $\int_a^b f dx = F(b) - F(a)$

Assignment: (Advanced Learners)					
Subject Name	Riemann Integration and series of functions			Subject Code	MTH555
Faculty Name	Mrs. Indu Bala	Date of Issue	15-11-2023	Date of Submission	24-11-2023

1. Prove that every continuous function is Riemann integrable.
2. Prove that a bounded function f is integrable on $[a, b]$ if and only if for every $\epsilon > 0$, there exist a partition P of closed interval $[a, b]$ such that $U(P, f) - L(P, f) < \epsilon$
3. Express the integral $\int_0^{\frac{\pi}{2}} \sqrt{\tan x} \, dx$ in terms of gamma function.
4. State and prove duplication formula

b. Course Name (Course Code): Remedial Mathematics (PHR119)

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom)
2. Extra lectures have been taken for their revision

Action taken for Advanced Learners

1. Advanced Assignment given to them (Assignment at the bottom)

Proof of Assignments

Assignment: (Slow Learners)					
Subject Name	Remedial Mathematics			Subject Code	MTH225A
Faculty Name	Mrs. Indu Bala	Date of Issue	01-11-2023	Date of Submission	08-11-2023

1. Write any five examples of finding inverse of the matrices.
2. Write any three examples of system of linear equations solve by using matrices
3. Write any five examples of differentiations
4. Write any five examples of integrations.

Assignment: (Advanced Learners)					
Subject Name	Remedial Mathematics			Subject Code	MTH225A
Faculty Name	Mrs. Indu Bala	Date of Issue	01-11-2023	Date of Submission	08-11-2023

1. Define diagonal matrix and Find the determinant of matrix $A = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 2 \\ 0 & 0 & 4 \end{bmatrix}$.
2. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ -1 & 1 & 2 \end{bmatrix}$, find A^{-1} .
3. Resolve the rational fractional $\int \frac{x-1}{(x+1)(x-2)}$ into a partial fraction.
4. Resolve the rational fractional $\int \frac{x-1}{(x+1)^2}$ into a partial fraction.
5. Draw the graph of $y = \log_a x$, for $0 < a < 1$ and for $a > 1$. Also write the value of $\log 1 = ?$
6. Define real values function, one-one and onto real valued function.
7. Using matrix method to solve that the system of equations $x + y + z = 6$, $2x - y + z = 3$, $x - 2y + 3z = 6$.
8. If $A = \begin{bmatrix} 3 & 1 \\ 7 & 5 \end{bmatrix}$ then find
 - i) A' (or A transpose),
 - ii) A^{-1} ,
 - iii) $A \cdot (\text{adj } A)$

c. Course Name(Course Code): Discrete Mathematics (CSA316)

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom)
2. Extra lectures have been taken for revision

Action taken for Advanced Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom)

Proof of Assignments

Assignment: (Slow Learners)					
Subject Name	Discrete Mathematics			Subject Code	MTH256A
Faculty Name	Mrs. Indu Bala	Date of Issue	15-11-2023	Date of Submission	20-11-2023

1. Define function.
2. If $A=\{1,2,3,4,5\}$ and $B=\{2,5,6,7,8,9\}$. Find $A \cap B$ and $A-B$.
3. Evaluate the value of 4P_2
4. Give a statement of Pigeon hole principle
5. Define finite and infinite sets with examples.
6. Show that $f: R \rightarrow R$ defined by $f(x) = e^x$ is one-one, but not onto
7. Show that $f: R \rightarrow R$ defined by $f(x) = x^2$ is neither one-one, nor onto.

Assignment: (Advanced Learners)					
Subject Name	Discrete Mathematics			Subject Code	MTH252A
Faculty Name	Mrs. Indu Bala	Date of Issue	15-11-2023	Date of Submission	20-11-2023

1. Let $A=\{2,3,4\}$ and $B=\{a, b, c\}$ and $f = \{(2, a), (3, b), (4, b)\}$ is a function from A to B. Find domain co-domain and range of the function. In the set N of all natural numbers, let a relation R be defined by: $R = \{(x, y): x \in N, y \in N, x - y \text{ is divisible by } 5\}$. Prove that R is an equivalence relation.
2. Determine the value of ${}^nC_{n-2} = 10$
3. Determine the number of triangles that are formed by selecting points from a set of 15 points out of which 8 are collinear.
4. State and prove inclusion and exclusion principle
5. Prove by mathematical induction $1^2 + 2^2 + 3^2 + \dots + n^2 = \frac{n(n+1)(2n+1)}{6}$

d. Course Name (Course Code): Discrete mathematical structure (CSA517)

Action taken for Slow Learners

1. Basic Assignment given to them as per their knowledge. (Assignment at the bottom)
2. Extra lectures have been taken for revision.

Action taken for Advanced Learners

1. Advanced Assignment given to them (Assignment at the bottom)

Proof of Assignments

Assignment: (Slow Learners)				
Subject Name	Discrete mathematical structure		Subject Code	MTH252A

Faculty Name	Mrs. Indu Bala	Date of Issue	8-11-2023	Date of Submission	20-11-2023
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1. Write any five examples of verifying two graphs are isomorphism
2. Write any five examples of verifying a graphs is planer or non-planer
3. Write all the definitions of logical connectives
4. Write three Examples of tautology in logical connectives.
5. Write one example of logical equivalence in logical connectives

Assignment: (Advanced Learners)					
Subject Name	Discrete mathematical structure			Subject Code	MTH252A
Faculty Name	Mrs. Indu Bala	Date of Issue	8-11-2023	Date of Submission	20-11-2023

1. Which of the following functions one-one and onto
 - i. If $f: R \rightarrow R$ defined by $f(x) = x^3 - x$
 - ii. If $f: Z \rightarrow Z$ defined by $f(x) = -x + 2$
 - iii. If $f: R \rightarrow R$ defined by $f(x) = x^2$
 - iv. If $f: R \rightarrow R$ defined by $f(x) = x^3$
2. Consider the function $f: R \rightarrow R$ defined by $f(x) = x^3 + 3x + 1$ and $g(x) = 2x - 3$. Find
 - i. $f \circ g$
 - ii. $f \circ f$
 - iii. $g \circ f$

6. Faculty Name: Mr. Arun Kochar

a. Course Name (Course Code): Operation Research- I (MTH664)

Action taken for Slow Learners

1. Simple and Basic assignments have been given to them.

Action taken for Advanced Learners

1. Conceptual and competitive questions have been given to them.

2. Online NPTEL video lectures are provided to them and whose links are as follows:

<https://youtu.be/pzbSURDWluA>

<https://youtu.be/XEA1pOtyrfo>

Class/Semester: M.Sc. (Hons) Mathematics/III SEM.

Subject with Code: Operation Research- I (MTH664)

Assignment No. 1 (Slow Learners)

Date of Issue: 16/11/2023

Due date of Submission: 22/11/2023

Q. No.	Question	CO Mapped	RBT Level
1	Using graphical method to find optimum solution of the problem Max $Z = 10x_1 + 5x_2$ subjected to constraints $4x_1 + 5x_2 \leq 100$, $5x_1 + 2x_2 \leq 80$ where $x_1, x_2 \geq 0$.	CO1	L6
2	Write in detail about the rules in formulating dual problem from the primal problem.	CO2	L3
3	Use the Dual Simplex method to solve following LPP: Maximize $Z = x_1 + 2x_2$ subjected to constraints $2x_1 + x_2 \geq 4$, $x_1 + 2x_2 \geq 7$, where $x_1, x_2 \geq 0$.	CO2	L4
4	Use Fractional cut method to solve following Linear programming problem: Max $Z = x_1 + x_2$ subjected to conditions $3x_1 + 4x_2 \leq 24$, $x_2 = 2$ where $x_1, x_2 \geq 0$ and x_2 is integer.	CO3	L4

Assignment No. 2 (Advanced Learners)

Date of Issue: 16/11/2023

Due date of Submission: 22/11/2023

Q. No.	Question	CO Mapped	RBT Level
1	Solve the following LPP by two phases simplex method Max $Z = 2x_1 + x_2 + 3x_3$ subjected to conditions $x_1 + x_2 + 2x_3 \leq 5$, $2x_1 + 3x_2 + 4x_3 = 12$ where $x_1, x_2, x_3 \geq 0$.	CO1	L6
2	A person requires 10, 12 and 12 units chemicals A, B and C respectively for his garden. A liquid product contains 5, 2 and 1 units of A, B and C respectively per jar. A dry product contains 1, 2 and 4 units of A, B and C per carton. If the liquid product sells whose cost price is Rs. 3 per jar and the dry product cost for Rs. 2 per carton, how many of each should be purchased, in order to minimize the cost and meet the requirements? Formulate the LPP and solve it.	CO1	L3
3	Briefly explain the scopes of Operations Research (OR).	CO3	L4
4	Find multiple optimum solution, using Simplex method Max $Z = 2x_1 + 3x_2$ subjected to constraints $6x_1 + 9x_2 \leq 100$, $2x_1 + x_2 \leq 20$ where $x_1, x_2 \geq 0$.	CO2	L4

Course Outcomes (COs): After successfully completing this course the students will be able to
CO1: understand the key concepts of Operational Research and Linear Programming and their role in various organizations.
CO2: formulate real-world problems as a linear programming model and describe the theoretical workings of the graphical and simplex method, demonstrate the solution process by hand and solver.
CO3: employ the suitable methods for improving transportation cost of transportation problems.
CO4: solve integer programming problem with different techniques and Game theory.

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)	Higher Order Thinking Levels (HOTs)
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RBT Level No.	L1	L2	L3	L4	L5	L6
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

b. Course Name (Course Code): Partial Differential Equations (MTH231)

Action taken for Slow Learners

1. Simple and Basic assignments have been given to them. (Assignment at the bottom)
2. Online NPTEL video lectures are provided to them and whose links are as follows:
<https://youtu.be/De-vi95YILE>
<https://youtu.be/btOCUmJkrrg>

Action taken for Advanced Learners

1. Advanced Assignment given to them.
2. NPTEL video lecture given to them. Link is given below
<https://youtu.be/De-vi95YILE>

Class/Semester: B.Sc.(Hons)Mathematics/B.Sc C.Sc./III

Subject with Code:): Partial Differential Equations(MTH231)

Assignment No. 1 (Slow Learners)

Date of Issue: 20/11/2023

Due date of Submission: 27/11/2023

Max marks: 10

Q. No.	Question	CO Mapped	RBT Level
1	Find general solution of $(D^3 - 6D^2D' + 11DD'^2 - 6D'^3)z = e^{5x+6y}$	CO2	L3
2	Solve $x(y^2 - z^2)p + y(z^2 - x^2)q - z(x^2 - y^2)r = 0$.	CO1	L4
3	Solve $(D^3 - 4D^2D' + 4DD'^2)z = 4\sin(2x + y)$.	CO2	L5
4	Find a complete, singular and general integrals of $(p^2 + q^2)y - qz = 0$	CO1	L5

Assignment No. 2 (Advanced Learners)

Date of Issue: 20/11/2023

Due date of Submission: 27/11/2023

Q. No.	Question	CO Mapped	RBT Level
1	Solve $(D^2 + 3DD' + 2D'^2)z = (x+y)$.	CO2	L3
2	Find the integral surface of the partial differential equation $(x - y)p + (y - x - z)q = z$ through the circle $z = 1, x^2 + y^2 = 1$.	CO1	L4
3	Find a complete, singular and general integrals of $(p^2 + q^2)y - qz = 0$	CO1	L5
4	Find the general solution of partial differential equation $px(x + y) - qy(x + y) + (x - y)(2x + 2y + z) = 0$.	CO2	L5

Course Outcomes (COs): After successfully completing this course the students will be able to
CO1: describe theoretical aspects to solve linear and non-linear partial differential equations.
CO2: enumerate methods for solving second order and higher order partial differential equations.
CO3: describe model of physical phenomena using partial differential equations such as the heat equation, wave equation and Laplace equation.
CO4: analyze the fundamental solutions and applications of heat equation, wave equation and Laplace equation.

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
RBT Level No.	L1	L2	L3	L4	L5	L6
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

c. Course Name (Course Code): Engineering Mathematics-I (MAT151)

Action taken for Slow Learners

1. Simple and Basic assignments have been given to them. (Assignment at the bottom)

Action taken for Advanced Learners

1. Advanced Assignment given to them.
2. NPTEL video lecture given to them. Link is given below

[https://youtu.be/ RDF7My0Lfg](https://youtu.be/RDF7My0Lfg)

<https://youtu.be/h5urBuE4Xhg>

Class/Semester: B.Tech. CSE +SAP/SEM. I

Subject with Code: Engineering Mathematics-I (MAT151)

Assignment No. 1 (Slow Learners)

Date of Issue: 16/11/2023

Due date of Submission: 27/11/2023

Q. No.	Question	CO Mapped	RBT Level
1	Using Gauss-Jordan method, find the inverse of the matrix $A = \begin{bmatrix} 2 & 3 & 4 \\ 4 & 3 & 1 \\ 1 & 2 & 4 \end{bmatrix}$	CO1	L4
2	If $u = \log(x^3 + y^3 + z^3 - 3xyz)$, show that $\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z}\right)^2 u = \frac{-9}{(x+y+z)^2}$	CO2	L3
3	If $z = f(x + ct) + \phi(x - ct)$, prove that $\frac{\partial^2 z}{\partial t^2} = c^2 \frac{\partial^2 z}{\partial x^2}$.	CO1	L3
4	Reduce the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ to the diagonal form.	CO1	L5

Assignment No. 2 (Advanced Learners)

Date of Issue: 16/11/2023

Due date of Submission: 27/11/2023

Q. No.	Question	CO Mapped	RBT Level
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1	Reduce the matrix $A = \begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$ into its normal form and hence find its rank.	CO1	L4
2	If $u = \frac{x^3y^3z^3}{x^3+y^3+z^3} + \log\left(\frac{xy+yz+zx}{x^2+y^2+z^2}\right)$, find the value of $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z}$.	CO2	L3
3	If $u = \cos^{-1}\left(\frac{x+2y+3z}{x^8+y^8+z^8}\right)$, find the value of $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z}$.	CO2	L3
4	Investigate the values of λ and μ so that the system of equations $x + y + z = 6$; $x + 2y + 3z = 10$; $x + 2y + \lambda z = \mu$ have (i). Unique solution, (ii). No solution. .	CO1	L5

Course Outcomes (COs): After successfully completing this course the students will be able to
CO1: Understand the theory of matrices used in solving the problems in mechanics and other streams.
CO2: Understand the concept of partial differentiation, Euler's theorem and its extension, total derivative, maxima and minima of a function of two variables, and Lagrange's method of multipliers.
CO3: Understand the concept of ordinary differential equation and their solutions (Homogeneous, differential equation, Exact differential equations).
CO4: Understand the solution of differential equations with constant coefficients by method of variation of parameters and simultaneous linear differential equations.

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
	L1	L2	L3	L4	L5	L6
RBT Level No.	L1	L2	L3	L4	L5	L6
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

d. Course Name (Course Code): Statistical Methods for Applied Sciences (MTH670)

Action taken for Slow Learners

1. Simple and Basic assignments have been given to them. (Assignment at the bottom)

Action taken for Advanced Learners

1. Advanced Assignment given to them.
2. NPTEL video lecture given to them. Link is given below

<https://youtu.be/YssdtWqMZ9o>

<https://youtu.be/EJsJImmQPuI>

Class/Semester: M. Sc. - Agriculture Horticulture (Vegetable Science)/SEM. III

Subject with Code: Statistical Methods for Applied Sciences (MTH670)

Assignment No. 1 (Slow Learners)

Date of Issue: 18/11/2023

Due date of Submission: 25/11/2023

Q. No.	Question	CO Mapped	RBT Level																				
1	Define median with its merits and demerits.	CO1	L4																				
2	Two bags contain 2 white, 3 blue and 3 white, 2 blue balls respectively. One of the bags is selected at random and a ball is drawn from it. If the ball drawn is blue, find the probability that is drawn from the second bag.	CO3	L3																				
3	One shot is fired from each of the 3 guns. E_1, E_2, E_3 denote the event that the target is hit by the first, second and third gun respectively. Given that $P(E_1) = 0.5, P(E_2) = 0.6, P(E_3) = 0.8$ and E_1, E_2, E_3 are independent events. Find the probability that a) exactly one hit is registered. b) at least 3 hits are registered.	CO1	L3																				
4	A random variable X has the following probability distribution <table style="margin-left: 20px;"> <tr> <td>X = x</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> </tr> <tr> <td>p(x)</td> <td>k</td> <td>3k</td> <td>5k</td> <td>7k</td> <td>9k</td> <td>11k</td> <td>13k</td> <td>15k</td> <td>17k</td> </tr> </table> Find $P(2 \leq X < 8)$ and what is the minimum value of x for which $P(X \leq x) > 0.5$.	X = x	0	1	2	3	4	5	6	7	8	p(x)	k	3k	5k	7k	9k	11k	13k	15k	17k	CO3	L5
X = x	0	1	2	3	4	5	6	7	8														
p(x)	k	3k	5k	7k	9k	11k	13k	15k	17k														

Assignment No. 2 (Advanced Learners)

Date of Issue: 18/11/2023

Due date of Submission: 25/11/2023

Q. No.	Question	CO Mapped	RBT Level																						
1	The following data relates to age of employees and the number of days they were reported sick in a month: Calculate Karl Pearson's coefficient of correlation. <table style="margin-left: 40px; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 5px;">Age (X)</td> <td style="border: 1px solid black; padding: 5px;">30</td> <td style="border: 1px solid black; padding: 5px;">32</td> <td style="border: 1px solid black; padding: 5px;">35</td> <td style="border: 1px solid black; padding: 5px;">40</td> <td style="border: 1px solid black; padding: 5px;">48</td> <td style="border: 1px solid black; padding: 5px;">50</td> <td style="border: 1px solid black; padding: 5px;">52</td> <td style="border: 1px solid black; padding: 5px;">55</td> <td style="border: 1px solid black; padding: 5px;">57</td> <td style="border: 1px solid black; padding: 5px;">61</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">Sick days (Y)</td> <td style="border: 1px solid black; padding: 5px;">1</td> <td style="border: 1px solid black; padding: 5px;">0</td> <td style="border: 1px solid black; padding: 5px;">2</td> <td style="border: 1px solid black; padding: 5px;">5</td> <td style="border: 1px solid black; padding: 5px;">2</td> <td style="border: 1px solid black; padding: 5px;">4</td> <td style="border: 1px solid black; padding: 5px;">6</td> <td style="border: 1px solid black; padding: 5px;">5</td> <td style="border: 1px solid black; padding: 5px;">7</td> <td style="border: 1px solid black; padding: 5px;">8</td> </tr> </table>	Age (X)	30	32	35	40	48	50	52	55	57	61	Sick days (Y)	1	0	2	5	2	4	6	5	7	8	CO2	L4
Age (X)	30	32	35	40	48	50	52	55	57	61															
Sick days (Y)	1	0	2	5	2	4	6	5	7	8															
2	Calculate the Quartile deviation Q_1 of the following data: <table style="margin-left: 40px; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 5px;">Marks:</td> <td style="border: 1px solid black; padding: 5px;">0-10</td> <td style="border: 1px solid black; padding: 5px;">10-20</td> <td style="border: 1px solid black; padding: 5px;">20-30</td> <td style="border: 1px solid black; padding: 5px;">30-40</td> <td style="border: 1px solid black; padding: 5px;">40-50</td> <td style="border: 1px solid black; padding: 5px;">50-60</td> <td style="border: 1px solid black; padding: 5px;">60-70</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">Number of students:</td> <td style="border: 1px solid black; padding: 5px;">6</td> <td style="border: 1px solid black; padding: 5px;">5</td> <td style="border: 1px solid black; padding: 5px;">8</td> <td style="border: 1px solid black; padding: 5px;">15</td> <td style="border: 1px solid black; padding: 5px;">7</td> <td style="border: 1px solid black; padding: 5px;">6</td> <td style="border: 1px solid black; padding: 5px;">3</td> </tr> </table>	Marks:	0-10	10-20	20-30	30-40	40-50	50-60	60-70	Number of students:	6	5	8	15	7	6	3	CO2	L3						
Marks:	0-10	10-20	20-30	30-40	40-50	50-60	60-70																		
Number of students:	6	5	8	15	7	6	3																		
3	Find the missing frequencies if the mean of the following distribution is 50 and $\Sigma f = 120$ <table style="margin-left: 40px; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 5px;">Class</td> <td style="border: 1px solid black; padding: 5px;">0-20</td> <td style="border: 1px solid black; padding: 5px;">20-40</td> <td style="border: 1px solid black; padding: 5px;">40-60</td> <td style="border: 1px solid black; padding: 5px;">60-80</td> <td style="border: 1px solid black; padding: 5px;">80-100</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">Frequencies(f)</td> <td style="border: 1px solid black; padding: 5px;">17</td> <td style="border: 1px solid black; padding: 5px;">f_1</td> <td style="border: 1px solid black; padding: 5px;">32</td> <td style="border: 1px solid black; padding: 5px;">f_2</td> <td style="border: 1px solid black; padding: 5px;">19</td> </tr> </table>	Class	0-20	20-40	40-60	60-80	80-100	Frequencies(f)	17	f_1	32	f_2	19	CO2	L3										
Class	0-20	20-40	40-60	60-80	80-100																				
Frequencies(f)	17	f_1	32	f_2	19																				
4	Write merits and demerits of mean.	CO1	L5																						

Course Outcomes (COs): After successfully completing this course the students will be able to

CO1: Understand types of data and their attributes, representation of data.

CO2: Understand Measures of Central tendency and Measures of Dispersion.
CO3: Understand Probability, Random variables, Correlation and Regression.
CO4: Understand Probability Distribution, t-test, Chi-Square test, F-test.

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
	L1	L2	L3	L4	L5	L6
RBT Level No.						
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

7. Faculty Name: Dr. Shelly Garg

a. Course Name (Course Code): Group Theory-I (MTH222)

Action taken for Slow Learners

1. Assignment was given.
2. Provided links of video lectures for better understanding.

Action taken for Advanced Learners

1. Assignment was given.
2. Discussed advanced problems related to the subject concern.
3. Motivated for online courses related to the subject.
4. Online NPTEL video lectures are provided to them.

Assignment for slow Learners

Q. No.	Question	CO Mapped	RBT Level
1	Let $f: (\mathbb{Z}, +) \rightarrow (4\mathbb{Z}, +)$ be defined by $f(x) = 4x$. Prove that f is a group isomorphism.	CO4	L3
2	Prove that homomorphic image of an abelian group is abelian.	CO4	L3
3	Let $f: G \rightarrow G'$ be a group homomorphism. Prove that $\ker f$ is a normal subgroup of G .	CO4	L3

Assignment for Advance Learners

Q. No.	Question	CO Mapped	RBT Level
1	Prove that homomorphic image of a finite group is finite.	CO4	L3
2	Prove that every infinite cyclic group is isomorphic to \mathbb{Z} .	CO4	L5
3	Let G be the group of real numbers under addition. Show that $\theta: G \rightarrow G$ such that $\theta(x) = [x]$ is not a homomorphism, where $[x]$ is the greatest integer function.	CO4	L4

Course Outcomes (COs): After successfully completing this course the students will be able to
CO1: To recognize the mathematical objects called groups.
CO2: To understand the concept of Cyclic Groups and to learn cyclic notation for permutations and its types.
CO3: To explain the significance of the notions of cosets, normal subgroups, and factor groups and to learn Lagrange's theorem and its consequences.
CO4: Describe about structure preserving maps between groups and their consequences.

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
	L1	L2	L3	L4	L5	L6
RBT Level No.	L1	L2	L3	L4	L5	L6
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

b. Course Name (Course Code): Mathematics for Chemists II (MTH260A)

Action taken for Slow Learners

No slow learner in class.

Action taken for Advanced Learners

1. Assignment was given.
2. Motivated for online courses related to the subject.
3. Discussed advanced problems related to the subject.

Assignment for Advance Learners

Q. No.	Question	CO Mapped	RBT Level
1	Evaluate $\int \frac{3x}{1+2x^4} dx$	CO4	L3
2	Evaluate $\int \frac{x^2}{\sqrt{x^6+a^6}} dx$	CO4	L5
3	Evaluate the integral $\int \sqrt{\frac{a+x}{a-x}} dx$	CO4	L5
4	Evaluate the integral $\int x^3 \sqrt{3+x^4} dx$	CO4	L3
5	Evaluate the integral $\int \frac{x+2}{2x^2+6x+5} dx$	CO4	L5
6	Evaluate $\int \frac{x^3}{(x-1)(x-2)} dx$	CO4	L4
7	Evaluate $\int \frac{1}{(x-3)\sqrt{x+1}} dx$	CO4	L3

Course Outcomes (COs): After successfully completing this course the students will be able to
CO1: Learn the concept of domain and range of a function and the concepts of limit and continuity
CO2: Learn different formulas to find derivative of a given function

CO3: Applications of derivatives like to identify increasing/ decreasing functions, maxima/minima of functions, Rolle's, Lagrange's and Mean Value Theorems etc.

CO4: Different methods to find integration, definite integrals

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
	L1	L2	L3	L4	L5	L6
RBT Level No.						
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

8. Faculty Name: Dr. Raj Kumar

a. Course Name (Course Code): Real Analysis (MTH229)

Action taken for Slow Learners

1. Remedial classes taken.
2. Additional assignments given for practice.

Action taken for Advanced Learners

1. Advanced Assignment given to them.
2. NPTEL video lecture given to them. Link is given below <https://archive.nptel.ac.in/courses/111/106/111106053/>
3. Discussed questions for competitive exams.

Class/Semester: B.Sc. (Hons) Mathematics/3rd

Subject with Code: Real Analysis (MTH229)

Basic Assignment

Q. No.	Question	CO Mapped	RBT Level
1	Prove that intersection of any finite number of open sets is open. Is the result true for arbitrary family of open sets? Justify.	CO2	L2
2	State and prove Bolzano-Weirstrass's theorem for sets.	CO2	L2
3	Let $f(x) = \frac{2^x + 3x + 1}{2x - 1}$ for $2 \leq x \leq 3$, then find the constant M , such that $ f(x) \leq M$.	CO2	L3
4	For any two non-empty sets A, B prove that $Su(A + B) = Sup(A) + Sup(B)$.	CO1	L2
5	Prove that a set is open if and only of its compliment is closed.	CO3	L2

Course Outcomes (COs): After successfully completing this course the students will be able to

CO1: Students will be able to demonstrate competence with the algebraic and order properties of real numbers and by finding supremum and infimum of sets.

CO2: Students will be able to demonstrate competence with the interior points, limit points and isolated points of sets. Students will learn about open and closed sets.

CO3: Students will be able to demonstrate competence with elementary properties of sequences by finding limits and proving results involving sum/difference/product/quotients of sequences and will be able to apply the monotone convergence theorem.

CO4: Students will be able to demonstrate competence with the convergence and divergence of positive terms series and alternative series using different tests of convergence.

CO5: Students will learn about properties of real numbers, real sets sequences and series of real numbers.

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
RBT Level No.	L1	L2	L3	L4	L5	L6

RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
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Class/Semester: B.Sc. (Hons) Mathematics/3rd

Subject with Code: Real Analysis (MTH229)

Advanced Assignment

Q. No.	Question	CO Mapped	RBT Level
1	Prove that the derived set of a bounded set is bounded and also show that the derived set of an infinite bounded set has the smallest and greatest members.	CO2	L4
2	Prove that the set $[0,1]$ is uncountable.	CO2	L5
3	Prove that countable union of countable sets is countable.	CO2	L4
4	Check the convergence of the series $\frac{3}{7}x + \frac{3.6}{7.10}x^2 + \frac{3.6.9}{7.10.13}x^3 + \dots$.	CO1	L4
5	Prove that the set of the limit points of a bounded sequence has the greatest and the least member.	CO3	L5

Course Outcomes (COs): After successfully completing this course the students will be able to

CO1: Students will be able to demonstrate competence with the algebraic and order properties of real numbers and by finding supremum and infimum of sets.

CO2: Students will be able to demonstrate competence with the interior points, limit points and isolated points of sets. Students will learn about open and closed sets.

CO3: Students will be able to demonstrate competence with elementary properties of sequences by finding limits and proving results involving sum/difference/product/quotients of sequences and will be able to apply the monotone convergence theorem.

CO4: Students will be able to demonstrate competence with the convergence and divergence of positive terms series and alternative series using different tests of convergence.

CO5: Students will learn about properties of real numbers, real sets sequences and series of real numbers.

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
	L1	L2	L3	L4	L5	L6
RBT Level No.						
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

b. Course Name (Course Code): Linear Algebra (MTH553)

Action taken for Slow Learners

1. Remedial classes taken.
2. Additional assignments given for practice.

Action taken for Advanced Learners

1. Advanced Assignment given to them.
2. NPTEL video lecture given to them. Link is given below
<https://archive.nptel.ac.in/courses/111/106/111106135/>
3. Discussed questions for competitive exams.

Class/Semester: M.Sc. (Hons) Mathematics/1st
Subject with Code: Linear Algebra (MTH553)

Basic Assignment

Q. No.	Question	CO Mapped	RBT Level
1	Let V be a vector space of all $n \times n$ matrices over the field of complex numbers. Justify, whether following subsets are subspaces of V or not. (i) set of all invertible matrices (ii) set of all non-invertible matrices	CO2	L2
2	Prove that the linear span $L(S)$ of any subset S of a vector space $V(F)$ is a subspace of V generated by S .	CO2	L2
3	If T is a linear operator on a finite dimensional vector space V , show that, if T is one-one then T must be onto.	CO2	L3
4	Check if the mapping $f: V_3(F) \rightarrow V_2(F)$ defined by $(x, y, z) \mapsto (x, y)$ is an isomorphism or not?	CO1	L2
5	Determine a basis of the subspace spanned by the vectors $\{(1,2,3), (2,1,-1), (1,-1,-4), (4,2,-2)\}$.	CO3	L3

Course Outcomes (COs): After successfully completing this course the students will be able to
CO1: Students will learn about axioms of vector spaces, linear dependence and independence of vectors and ranks of matrices.
CO2: Students will learn to associate a matrix with a linear transformation, about characteristic and minimal polynomials, and characteristic vectors.
CO3: Students will learn to convert matrices in to their canonical forms such as diagonal form, triangular form and also will learn about linear functional and dual spaces.
CO4: Students will learn about inner product spaces, orthogonal/orthonormal vectors and adjoint operators.
CO5: Students will learn about basics of linear algebra.

Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
	L1	L2	L3	L4	L5	L6
RBT Level No.	L1	L2	L3	L4	L5	L6
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

Advanced Assignment

Q. No.	Question	CO Mapped	RBT Level
1	Prove that a necessary and sufficient condition that an $n \times n$ matrix A over a field F be diagonalizable is that A has n linearly independent characteristic vectors in $V_n(F)$.	CO2	L4
2	Find range and null space for $T: R^3 \rightarrow R^3$ such that $T: (x, y, z) \mapsto (x + 2y - z, y + z, x + y - 2z)$.	CO2	L5
3	Let $T: R^3 \rightarrow R^3$ be define as $T(x, y, z) = (3x, x - y, 2x + y + z)$, find T^{-1} .	CO2	L4
4	Let $V(F)$ be an n -dimensional vector space and let B, B' be ordered bases for V . Then for a transition matrix A from B to B' prove that $[a]_{B'} = A[a]_B$.	CO1	L5
5	Determine a basis of the subspace spanned by the vectors $\{(1,2,3), (2,1,-1), (1,-1,-4), (4,2,-2)\}$.	CO3	L3

Course Outcomes (COs): After successfully completing this course the students will be able to
CO1: Students will learn about axioms of vector spaces, linear dependence and independence of vectors and ranks of matrices.
CO2: Students will learn to associate a matrix with a linear transformation, about characteristic and minimal polynomials, and characteristic vectors.
CO3: Students will learn to convert matrices in to their canonical forms such as diagonal form, triangular form and also will learn about linear functional and dual spaces.
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RBT Level No.	L1	L2	L3	L4	L5	L6
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

c. Course Name (Course Code): Integral Transforms and Complex Analysis (MTH351A)

Action taken for Slow Learners

1. Remedial classes taken.
2. Additional assignments given for practice.

Action taken for Advanced Learners

1. Advanced Assignment given to them.
2. NPTEL video lecture given to them. Link is given below
<https://www.youtube.com/watch?v=gFjlBKW8aZU>
<https://www.youtube.com/watch?v=c9NibpoQjDk>
3. Discussed questions for competitive exams.

Class/Semester: B.Sc. (Hons)Physics/5th

Subject with Code: Integral Transforms and Complex Analysis (MTH351A)

Basic Assignment

Q. No.	Question	CO Mapped	RBT Level
1	Find Laplace inverse of s^{s+2} of $s^2(s+1)(s-2)^{-1}$.	CO2	L2
2	Find Laplace of $\sin 3t \cos 3t \cos 2t$.	CO2	L2
3	Find complex conjugate of $\frac{(1+2i)^3}{(1+i)(2-i)}$.	CO2	L3
4	Determine whether $1/z$ is analytic or not ?	CO1	L2

5	Find modulus and argument of $\sqrt{\frac{1+i}{1-i}}$.	CO3	L3
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Course Outcomes (COs): After successfully completing this course the students will be able to
CO1: Students will learn about axioms of vector spaces, linear dependence and independence of vectors and ranks of matrices.
CO2: Students will learn to associate a matrix with a linear transformation, about characteristic and minimal polynomials, and characteristic vectors.
CO3: Students will learn to convert matrices in to their canonical forms such as diagonal form, triangular form and also will learn about linear functional and dual spaces.
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Revised Blooms Taxonomy (RBT)

RBT Classifications	Lower Order Thinking Levels (LOTs)			Higher Order Thinking Levels (HOTs)		
	L1	L2	L3	L4	L5	L6
RBT Level No.						
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

Advanced Assignment

Q. No.	Question	CO Mapped	RBT Level
1	Evaluate $L^{-1} \left\{ \frac{s}{(s^2+1)(s^2+4)(s^2+9)} \right\}$.	CO2	L4
2	Solve by method of Laplace transformation, the equation $y''' + 2y'' - y' - 2y = 0$, given that $y(0) = y'(0) = 0$ and $y''(0) = 6$.	CO2	L5
3	Evaluate $\int_0^{2\pi} \frac{d\theta}{5-3\cos\theta}$.	CO2	L4
4	Evaluate $\int_C \frac{z^2-2z}{(z+1)^2(z^2-4)} dz$, where C is the circle $ z = \frac{3}{2}$.	CO1	L5
5	If $\frac{\sin(\alpha + i\beta)}{\cosh^2 \beta} = x + iy$, then prove that (a) $x^2 + \frac{y^2}{\sinh^2 \beta} = 1$ (b) $\frac{x^2}{\sin^2 \alpha} - \frac{y^2}{\cos^2 \alpha} = 1$.	CO3	L3

Course Outcomes (COs): After successfully completing this course the students will be able to
CO1: Students will learn about axioms of vector spaces, linear dependence and independence of vectors and ranks of matrices.
CO2: Students will learn to associate a matrix with a linear transformation, about characteristic and minimal polynomials, and characteristic vectors.
CO3: Students will learn to convert matrices in to their canonical forms such as diagonal form, triangular form and also will learn about linear functional and dual spaces.
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RBT Level No.						
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

Department- Faculty of Pharmaceutical Sciences Session24251
Action Taken Report for Slow and Advanced Learners

1.F aculty Name Mr.Rahul Mehra

a.C ourse Name Pharmaceutical Chemistry (Course Code) (ER20-12T)

Action taken for Slow Learners

- 1.S tudents were given open ended assignment.
- 2.T hey were encouraged to clear their doubts in the class.
- 3.R egular check was kept over them regarding their performance.

Action taken for Advanced Learners

1. Open ended assignment were provided to them.
2. Regularly questions given to them for learn.

Class/ Semester: D. Pharmacy (1st Year)

Course Name: Pharmaceutical Chemistry

Course Code: ER20-12T

ASSIGNMENT NO-1 DATE OF ISSUE-26-09-24 DATE OF SUBMISSION-30-09-24

ADVANCED LEARNER-:

Name of Student	Roll No	Percentage of marks	Remarks
BENIKA	12400359	85	GOOD
CHANANPREET SINGH	12401667	82.5	GOOD
JASHANBALDEEP KAUR	12401644	80	GOOD

<u>S.NO.</u>	<u>TOPIC</u>	<u>CO MAPPED</u>	<u>RBT LEVEL</u>
1.	Green Chemistry	CO1	L1,L2

SLOW LEARNER-:

Sr. No.	Name of Student	Roll No	Percentage of marks	Remarks
1	RANJIT KUMAR	12400163	17.5	POOR
2	SONALI	12400179	20	POOR
3	KARTIK KAPLISH	12400182	10	POOR
4	MOHIT JASSAL	12400251	0	POOR
5	MANPREET	12400354	0	POOR
6	SIMARANPREET KAUR	1200480	27.5	POOR
7	MOHIT	12400499	35	POOR
8	PIYUSH DHINGRA	12400296	30	POOR
9	SIMRAN KAUR	12400667	32.5	POOR
10	JASVEER HEER	12400668	20	POOR
11	RAMANDEEP SINGH	12400700	22.5	POOR
12	KOMALPREET KAUR	12400714	17.5	POOR
13	AMANDEEP SINGH PHOOL	12400729	35	POOR
14	VIKRANT SHARMA	12400730	32.5	POOR

15	VISHAL KUMAR	12400846	22.5	POOR
16	SIMARJIT SINGH	12400911	27.5	POOR
17	MEHAKINDER SINGH	12401005	32.5	POOR
18	PRINCE PAL	12401008	17.5	POOR
19	ANKUSH KUMAR	12401056	10	POOR
20	RAJAT KAPOOR	12401318	27.5	POOR
21	MEENAL	12401450	15	POOR
22	BALJIT	12400787	25	POOR
23	BALJINDER	12400289	0	POOR

<u>S.NO.</u>	<u>TOPIC</u>	<u>CO MAPPED</u>	<u>RBT LEVEL</u>
1.	Green Chemistry	CO1	L1,L2

DAV UNIVERSITY
Empowering Education and Best Learning Experiences

Academic Session 2022-23
Department M.L.T

Programme B.Sc. M.L.T
Year 11
Sem 111
Section 111
Course M.L.T 101
Course Code M.L.T 101

Student Support Record

Advanced Learners Record

Name of the Student	Registration No.	Date	Address Type (Residential)
Kiran Deep	12345678	11/11/22	Residential

Observations/Recommendations/Remarks

Kiran Deep has been a consistent learner every intervention from the faculty he must have been involved with the conversation with his father and also with the medical professionals.

Observations/Recommendations/Remarks

Kiran Deep has high potential to excel in medical field but her confidence level is still very low in public speaking. She needs more practice in public speaking.

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Department M.L.T

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Year 11
Sem 111
Section 111
Course M.L.T 101
Course Code M.L.T 101

Student Support Record

Advanced Learners Record

Name of the Student	Registration No.	Date	Address Type (Residential)
Kiran Deep	12345678	11/11/22	Residential

Observations/Recommendations/Remarks

There is a degree of uncertainty among these students. The students are engaged in assignments, overall attendance and overall student attendance is recommended.

Observations/Recommendations/Remarks

These girls are very quiet. They grasp the fundamental facts easily. Some hesitation in public speaking has been observed. I recommend more oral assignments.

Anuj
11095

Signature (Faculty)