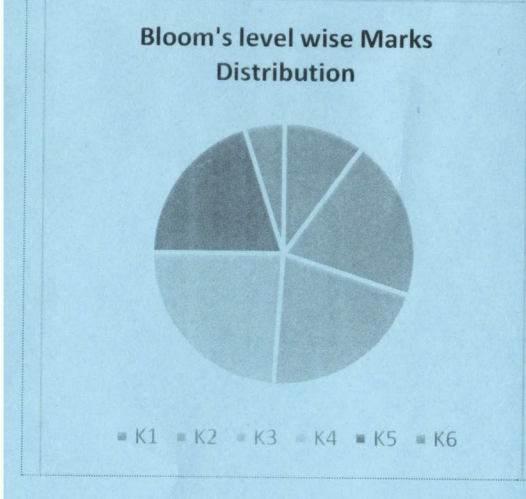
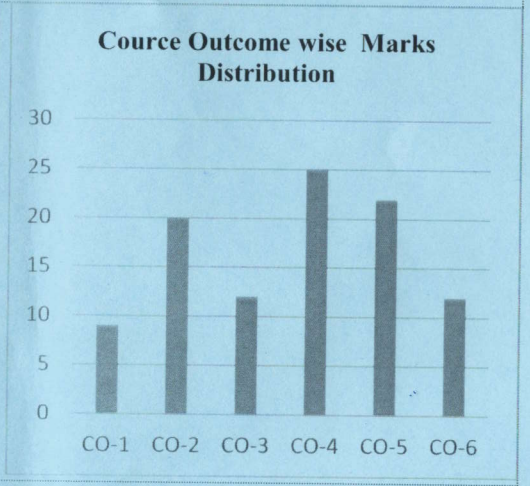
CO- Course Outcomes, **KL**- Knowledge Level, **PO** – Program Outcome

Course Outcomes	CO1	Define scientific work, energy and power and their units.
	CO2	Represent physical quantities as scalar and vectors and solve real life relevant problems.
	CO3	Identify physical quantities, select their units for use in engineering solutions, and make measurements with accuracy by minimizing different types of errors.
	CO4	Analyze type of motions and apply the formulation to understand banking of roads/railway tracks and conservation of momentum principle to describe rocket propulsion, recoil of gun etc.
	CO5	Describe forms of friction and methods to minimize friction between different surfaces.
	CO6	Drive relationships for work, energy and power and solve related problems

GRAPHICAL REPRESENTATION





ARKA JAIN University
Jharkhand
NAAC GRADE A ACCREDITED UNIVERSITY

END SEM EXAMINATION
School of Engineering & IT

Program	**Diploma**	**Branch**	**ME/MT**
Subject Name	**Applied Physics**	**Session**	**Odd, 2025-26**
Semester	**1st**	**Year**	**Jan, 2026**

Time: 3 Hour
Max. Marks : 70

- Start writing from 2nd page onwards; **don't Write on the 1st Page Backside**
- **Answer all Questions of Section A (Compulsory)**
- **Answer Any Four out of Six of Section B**
- **Answer Any Three out of Five of Section C**
- **Graf Paper / Drawing Sheet/ Log Book/ Ledger (please Mention if any)**
- **Possession of Mobile Phone** or any kind of **Written Material, Arguments with the Invigilator or Discussion with Co-Student** will comes under **Unfair Means** and will **Result** in the **Cancellation of the Paper(s)**.

Knowledge Level (KL)			
	K1 : Remembering	**K3 :** Applying	**K5 :** Evaluating
	K2 : Understanding	**K4 :** Analysing	**K6 :** Creating

Section A (Each question Carry 02 Marks from Q1-i to x – 20 Marks)

Q. N 1	QUESTIONS	Marks	COs	KL
i	Differentiate between fundamental and derived unit.	2	CO3	K3
ii	The unit vector along $i+j$ is	2	CO2	K1
iii	In a normal projectile motion, what will be the condition for maximum height	2	CO4	K2
iv	Give the conditions for SHM.	2	CO4	K3
v	Why rain drops are spherical in shape when plate placed on a glass and the surface gets flattened when more drops are added to it.	2	CO5	K2
vi	Define stress and strain.	2	CO5	K1
vii	State the 1st 2nd and 3rd law of thermodynamics.	2	CO1	K1
viii	Compare specific heats and molar specific heats	2	CO6	K3
ix	Write types and application of optical Fibres.	2	CO2	K2

x	Compute advantages and dis-advantages of Nano Technology.	2	CO2	K4

Section B (Answer any FOUR out of SIX) – 20 Marks
(Each question Carry 05 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
2	Analysis the unit vector parallel to the resultant of the vectors A = 4i+3j+6k ; B=-î+3j-8k	05	CO2	K5
3	Explain Capillarity and its applications in daily life.	05	CO5	K3
4	Find expression for time period of a simple pendulum.	05	CO4	K2
5	Discuss Young's modulus of elasticity and its units.	05	CO3	K4
6	Derive relation CP-CV=R	05	CO6	K4
7	Explain principle and working optical fibres.	05	CO4	K2

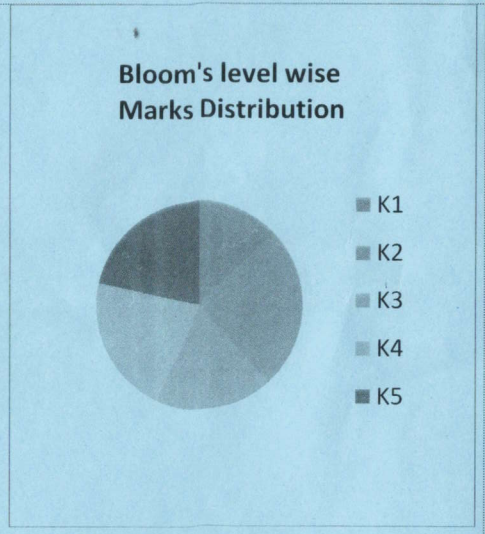
Section C (Answer any THREE out of FIVE) – 30 Marks
(Each question Carry 10 Marks)

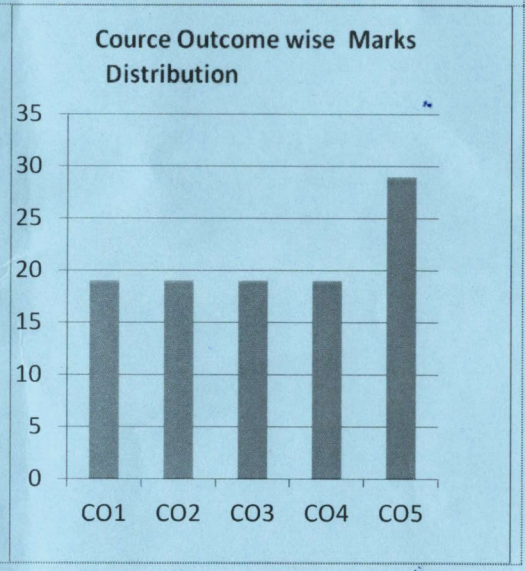
Q. No.	QUESTIONS	Marks	COs	KL
8	The resultant of two forces, one double the other in magnitude, is perpendicular to the smaller of the two forces. Analyze the problem and find the angle between the two forces	10	CO2	K2
9	State and prove law of conservation of energy in case of a freely falling body	10	CO3	K3
10	A Particle undergoes Simple Harmonic Motion with position x=A sin (wt +¢). At t=0, Its position is x=A/2 and it is moving towards the origin. Evaluate the possible value of.Ø	10	CO4	K5
11	Derive the relation between coefficient of linear expansion A and coefficient of volume expansion.	10	CO6	K4
12	Derive and analyze Einstein's Photoelectric equations.	10	CO3	K5

CO- Course Outcomes, **KL**- Knowledge Level, **PO** – Program Outcome

Course Outcomes	CO1	Classify matter based on state of aggregation and substantiate the laws and principles on which structure of atom is established.
	CO2	Explain cause and facture factors which adversely affecting natural water quality and remedial measure available for water purification to achieve water quality standards.
	CO3	Qualitatively analyze the engineering materials and understand their properties and applications and explain the chemistry of various polymers.
	CO4	Ascertain construction, mechanism efficiency of electrochemical cells and understand corrosion and develop economical prevention techniques.
	CO5	Select most efficient fuel and lubricant for engine and engineering applications in relevant applications.

GRAPHICAL REPRESENTATION





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END SEM EXAMINATION
School of Engineering & IT

Program	**Diploma**	**Branch**	**ME/Mechatronics**
Subject Name	**Applied Chemistry**	**Session**	**Odd, 2025-26**
Semester	**1st**	**Year**	**Jan, 2026**

Time: 3 Hour
Max. Marks : 70

- Start writing from 2nd page onwards; **don't Write on the 1st Page Backside**
- **Answer all Questions of Section A (Compulsory)**
- **Answer Any Four out of Six of Section B**
- **Answer Any Three out of Five of Section C**
- **Graf Paper / Drawing Sheet/ Log Book/ Ledger (please Mention if any)**
- **Possession of Mobile Phone** or any kind of **Written Material, Arguments with the Invigilator or Discussion with Co-Student** will comes under **Unfair Means** and will **Result** in the **Cancellation of the Paper(s)**.

Knowledge Level (KL)	**K1 :** Remembering	**K3 :** Applying	**K5 :** Evaluating
	K2 : Understanding	**K4 :** Analysing	**K6 :**Creating

Section A (Each question Carry 02 Marks from Q1-i to x – 20 Marks)

Q. N 1	QUESTIONS	Marks	COs	KL
i	Define alloys & its types with examples.	2	CO4	K1
ii	Rusting of iron is quicker in saline water than in ordinary water.	2	CO4	K1
iii	What is cloud and pour point?	2	CO5	K2
iv	Write down two methods for corrosion protection.	2	CO3	K3
v	What is Polymerisation?	2	CO4	K2
vi	Define the calorific value of a fuel.	2	CO5	K3
vii	Write the notation of following: a. $n = 6$ & $l = 0$ b. $n = 2$ & $l = 1$ c. $n = 5$ & $l = 2$ d. $n = 3$ & $l = 0$	2	CO3	K4
viii	Define Covalent using suitable example.	2	CO1	K1

ix	What is octane number?	2	CO5	K1
x	Define hard water and soft water.	2	CO2	K2

Section B (Answer any FOUR out of SIX) – 20 Marks
(Each question Carry 05 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
2	Compare the properties of solid, liquid & gaseous fuels.	05	CO5	K2
3	Discuss about the magnetic and azimuthal quantum number	05	CO1	K4
4	Distinguish between scale and sludge in boiler corrosion.	05	CO2	K3
5	Write short notes on vulcanization of rubber.	05	CO3	K4
6	Discuss the method used to protect metals from corrosion.	05	CO4	K2
7	Define the lubricants. What are the functions of lubricants.	05	CO5	K1

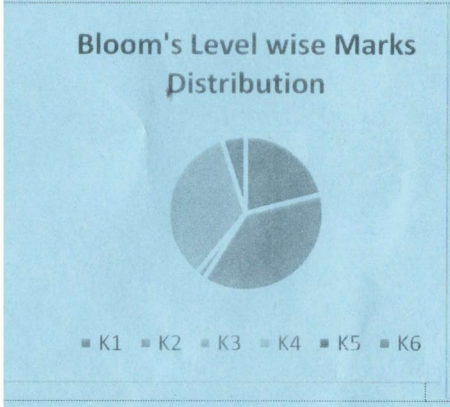
Section C (Answer any THREE out of FIVE) – 30 Marks
(Each question Carry 10 Marks)

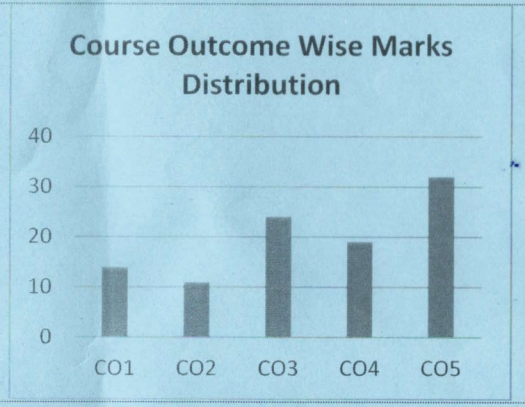
Q. No.	QUESTIONS	Marks	COs	KL
8	Why corrosion is natural process? Discuss about electrochemical corrosion.	10	CO4	K3
9	Write down the steps and explain the steps of metallurgy.	10	CO3	K5
10	Write the composition and uses of a. CNG b. Biogas c. LPG	10	CO5	K4
11	Write the postulates, explain Rutherford atomic model and drawbacks.	10	CO1	K2
12	What is the principle of EDTA method? Describe the estimation of hardness of water by complex metric titration.	10	CO2	K5

CO- Course Outcomes, **KL**- Knowledge Level, **PO** – Program Outcome

Course Outcomes	CO1	Train volunteer youth to become confident, committed and competent leaders in all walks of life.
	CO2	Enhance awareness levels of cadets to become empowered and responsible citizens of the country.
	CO3	Undertake adventure activities to hone leadership qualities and risk taking abilities.
	CO4	Provide a platform to launch 'Good Will Ambassadors' to project the image of the country overseas.
	CO5	Provide opportunities and encourage cadets to enrich their knowledge, develop communication skills and build character.

GRAPHICAL REPRESENTATION





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END SEM EXAMINATION
School of Engineering & IT

Program	**Diploma**	**Branch**	**ME/ Mechatronics**
Subject Name	**Sports and Yoga**	**Semester**	**1st**
		Year	**January, 2026**

Time: 1.5 Hour
Max. Marks : 35

- Start writing from 2nd page onwards; **don't Write on the 1st Page Backside**
- **Answer all Questions of Section A (Compulsory)**
- **Answer Any Five out of Six of Section B**
- **Answer Any Two out of Four of Section C**
- **Possession of Mobile Phones** or any kind of **Written Material, Arguments with the Invigilator or Discussing with Co-Student** will comes under **Unfair Means** and will **Result** in the **Cancellation of the Papers**.

Knowledge Level (KL)	**K1 :** Remembering	**K3 :** Applying	**K5 :** Evaluating
	K2 : Understanding	**K4 :** Analysing	**K6 :** Creating

Section A (Each question Carry 01 Marks from Q1-i to v) – 05 Marks

Q. N 1	QUESTIONS	Marks	COs	KL
i	What is the primary objective of the National Cadet Corps (NCC)?	01	CO2	K1
ii	How does the National Cadet Corps contribute to the personal development of youth in India?	01	CO3	K2
iii	How many players are there in a cricket team?	01	CO1	K3
iv	How many players from each team are allowed to be on the field at the start of a cricket match?	01	CO2	K1
v	How does the number of players on the field vary between formats in cricket (Test, ODI, and T20)?	01	CO2	K1

Section B (Answer any FIVE out of SIX) – 10 Marks
(Each question Carry 02 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
2	What are the primary benefits of practicing yoga regularly?	02	CO1	K2
3	How can yoga be incorporated into a daily routine to improve mental and physical health?	02	CO2	K2
4	What are the key benefits of participating in sports for physical and mental health?	02	CO1	K2

5	How does NCC help cadets in their career development and employability?	02	CO2	K2
6	How is a winner determined in a marathon?	02	CO3	K1
7	What are the eligibility criteria for joining the National Cadet Corps?	02	CO2	K3

Section C (Answer any TWO out of FOUR) – 20Marks
(Each question Carry 05 Marks)

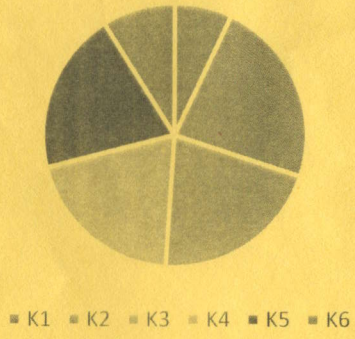
Q. No.	QUESTIONS	Marks	COs	KL
8	How does yoga differ from other forms of exercise in terms of its impact on flexibility, strength, and stress relief?	05	CO1	K1
9	To what extent has the NCC been successful in contributing to the overall development of youth in India, both in terms of personal growth and national service?	05	CO2	K2
10	How does the NCC contribute to social service and community development, and what are some key activities undertaken by cadets in this area?	05	CO3	K2
11	What is the National Service Scheme (NSS), and how does it promote social welfare and volunteerism among students?	05	CO2	K3

CO- Course Outcomes, **KL**- Knowledge Level, **PO** – Program Outcome

Course Outcomes	CO1	Develop basic speaking and writing skills including proper usage of language and vocabulary so that they can become highly confident and skilled speakers and writers.
	CO2	Be informed of the latest trends in basic verbal activities such as presentations, facing interviews and other forms of oral communication.
	CO3	Also develop skills of group presentation and communication in team. Develop non-verbal communication such as proper use of body language and gestures.
	CO4	Learn the Reading Comprehension
	CO5	Learn Grammar and Vocabulary

GRAPHICAL REPRESENTATION

Bloom's level wise Marks Distribution



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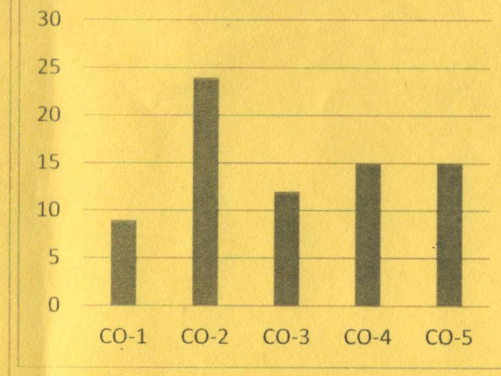

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END SEM EXAMINATION
School of Engineering & IT

Program	**Diploma**	**Branch**	**ME, Mechatronics**
Subject Name	**COMMUNICATION SKILLS IN ENGLISH**	**Session**	**Odd, 2025-26**
Semester	**1ST**	**Year**	**Jan, 2026**

Time: 3 Hour
Max. Marks : 70

- Start writing from 2nd page onwards; **don't Write on the 1st Page Backside**
- **Answer all Questions of Section A (Compulsory)**
- **Answer Any Four out of Six of Section B**
- **Answer Any Three out of Five of Section C**
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Knowledge Level (KL)			
	K1 : Remembering	**K3 :** Applying	**K5 :** Evaluating
	K2 : Understanding	**K4 :** Analysing	**K6 :** Creating

Section A (Each question Carry 02 Marks from Q1-i to x – 20 Marks)

Q. N 1	QUESTIONS	Marks	COs	KL
i	State down the meaning of Communication.	2	CO1	K1
ii	Mention names any 2 Professional apps.	2	CO2	K2
iii	We express _____ & _____ in communication.	2	CO3	K1
iv	Soft skill is related to which two things?	2	CO4	K3
v	List down two Professional places.	2	CO2	K2
vi	Mention the era during which the poem "where the mind is without fear" was written.	2	CO1	K1
vii	Mention any two themes of the poem 'Night of the Scorpion'.	2	CO2	K2
viii	Write the Synonyms of: Rich & Respect	2	CO3	K1
ix	Write the Antonyms of: Crooked & Huge	2	CO4	K3
x	Define Verb.	2	CO2	K2

Section B (Answer any FOUR out of SIX) – 20 Marks
(Each question Carry 05 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
2	State down the Antonyms of the following: a. Above b. Presence c. Simple d. Honest e. Huge	05	CO5	K6
3	Write down a short summary of the poem "where the mind is without fear"	05	CO4	K3
4	Fill in the blanks with appropriate prepositions: a. The train arrives ___ 6 a.m. b. He jumped ___ the river to save the child. c. I am interested ___ learning English. d. The picture is hanging ___ the wall. e. She has been working here ___ 2022.	05	CO2	K2
5	Write a short note on Rusty's feelings of loneliness.	05	CO3	K4
6	Describe the Character sketch of Rusty.	05	CO2	K3
7	Explain how "Knowledge is power".	05	CO5	K2

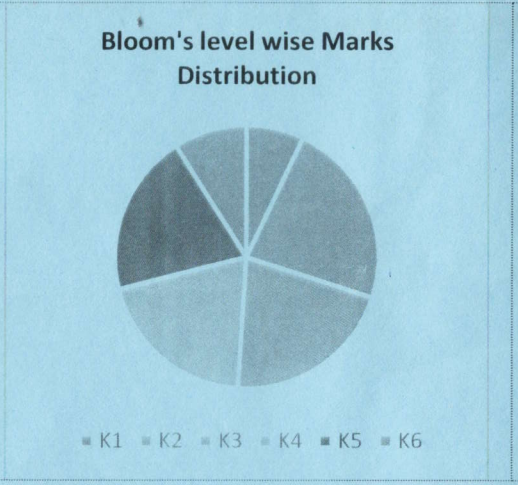
Section C (Answer any THREE out of FIVE) – 30 Marks
(Each question Carry 10 Marks)

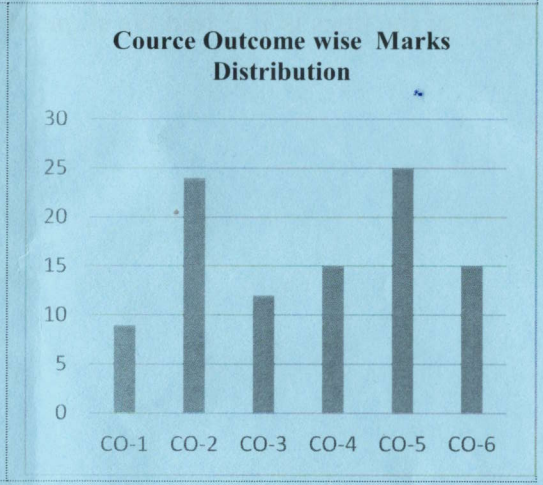
Q. No.	QUESTIONS	Marks	COs	KL
8	Explain why art of choosing words is important.	10	CO2	K2
9	Describe Process of communication with the help of a Flow Chart.	10	CO3	K1
10	Differentiate between Soft Skill & Hard Skill.	10	CO2	K3
11	Soft Skill is important in Team-work. Explain	10	CO3	K1
12	Honesty is the best policy. Explain	10	CO3	K1

CO- Course Outcomes, **KL**- Knowledge Level, **PO** – Program Outcome

Course Outcomes	CO1	Able to apply the concept of Matrices &Determinants
	CO2	To understand about the Probability & Statistics
	CO3	Understand, predict and optimize engineering systems.
	CO4	Analysing about different forms of the equation of straight line and curves
	CO5	Analyse vectors in geometrically and algebraically.
	CO6	Evaluating why mathematical thinking is valuable in daily life

GRAFICAL REPRESENTATION





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END SEM EXAMINATION
School of Engineering & IT

Program	Diploma	Branch	EEE/ME/CSE/MT
Subject Name	Mathematics-I	Semester	1st
		Year	January 2026

Time: 3 Hour
Max. Marks : 70

- Start writing from 2nd page onwards; don't Write on the 1st Page Backside
- Answer all Questions of Section A (Compulsory)
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Knowledge Level (KL)			
	K1 : Remembering	K3 : Applying	K5 : Evaluating
	K2 : Understanding	K4 : Analysing	K6 : Creating

Section A (Each question Carry 02 Marks from Q1-i to x – 20 Marks)

Q. N 1	QUESTIONS	Marks	COs	KL
i	Simplify $\frac{99!\ X\ 5!}{100!}$	2	CO1	K4
ii	Five digits are given 2, 4,5,3,1. How many 4- digits even numbers are possible if repetition is allowed.	2	CO3	K2
iii	Find the conjugate of the complex no. 5 + 7i.	2	CO2	K3
iv	Evaluate 6! + 7!	2	CO1	K2
v	Find a point on the x-axis, which is equidistant from the points (7, 6) and (3, 4).	2	CO3	K4
vi	If Sin A = 3/4, Calculate cos A and tan A.	2	CO6	K5
vii	Find the magnitude of the vector $\vec{a} = \hat{7}\iota + 2\hat{\jmath} + 0\hat{k}$	2	CO2	K1

viii	Find the slope of the line Passing through the points (3, – 2) and (–1, 4).	2	CO5	K4
ix	Find the number of permutations of the letters of the word ALLAHABAD	2	CO5	K5
x	Find the multiplicative inverse of 3 – 5i.	2	CO1	K2

Section B (Answer any FOUR out of SIX) – 20 Marks

(Each question Carry 05 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
	If in two circles, arcs of the same length subtend angles 60° and 75° at the center, find the ratio of their radii.	05	CO5	K5
	Prove the following: $Sin\ 2x + 2\ Sin\ 4x + Sin\ 6x = 4cos^2\ x\ \sin 4x$	05	CO3	K2
	Express $(2 + 5i)^3$ in the form a + ib	05	CO4	K3
	Compute the magnitude of the following vectors a) $\vec{a} = \hat{\imath} + \hat{\jmath} + \hat{k}$ b) $\vec{b} = \widehat{2\imath} - \hat{\jmath} + \hat{k}$ c) $\vec{d} = \widehat{5\imath} + 2\hat{\jmath} + 0\,\hat{k}$	05	CO3	K4
	Find the sum of the vectors $\vec{a} = 2\hat{\imath} + 3\hat{\jmath} - 9\hat{k}$ and $\vec{b} = 3\hat{\imath} + 0\hat{\jmath}\ \widehat{-2k}$ .Also find the magnitude of $\vec{a}$ and $\vec{b}$.	05	CO4	K5
	How many 3-digit numbers can be formed from the digits 1, 2, 3, 4 and 5 assuming that a) Repetition of the digits is allowed. Repetition of the digits is not allowed.	05	CO6	K6

Section C (Answer any THREE out of FIVE) – 30 Marks-

(Each question Carry 10 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
8	If 4x + i(3x – y) = 3 + i (– 6), where x and y are real numbers, then find the values of x and y.	10	CO2	K4
9	Prove that cot 4x (sin 5x + sin 3x) = cot x (sin 5x – sin 3x)	10	CO5	K6
10	Line through the points (–2, 6) and (4, 8) is Perpendicular to the line through the Points (8, 12) and (x, 24). Find the value of x.	10	CO4	K3
11	Find the values of other **five** trigonometric functions if cos x = -1/2, x lies in the third quadrant.	10	CO5	K4
12	If the angle between two lines is $\pi/4$ and slope of one of the lines is 1/ 2 find the slope of the other line.	10	CO1	K5