2ND SEM./COMMON TO ALL /2022(S)

TH1 A COMMUNICATIVE ENGLISH

Full Marks: 80 **Time 03 hours**

Answer ALL Questions

Figures in the right hand margin indicate marks

Answer All questions.

Q.1. Read the following passage carefully and do as directed.

It was the summer of 1936. The Olympic Games were being held in Berlin. Because Adolf Hitler childishly insisted that his performers were members of a "master race", nationalistic feelings were at an all-time high.

Jesse Owens wasn't too worried about all this. He had trained, sweated and disciplined himself for six years, with the Games in mind. While he was going over on the boat, all he could think about was taking home one or two of those gold medals. He had his eye especially on the long jump. A year before, as a university student, he'd set the world record of 26 feet 8 ¼ inches. Everyone kind of expected him to win that Olympic event hands down.

He was in for a surprise. When the time came for the long-jump trials, he was startled to see a tall boy hitting the pit at almost 26 feet on his practice leaps! He turned out to be a German named Luz Long. He was told that Hitler had kept Long under wraps, evidently hoping he would win the jump. He supposed that if Long won, it would add some new support to the Nazis' Aryan-superiority theory. After all, he is a Negro. A little hot under the collar about Hitler's ways, he determined to go out there and really show Der Fuhrer and his master race who was superior and who was not.

A Answer the following briefly:

i. Why were nationalistic feelings running high during the 1936 Summer Olympics in Berlin? 02

ii. Why was Owens not worried? 02

iii. What was the surprise that awaited Jesse Owens in Berlin? 02

iv. What made Owens determined to beat Luz Long? 02

B. Find the words from the passage which have the following meanings:

i Superior to all other races 02

ii Secrets 02

C. Make sentences using the following words on your own (any one): 02

Perform, insist

D. Supply a single-word (from the passage) substitute to: 02

Greatly shocked and surprised

E Make a note of the above passage 04

Q.2. Answer **Any FIVE** of the following: 05×02

i. What does "my education was left to the street" mean here?

ii. What lesson did the narrator learn during his encounter with a bully like Red?

iii. "If this were happening in India"- What does the author mean by this?

iv. How did the author handle inefficient employees in C-DOT and why?

v. Why did Sir Ralph curse himself?

vi. How did the friend inspire self-confidence in the poet?

Q.3. **Do as directed.**

Fill-in the blanks with appropriate choices/ following instructions given in the brackets.

i.	On his way back to home, he -----(see) a snake.	02
ii.	He is -----(a/an) university student.	02
iii.	You ----(must/ought to) obey the traffic rules.	02
Iv	The boy makes toys. (change the voice)	02
V	Does she want a book? (change the voice)	02

Q.4. Write a paragraph in about 120 words on any one of the following topics: 05×01

Global Warming or Covid-19 Pandemic

Q 5. Answer **ANY** of the following: 05×01

Your department has organized a study tour to World Skill Centre. As you are the class representative of your class, draft a notice to inform all your classmates. Or

Write a report on the annual day celebration of your college.

Q 6. A. Answer any **TWO** of the following: 05×02

i. You need Rs. 600/-to pay the fees towards registration for examination. Write a letter to your father asking him to send the money to your account.

ii. You could not appear for the internal assessment on account of your illness. Write an application to the head of your department requesting him/her to allow you another chance for the said examination.

iii. You are Bimala Books, Jaraka Road, Jajpur . You have received a packet of engineering mathematics text books instead of Communicative English books from your distributor M/S Padmalaya Books, Satya Nagar, Bhubaneswar. Draft a letter of complaint.

B. Jindal Steel Plant, Kalinga Nagar, Jajpur has invited applications for the post of Junior Engineer from diploma holders in Civil, Electrical and Mechanical Engineering. 10

Apply for the post and enclose your resume' or C.V.

Q.7 Answer any **TWO** of the following: 05×02

i. Write a short note on postures and gestures.

ii. Discuss types of communication.

iii. Communication follows a dynamic cycle. Explain with the help of a suitable diagram.

2ND SEMESTER/ COMMON / 2022(S)

Th1(b) Computer Application

Full Marks: 80 Time- 3 Hrs

Answer any **FIVE** Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10
   a. Write the symbols used for the following expression in flowcharts (I/o, Decision Making, Processing, Connector)
   b. Interpret MICR
   c. Define MIPS
   d. Identify which are variables .....
   (rama, r-ama, r_ama, rama2, 3rama, r@ama)
   e. Distinguish between file and folder
   f. Define algorithm
   g. Compare between compiler and interpreter
   h. Interpret WWW
   i. Define array
   j. Write four antivirus softwares

2. Answer **Any Six** Questions 6 x 5
   a. Compare between time sharing and multiprogramming operating system
   b. Draw a flow chart to get the factorial of a given number
   c. Write on several type of operators used in C programming language
   d. Explain different mode of data processing
   e. Summarise different types of data transmission mode
   f. Explain how you could able to know that a computer system is virus affected
   g Compare between 3rd and 4th generation computers

3 Draw a flow chart and write a program in C to get the addition of all even numbers from 1 to 99 10

4 Write on sequential, direct and ISAM file access method 10

5 Briefly write on several types of networking devices used to form a network 10

6 Summarise the features of DOS,UNIX and WINDOWS operating system 10

7 Classify memory in details 10

2nd Sem. / COMMON / 2022(S)

Th2 ENGINEERING CHEMISTRY

Full Marks: 80 Time- 3 Hrs

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10

a. Define Flux. Give an example of Acidic Flux.
b. Calculate the pH of 0.001M KOH solution.
c. What are the characteristics for a compound to be Aromatic?
d. What causes permanent hardness in water?
e. Write down any one difference between Double salt & Complex salt. Give an example of each.
f. Find out the Conjugate Base of HPO_4^{2-}.
g. Write down the electronic configuration of Cr & Cu.
h. Define isotope with an example.
i. Calculate the equivalent weight of CH_3COOH & $Al_2(SO_4)_3$.
j. Write down the general formula for Alkene series. What is the first member of alkene family?

2. Answer **Any Six** Questions 5 x 6

a. Differentiate between Calcination & Roasting.
b. Write down the composition & uses of Bronze & Duralumin.
c. Differentiate between Saturated & Unsaturated Hydrocarbons.
d. Explain the Hot lime Soda method of softening of hard water.
e. Define Corrosion. Explain waterline Corrosion.
f. Write down the Structural formula & IUPAC name of the following:-
   i) 2,3- dibromo -1,4-dichloro - but-2- ene
   ii) 5 - iodo - 4,4,5-trichloro - hex-2- ene
   iii) 1,1,2,2-tetrafluoro ethene
   iv) $CH_3CH(OH)C(Br)C(CH_3)CH_3$
   v) $CH{\equiv}C\text{-}CH{=}CH_2$
g Explain the Froth floatation method with a labelled diagram.

3	Make a comparative study of Arrhenius Theory & Bronsted-Lowry Theory of acids & bases.	7
	Write down the limitations of Arrhenius Theory of acids & bases.	3
4	(a)Differentiate between Thermoplastic & Thermosetting polymers with examples.	5
	(b)How is Polyvinyl Chloride prepared? What are its uses?	5
5	(a) State and explain Faraday's first law of electrolysis.	5
	(b)How many grams of NaOH is required to prepare 4L of its solution having pH 10.	5
6	Explain the Bohr's model of atomic structure. What are the drawbacks of this model?	7+3
7	(a)What are the conditions for a fuel to be a good fuel?	5
	(b)What are Bio-fertilizers ? Write Uses of various Bio-fertilizers.	5

2nd Sem./ COMMON / 2022(S)
Th-2A Engineering Physics

Full Marks: 80 Time- 3 Hrs

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10

a. Write the SI unit of i) Frequency ii) Temperature
b. State Triangle's law of vector addition
c. Define vector product of 02 vectors.
d. What is Static Friction ?
e. Define Universal Gravitational Constant (G)
f. Write any two application of Ultrasonic wave.
g. Define Latent heat.
h. What is refractive Index ?
i. Define Magnetic Flux Density.
j. Mention the value of relative permittivity of free space.

2. Answer **Any Six** Questions 6 x 5

a. Check the correctness of $T = 2\pi\sqrt{l/g}$ using Dimensional analysis.

Where the symbols used have their usual meaning

b. State Kepler's Law of Planetary Motion..
c. State Laws of Limiting Friction.
d. Differentiate between Transverse wave and Longitudinal wave-motion.
e. Draw with labelled diagram Refraction pattern through material of Prism.
f. Compare Fleming's Left hand and Right hand rule.
g State and explain Coulomb's law in magnetism.

3 Find the equations for i)Maximum height ii) Total time of Flight and iii) Horizontal range , when the projectile is fired at an angle with the horizontal. 10

4 Obtain the equations for (i) Displacement (ii) velocity (iii) Acceleration of a particle in Simple Harmonic Motion (SHM) 3+4+3

5 How much heat is required to convert 10 gm of ice at -5◦C to steam at 100^0C? 10

6 State Kirchhoff's laws. Derive the condition of balance in a wheatstone Bridge.. 4+6

7 Write the Principle, Properties and Applications of LASER. 10

2nd. SEM. /COMMON/ 2022(S)

TH-3 -ENGINEERING MATHEMATICS -II

Full Marks: 80 Time- 3 Hrs

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10

1. a. Define Modulus Function and represent it graphically.

   b. Evaluate $\lim_{x\to 0} \frac{x}{\sqrt{1+x}-\sqrt{1-x}}$

   c. Differentiate $\sec^{-1}\left(\frac{\sqrt{a^2+x^2}}{a}\right)$ with respect to x.

   d. Define unit vector and find the unit vector of the given vector $2\hat{\imath} + 3\hat{\jmath} + 6\hat{k}$.

   e. $Evaluate\ the\ integral \int \left(e^{5\ln x} - e^{4\ln x}\right) dx.$

   f. Define Homogeneous Function and State Euler's Theorem.

   g. Find the value of $\alpha\ so\ that\ \vec{a} = \hat{\imath} + \hat{\jmath} + \alpha\hat{k}, \vec{b} = 4\hat{\imath} - 3\hat{k}$ are perpendicular to each other.

   h. Find the order and degree of the following differential equation $\frac{d^2y}{dx^2} = \frac{3y+\frac{dy}{dx}}{\sqrt{\frac{d^2y}{dx^2}}}$

   i. $Find\ the\ value\ of \int_{-2}^{2} |x|\, dx.$

   j. If $y = t^2 and\ x = t^3 find \frac{dy}{dx}\ at\ t = 1.$

6 x 5

2. Answer **Any six** questions:

   a. If $f(x) = \begin{cases} ax^2 + b, if\ x < 1 \\ 1, if\ x = 1 \\ 2ax - b, if\ x > 1 \end{cases}$ is continuous at $x = 1$, then find the value of 'a' and 'b'.

   b. Find $\frac{dy}{dx}\ if\ y = (\ln x)^{tanx}$.

   c. Determine the area within the curve $y^2 = 4ax$ and the x-axis, the ordinate x=4.

   d. Evaluate $\int \frac{\tan x + \tan \alpha}{\tan x - \tan \alpha} dx$.

   e. Solve $(1 + x^2)dy + (1 + y^2)dx = 0$.

f. Find the scalar and vector projections of the vector $2\hat{\imath} - 3\hat{\jmath} - 6\hat{k}$ on the line joining the points (3,4,-2) and (5,6,-3).

g Find $\frac{dy}{dx}\ if\ x = \frac{2t}{1+t^2}, y = \frac{2t}{1-t^2}$.

3 i If $\sqrt{1-x^6} + \sqrt{1-y^6} = k(x^3 - y^3)$,prove that $\frac{dy}{dx} = \frac{x^2}{y^2}\sqrt{\frac{1-y^6}{1-x^6}}$ 7

ii Evaluate $\lim_{x\to 0} \frac{1-cos^3 x}{xsin2x}$. 3

4 i If $u = \tan^{-1}(x^2 + y^2 + z^2)$, $show\ that\ xu_x + yu_y + zu_z = sin2u$ 7

ii If sum of two unit vectors is a unit vector, show that the magnitude of their difference is$\sqrt{3}$. 3

5 i Evaluate$\int \frac{2x+11}{\sqrt{x^2+10x+29}} dx$. 6

ii If $y = \tan^{-1} x, prove\ that\ (1+x^2)y_2 + 2xy_1 = 0$ 4

6 i Solve the following differential equation $(1+y^2)dx = (\tan^{-1} y - x)dy$ 7

ii Find the derivative of $y = e^x\ by\ first\ principle.$ 3

7 i In a triangle AOB,angle AOB=90^0.If P, Q are the points of trisection of $\overline{AB}$,prove that $OP^2 + OQ^2 = \frac{5}{9}AB^2 by\ vector\ method.$ 6

ii Evaluate $\int e^x \left(\frac{1}{x^2} - \frac{2}{x^3}\right) dx$. 4

IIND SEM ./COMMON / 2022(S)

Th4(a) - Engineering Mechanics

Full Marks: 80 Time- 3 Hrs

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10

a. State the Law of Conservation of Linear momentum.
b. What is fundamental unit and derived units with examples?
c. What is coefficient of friction?
d. Write down the expression for Velocity Ratio of a Simple wheel and Axle.
e. What is Coplanar Concurrent Forces?
f. State Newton's 1^{st} law of motion.
g. What is Self Locking machine?
h. What is the distance of centroid of a semi circular area from the base?
i. Define Force and its unit in S.I system.
j. Define Couple and its unit.

2. Answer **Any Six** Questions 6 x 5

a. Derive the relation between Mechanical Advantage, Velocity Ratio and Efficiency of a Lifting machine.
b. In a lifting machine, an effort of 15N can lift a load of 300N and an effort of 20N can lift a load of 500N. Find the law of machine. Also find the effort required to lift a load of 880N.
c. What is Gear Train .Derive its velocity ratio of a Simple Gear Train.
d. State and Proof the Polygon Law of Forces.
e. Find the angle between two equal forces p, when their resultant is equal to (i) p and (ii) p/2
f. State and prove Lami's theorem.
g The following forces act at a point
   (i) 20N inclined at 30^0 towards North to East.
   (ii) 25N towards North
   (iii) 30N towards North west, and
   (iv) 35N inclined at 40^0towards south of west.

   Find the magnitude and direction of the resultant force.

3	State Triangle Law of force and proof Parallelogram Law of Force.	10
4	Define Centroid. An I- section has the following dimensions in mm units. Bottom flange= 300x100 Top flange= 150x50 Web= 300x50 Determine mathematically the position of centre of gravity of the section.	10
5	Define Angle of repose. A body of weight 500N is pulled up an inclined plane, by a force of 350N. The inclination of the plane is 30^0 to the horizontal and the force is applied parallel to the plane. Determine the co-efficient of friction.	10
6	A body of weight 70KN is suspended by two strings whose lengths are 6cm and 8cm from two points in the same horizontal level. The horizontal distance between the two points is 10cm. Determine the tensions of the strings.	10
7	Define Coefficient of Restitution. What are various types of Impacts? Discuss any one of them.	10

II ND /COMMON / 2022(S)

Th4-A&B Basic Electrical and Electronics

Full Marks: 80 Time- 3 Hrs

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10

a. What is the importance of pole and pole shoes in DC machine?

b. With a 8 ohm resistor and a 6 ohm inductive reactance, what is the total impedance?

c. What is the function of penstock in hydroelectric power plant?

d. What is fuse? Why it is used?

e. Write down 2 uses of PMMC & MI type instrument.

f. What is transducer and classify different types of transducer?

g. What is the function of filter?

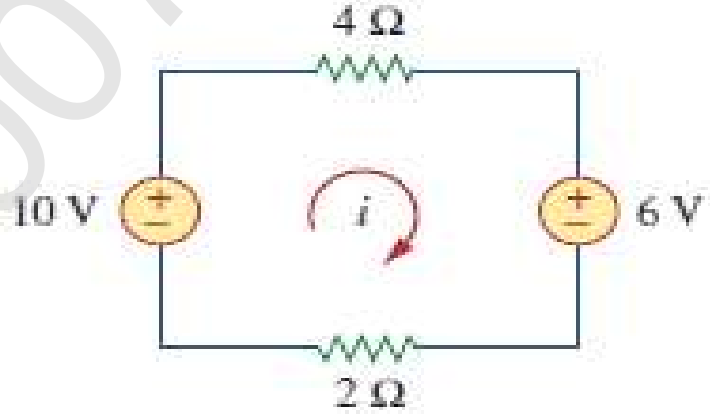
h. What is the function of delay line in CRO?

i. What is ripple and ripple factor?

j. Write down the relationship of output and input current gain in CE, CB configuration.

2. Answer **Any Six** Questions 6 x 5

a.



Find out (i)current (ii)voltage drop across 4 ohm and 2 ohm (iii) Power absorbed by resistance 4 ohm and 2 ohm.

b. Write down the construction and principle of filament lamp.

c. Discuss the torques required in measuring instruments in briefly.

d. With a neat block diagram explain the working of unregulated DC power supply system.

e. With a neat circuit diagram explain full wave center tap rectifier.

f. Explain different types of modulation.

g Explain the construction and working principle of a PN junction diode.

3 A coil of resistance 10 ohm and inductance 0.1H is connected in series with a capacitor 150µF across a 200V,50 Hz supply. Calculate (i)Inductive reactance (ii)Capacitive reactance (iii)Impedance (iv) Power factor(v) Current 10

4 A building has the following electrical appliances 10
(i) A 1.5 HP motor running for 6 hrs in a day.
(ii) Four fans each of 80W running for 10 hrs. in a day.
(iii) Four tube lights of 40W running for 15 hrs. per day.
Find the monthly bill for the month of February 2022 if unit cost of bill is Rs.2.50.

5 Draw the block diagram of Thermal Power Plant and explain the function of each elements of it. 10

6 (a) Explain the working principle of single-phase CE amplifier. 10
(b) Explain working principle of multimeter with block diagram.

7 Define Oscillator and classify it. Also explain working of basic Oscillator with simple block diagram. 10

2ND SEM . /COMMON/ 2023(S)NEW

TH-4 (A&B) Basic Electrical and Electronics

Full Marks: 80 **Time- 3 Hrs**

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10

   a. Define(i)Amplitude factor (ii) Kirchhoff's Current Law

   b. What are the differences between DC and AC supply?

   c. Write any two merits of full wave bridge rectifier.

   d. Why is the average value of sinusoidal signal calculated in half cycle?

   e. State any two uses of integrated circuits.

   f. A resistor of 6 ohm and an inductive reactance of 8 ohm are connected in series to a 250V, 50Hz supply. Calculate the current flowing in the circuit network.

   g. What do you mean by photoconductive transducer?

   h. Classify different types of Transistor configuration.

   i. What do you mean by star rating concept of home appliances?

   j. What do you mean by electron emission? Give an example

2. Answer **Any Six** Questions 6 x 5

   a. What are the main parts and principle of operation of DC generator?

   b. Describe the alternating current (AC) through pure capacitance with phasor diagrams.

   c. Explain the working of Super heterodyne Radio Receiver briefly.

   d. A shunt generator delivers 450 A at 230 V and the resistance of the shunt field and armature are 50 Ω and 0.03 Ω respectively. Calculate the generated EMF.

   e. Describe about the MI type measuring instruments briefly.

   f. Write a short note on Mercury Vapour Lamp with a neat diagram.

   g Briefly describe the operating principle of LVDT with a neat diagram

3 10

Calculate the electricity bill amount for a month of 30 days, if the following devices are used as specified :

(i). 3 Bulbs of 40 W for 6 h/day
(ii). 2 Tube lights of 50 W for 8 h/day
(iii). 2 computers of 40 W for 6 h/day
(iv). 2 fans of 70 W for 8 h/day

Given, the cost of electricity is Rs. 2.5/unit

4	Write a short note on (i) Basic protective devices used in house hold wiring (ii) Single phase Transformer	10
5	Describe about the Radio Transmitter & Receiver along with their block diagrams.	10
6	Explain about the nuclear powerplant in details with a neat diagram.	10
7	Write a short note on (i) Zener Diode (ii) Bourden tube diaphragm	10

2ND SEM / COMMON / 2023(S) NEW

Th-1 Computer Application

Full Marks: 80 **Time- 3 Hrs**

Answer any Five Questions including Q No.1 & 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10
   a. Write down any four data types used in C Programming language.
   b. Define Algorithm.
   c. What is FTP?
   d. Draw the flowchart symbol for I/O statement, start/stop and decision statement.
   e. Define Protocol.
   f. What do you mean by compiler?
   g. Define ISAM.
   h. What do you mean by recursion?
   i. What are the logical operators used in 'C' Language?
   j. Define Time Sharing Operating System.

2. Answer **Any Six** Questions 5 X 6
   a. Distinguish between RAM and ROM.
   b. What is Email? Write down its features.
   c. Give comparison between 3rd and 4th generation of computer.
   d. Explain the various networking devices.
   e. Write down the difference between application software and system software.
   f. Define network and explain various types of network.
   g Define Operating System. Explain the functions of operating system.

3 Define topology and describe the different types of topology used to form a network. 10

4 Draw and explain von Neumann architecture. 10

5 Draw a flowchart and write a program in C to find factorial of a given number N. 10

6 Write down the features of DOS, Windows and Unix? 10

7 Write short notes on any Two. 10
   Data transmission mode
   Array
   Virus
   Loops in C programming language.

2ND SEM ./COMMON/2023(S) NEW

TH1-A COMMUNICATIVE ENGLISH

Full Marks: 80 **Time :03 hours**

Answer all Questions
Figures in the Right hand margin indicate marks

Answer all questions

Q.1. Read the following passage carefully and do as directed.

My grandmother, like everybody's grandmother, was an old woman. She had been old and wrinkled for the twenty years that I had known her. People said that she had once been young and pretty and had even had a husband, but that was hard to believe. My grandfather's portrait hung above the mantelpiece in the drawing -room. He wore a big turban and loose-fitting clothes. His long white beard covered the best part of his chest and he looked at least a hundred years old. He did not look the sort of person who would have a wife or children. He looked as if he could only have lots and lots of grandchildren. As for my grandmother being young and pretty, the thought was almost revolting. She often told us of the games she used to play as a child. That seemed quite absurd and undignified on her part and we treated it like the fables of the prophets she used to tell us. She had always been short and fat and slightly bent. Her face was a criss-cross of wrinkles running from everywhere to everywhere. No, we were certain she had always been, as we had known her. Old, so terribly old that she could not have grown older, and had stayed at the same age for twenty years. She could never have been pretty; but she was always beautiful. She hobbled about the house in spotless white with one hand resting on her waist to balance her stoop and the other telling the beads of the rosary. Her silver locks were scattered untidily over her pale, puckered face, and her lips constantly moved in inaudible prayer. Yes, she was beautiful. She was like the winter landscape in the mountains, an expanse of pure white serenity breathing peace and contentment.

A	Answer the following briefly:	
i.	How did the grandfather appear in his portrait?	02
ii.	What sort of a person did he look in his portrait?	02
iii.	How does the author portray his grandmother?	02
iv.	Why does he say, "the thought was almost revolting?"	02
B.	Find the words from the passage which have the following meanings:	
i	shelf	02
ii	not respectable	02
C.	Make sentences using the following words on your own (any one): Seem, treat	02
D.	Supply single word substitute to: Something which is not logical and sensible	02
E	Make a note of the above passage	04

Q.2. **Answer any five of the following:** 05×02

i. What in your opinion was the best lesson that the street taught to the narrator?

ii. Explain the expression 'triumphant hatred'.

iii. What is the difference between criticizing an idea and criticizing an individual?

iv. What is crab mentality?

v. Why did Ralph do the wicked act?

vi. What does the poet pray for?

Q.3. Do as directed.

A. Fillin the blanks with appropriate choices given in the brackets.

i. It -----rain tonight. (may, can) 02

ii. He is ---- M.A. in English. (a, an) 02

iii. There is -----water in the jug. (little, few) 02

B. Change the voice

i. He reads a newspaper every day. 02

ii Shut the door. 02

Q.4. Write a paragraph in about 120 words on any one of the following topics:
Your college library **or** Online classes 05×01

Q 5. **Answer any of the following.** 05×01
You are the secretary of students' union. Draft a notice regarding the students' picnic to Puri and Konark for information of students.
Or
Write a report on the Blood Donation Camp conducted in your college.

Q 6. A **Answer any two of the following:** 05×02

i. Your best friend has won the first prize in the state level debate competition. Write a letter to him/her congratulating him/her on his/her success.

ii. You are the owner of Popular Books Corner, Grand Road, Puri. You have received a packet of Engineering Mathematics textbooks instead of Communicative English books from your distributor M/S Padmalaya Books, Satya Nagar, Bhubaneswar. Draft a letter of complaint.

iii. You are staying in your college hostel. You are facing a lot of difficulties as there are no facilities for drinking water there. Write an application to the superintendent of your hostel requesting him/her to take necessary steps for installing a water purifier in your hostel.

B. Tata Steel, Kalinga Nagar, Jajpur has invited applications for the post of Junior Engineer from diploma holders in Civil, Electrical and Mechanical Engineering. 10
(i) Apply for the post (ii) enclose your Resume' or C.V.

Q.7. **Answer any two of the following:** 05×02

i. Write a short note on body language.

ii. Discuss the types of formal communication in detail.

iii. Communication is a circular process. Justify it.

2ND SEM ./COMMON / 2023(S)NEW

TH-2(a) Engineering Physics

Full Marks: 80 **Time - 3 Hrs**

Answer any five Questions including Q.No. 1 & 2
Figures in the right hand margin indicates marks

1. Answer **All** questions **2 x 10**

   a. Write down the **S.I.** units of :
      i. Work
      ii. Electric Potential
      iii. Frequency
      iv. Speed

   b. If $\vec{A} = 2\hat{i} - 3\hat{j} + \hat{k}$ & $\vec{B} = 4\hat{i} + 2\hat{j}$, then find out their dot product.

   c. Define Angular velocity.

   d. Three capacitors of capacitance 2F, 3F, & 5F are connected in parallel. Calculate the equivalent capacitance.

   e. State the First law of Thermodynamics.

   f. Draw a ray diagram for refraction through prism.

   g. Define Critical angle.

   h. What is Optical Fibre ?

   i. Define ground waves.

   j. Define Unit Charge.

2. Answer **Any Six** Questions **5 x 6**

   a. Check the correctness of the physical equation : $S = ut + \frac{1}{2}at^2$.

   b. Write down the properties of Ultrasonics.

   c. State and explain Newton's law of gravitation.

   d. Compare Fleming's Left-hand rule and Right hand Rule.

   e. Write down properties of magnetic lines of force.

f. State and explain Kirchhoff's Laws.

g State Faraday's Laws of Electromagnetic Induction.

3 Derive expressions for (i) Velocity and (ii) Acceleration of a particle executing S.H.M. **7+3**

4 Establish a relation between co-efficient of linear expansion (α), co-efficient of superficial expansion (β), and co-efficient of cubical expansion (ϒ) of a material. **(10)**

5 Obtain expressions for (i) Time of flight and (ii) Horizontal range, for a projectile projected with initial velocity 'u', by making an angle 'Θ' with the horizontal. **5+5**

6 (i) State laws of limiting friction . **(5+5=10)**
(ii) Explain different methods to reduce friction.

7 Write short notes on: **(5+5=10)**
i. Difference between Heat and Temperature.
ii. Properties of LASER.

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Th- 2 (b) Engineering Chemistry

Full Marks: 80 **Time- 3 Hrs**

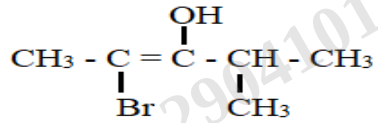
Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

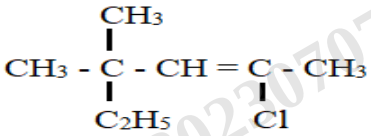
1. Answer All questions **2 x 10**

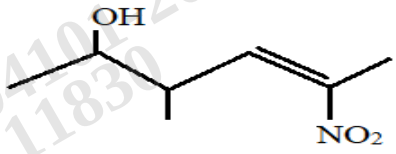
a. **What is gangue?**
b. **Define isotone. Give a suitable example of it.**
c. **What do you mean by neutralisation reaction? Give an example of it.**
d. **Define homopolymer. Give an example of it.**
e. **What is calorific value of fuel?**
f. **Define electrovalent bond.**
g. **Define hard water. What is the cause of hardness of water?**
h. **Write down the general formulae of alkane and alkene.**
i. **What are herbicides? Give an example of herbicide.**
j. **Define P^H. What is the range of P^H for acidic solutions?**

2. Answer Any Six Questions **6 x 5**

a. **Explain the mechanism of rusting of iron.**
b. **Write down the IUPAC names/structural formulae of the following:**

(i) 

(ii) 

(iii) 

(iv) 5-Bromo-3-chlorohex-4en-3-ol

(v) 2,4-Dimethylpenta-1,3-diene

c. **What are the advantages of hot lime soda process over cold lime soda process?**
d. **Define and explain Hund's rule.**
e. **2.45 g of H_2SO_4 is present in 2 litres of its solution. Calculate its molarity and normality.**
f. **Explain magnetic separation method of concentration of ores.**
g **Define and explain Arrhenius theory of acids and bases.**

3	**(a)**	**State Bohr-Bury scheme.**	**5**
	(b)	**Explain electrolysis of molten NaCl and predict the products obtained at different electrodes.**	**5**
4	**(a)**	**Write down the composition and uses of alnico and duralumin.**	**5**
	(b)	**Distinguish between aliphatic and aromatic hydrocarbons.**	**5**
5	**(a)**	**Give a brief note on composition and uses of Bakelite.**	**5**
	(b)	**Define and explain vulcanisation of natural rubber.**	**5**
6	**(a)**	**12 g of NaOH is present in 1.5 lit of its solution. Find P^H of the solution.**	**6**
	(b)	**Define with examples acidic and basic salts.**	**4**
7	**(a)**	**Write down the composition and uses of producer gas and water gas.**	**4**
	(b)	**What are the outcomes of Rutherford's gold foil experiment?**	**6**

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TH- 3 ENGINEERING MATHEMATICS - II

Full Marks: 80 **Time- 3 Hrs**

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10

   a. $Evaluate \lim_{x\to 0} x \sin\frac{1}{x}$

   b. $if\ f(x) = mx + c, f(0) = f^I(0) = 1$
   $then\ find\ the\ value\ of\ f(1)$

   c. Determine order and Degree of $2\frac{d^2y}{dx^2} = \sqrt{\left(\frac{dy}{dx}\right)^3 + 5}$

   d. Integrate $\int \frac{\cos x}{1+\sin x} dx$

   e. Find the unit vector in the direction of the vector $2\hat{\imath} - \hat{\jmath} + 2\hat{k}$

   f. Find the derivative of $\sqrt{2x^2 + 3x + 5}$

   g. Evaluate $\int_0^3 [x] dx$

   h. Solve $\frac{dy}{dx} = \frac{e^{2x}+1}{e^x}$

   i. If $Z = \log(x^2 - y^2)$ $, then\ find\ \frac{\partial Z}{\partial x}\ and\ \frac{\partial Z}{\partial y}$

   j. $if\ x = 2t^2\ and\ y = 4t\ , then\ find\ \frac{dy}{dx}\ at\ t = 1$

2. Answer **Any Six** Questions 6 x 5

   a. Differentiate $x^{\sin x}$

   b. Integrate $\int \frac{sec^2\sqrt{x}}{\sqrt{x}} dx$

   c. $Test\ the\ continuity\ of\ the\ function$
   $F(x) = \begin{cases} \frac{|x|}{x} & when\ x \neq 0 \\ 1 & when\ x = 0 \end{cases}$ at $x = 0$

   d. $prove\ that\ \int \frac{dx}{a^2+x^2} = \frac{1}{a}\tan^{-1}\frac{x}{a} + C$

   e. $Find\ Scalar\ and\ Vector\ projection\ of\ \vec{a}\ on\ \vec{b}\ ,$
   $where\ \vec{a} = \hat{\imath} - \hat{\jmath} - \hat{k}\ and\ \vec{b} = 3\hat{\imath} + \hat{\jmath} + 3\hat{k}$

f. $Evaluate \int_0^{\frac{\pi}{2}} \frac{dx}{1+\sqrt{\tan x}}$

g $Solve\ (1+x^2)dy + (1+y^2)dx = 0$

3 a) $Evaluate \lim_{x\to 0} \frac{e^{4x}-e^{3x}}{e^{3x}-e^{2x}}$ 5

b) $Find \frac{dy}{dx}\ if\quad x^y y^x = 1$ 5

4 a) Find the area of parallelogram whose adjacent sides are the vectors $\hat{\imath} - 3\hat{\jmath} + \hat{k}\ and\ \hat{\imath} + \hat{\jmath} + \hat{k}$ 5

b) If $y = \tan^{-1} x\ then\ show\ that\ (1+x^2)y_2 + 2xy_1 = 0$ 5

5 a) Solve $x \log x \frac{dy}{dx} + y = 2 \log x$ 5

b) Integrate $\int x \tan^{-1} x\, dx$ 5

6 a) Differentiate $5^{ln \sin x}$ 5

b) Integrate $\int e^{cos^2 x} \sin 2x\, dx$ 5

7 a) Evaluate $\lim_{x\to 0} \frac{\log(x+1)}{\sqrt{x+1}-1}$ 5

b) Find the area of the circle $x^2 + y^2 = 16$ 5

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Th-4 Engineering Mechanics

Full Marks: 80 **Time- 3 Hrs**

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer All questions 2 x 10

   a. Define couple and state its unit in SI system.

   b. State Triangle's law of forces.

   c. Define angle of Repose.

   d. State Perpendicular Axis Theorem.

   e. In a weight lifting machine having a velocity ratio 20 is able to lift a weight of 1KN by an effort of 80N. Show that the machine can work in the reverse direction if the effort is removed.

   f. Define power. Write its SI unit

   g. What do you mean by (i) coplanar forces (ii) concurrent forces

   h. Define free body diagram.

   i. Explain conservation of energy.

   j. Define moment of a force. Classify the moments according to the direction of rotation.

2. Answer Any Six Questions 6 x 5

   a. The resultant of two concurrent forces is perpendicular to the smaller force and angle between the forces is 120˚. If the bigger force is 60N, find the smaller one.

   b. State the Laws of friction.

   c. What is gear train? Derive the velocity ratio of a compound gear train.

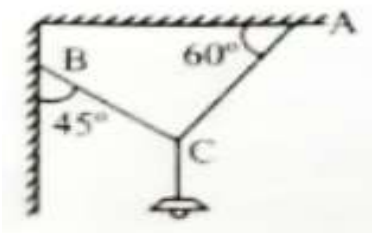
   d. A ball of mass 2 kg moving with a velocity of 2 m/s hits directly on a ball of mass 4 kg at rest. The first ball, after impinging, comes to rest. Find the velocity of the second ball after the impact and the coefficient of restitution.

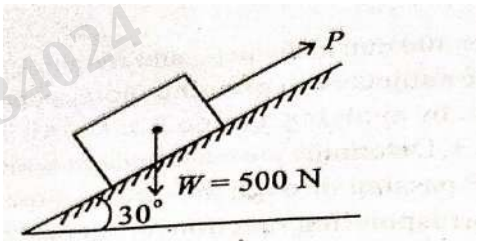
   e. State and prove Lami's theorem.

   f. A single purchase crab winch has 300mm long handle and 120mm diameter drum. Number of teeth on the pinion is 25 and that on wheel 130. if an effort of 20N lifts a load of 300N, find the MA,VR and efficiency of the crab winch.

   g Explain principles of transmissibility and superposition.

3 An electric light fixture weighs 15N hangs from a point "C" by two strings AC and BC. The string is inclined at 60° to the horizontal and BC is at 45° to the horizontal as shown in the figure below. Determine the forces on string AC and BC. 10



4	A body of weight 500N is lying on a plane inclined at an angle 30°. It is supported by an effort parallel to the plane as shown in figure. Determine the minimum & maximum values of "P" for which equilibrium can exist. Take the co-efficient of friction as 0.35. 	10
5	Find the position of centroid of I-section having following dimensions: Bottom flange = 300mm x 50mm Top flange = 150mm x 50mm Web = 300mm x 50mm	10
6	Find law of the machine in which an effort of 19.5N raised a load of 90N and another effort of 15.5N raised a load of 70N. Find what effort is required to lift a load of 100N.	10
7	State and explain Newton's laws of motion & equation of motion.	10