

1ST SEM./ COMMON / 2022(W)

Th-1(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. What is Variable and Constant in C programming Language?
 - b. What do you understand by algorithm and flowchart?
 - c. Differentiate between LAN and WAN.
 - d. Name any two network protocol.
 - e. Give example of any four optical input device.
 - f. Write down difference between file & folder.
 - g. What do you mean by Array?
 - h. Define GFLOPS.
 - i. What do you mean by GUI?
 - j. What do you mean by Impact printer and give example.
2. Answer **Any Six** Questions 5 x 6
 - a. Explain about different types of mode of data transmission mode.
 - b. Give comparison between 1st and 2nd generation of computer.
 - c. Differentiate between Primary Memory and Secondary memory.
 - d. Write down various data processing methods.
 - e. Write a program in C to find factorial of a given number.
 - f. Compare between time sharing and multi programming operating system.
 - g. Explain about different generation of programming language.
3. Define file access method and explain about various types of file access methods. 10
4. Briefly explain memory hierarchy system. 10
5. What do you mean by topology? Explain various types of topology. 10
6. What is virus? Explain different types of virus. Write down detection and prevention of virus. 10
7. Define call by value and call by reference with sample C program. 10

1ST SEM ./COMMON /2022(W)
TH1-A COMMUNICATIVE ENGLISH

Full Marks: 80

Time 03 hours

Answer All Questions
Figures in the Right hand Margin indicate Marks

Q.1 Answer ALL questions.

(Khairi's story started on October 5, 1974 when 12 Kharia tribals of (i) Similipal brought a two-month old tiger cub to Saroj Raj Chaudhury) an (ii) officer of the Indian Forest Service. Saroj noticed that (it was a female-famished and confused.) His first experience of what was to become his passion in life was angry snarls and scratching claws. But, (the veteran (iii) forester and instinctive lover of wildlife knew how to handle a hungry, angry cub.) He imitated the sounds of a mother-tigress. "Within minutes, her confidence was firmly anchored in the fostering human," is how he recalled those first few minutes between the legends.

Early next morning, Saroj started for his inspection of the Tiger Reserve area. I tagged along in the jeep that snaked through narrow road in the woods amidst lush foliage. My mother gave me a gun for my eighth birthday. As a young man, I shot wildlife with abandon. But soon, I realized that there is greater happiness in conserving these beautiful animals that do no wanton harm to man" is one of the things he told me about his life during that long travel.

At that time, (he was an authority on the tiger and Director of Project Tiger in India. Saroj introduced the Tiger Tracing Method of tiger and census where the pugmarks of each animal with distinctive measurements and characteristics are meticulously recorded.)

A Give brief answers to the following:

- | | |
|--|----|
| i. How and when did Mr. Chaudhury come across Khairi? | 02 |
| ii. In what condition did he find it? | 02 |
| iii. How did he manage the hungry and confused cub? | 02 |
| iv. What was his contribution to the tiger project? | 02 |
| B. Find the words from the passage which have the following meanings: | |
| i Very hungry | 02 |
| ii Reckless harm | 02 |
| C. Make sentences using the following words (any one):
realise, imitate | 02 |
| D. Supply a single word substitute to:
One who pays careful attention to every detail is -----. | 02 |
| E. Make a note of the above passage | 04 |

Q.2.

Answer Any Five of the following:

- | | |
|---|-------|
| i. What was the best lesson that the street taught to the narrator? | 05×02 |
| ii. How did the people in the street respond to the poem written by the narrator? | |

- iii. What is the joke about the Indian and Japanese workers at the Maruti Suzuki company?
- iv. What are the qualities of a good team player?
- v. How does the poet value her friendship?
- vi. Why did Ralph do the wicked act?

Q.3. **Do as Directed.**

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

- i. He is ----(ā/ān) M.A. in economics. 02
- ii. There are ----(a few, a little) students in the class. 02
- iii. You ----(should/ought to) obey your parents. 02
- iv. When I ----(reāch) the station the train----(already leave) .(Use the correct tense of the verb) 02
- v. Please maintain discipline. (Change the voice) 02

Q.4. Write a paragraph in about 120 words on any one of the following topics:
Knowledge without skill, The things I learnt during lockdown

05×01

Q.5. Answer any one of the following:

05×01

You are the secretary of the students' union. Draft a notice regarding a meeting to be held for discussion about annual function for information of all students.

Or

Write a report on World Youth Skill Day celebration in your college.

Q.6. A. **Answer any Two of the following:**

05×02

- i. Write a letter to your friend inviting him to your sister's marriage.
- ii. You are the owner of Reeta Electronics, Bapuji Nagar, Bhubaneswar. You have received a packet of fans instead of mixer grinders. Draft a letter of complaint to M/S Bajaj Electronics, Faridabad, New Delhi.
- iii. Write a letter to the superintendent of your hostel requesting him/her to take necessary steps for the maintenance of water tanks and water purifier of your hostel.
- B. Rourkela Steel Plant has invited applications for the post of Junior Engineer from diploma-holders in Civil, Electrical and Mechanical Engineering. Apply for the post and enclose your resume' or C.V.

10

Q.7 **Answer any Two of the following:**

05×02

- i. Discuss the stages of communication in detail with the diagram.
- ii. Write short notes on body language and communication barriers.
- iii. What is communication and what are the different types of communication?

1ST SEM. / COMMON / 2022(W)

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. What are the basic units in SI System ?
 - b. State triangle law of vector addition.
 - c. What is the condition for maximum horizontal range for a projectile ?
 - d. Define co-efficient of friction.
 - e. State Newton's law of gravitation.
 - f. Define Simple Harmonic Motion .
 - g. State First law of thermodynamics.
 - h. Write down laws of reflection.
 - i. Three resistors of 2 Ω , 4 Ω and 5 Ω are connected in parallel. Calculate the equivalent resistance.
 - j. Write down the properties of LASER.
2. Answer **Any Six** Questions 5 x 6
 - a. Check the correctness of the physical equation $v = u + at$ by dimensional analysis.
 - b. State laws of limiting friction.
 - c. Differentiate between longitudinal and transverse wave.
 - d. State and explain Coulomb's law of electrostatics.
 - e. State Faraday's laws of electromagnetic induction.
 - f. State Kepler's laws of planetary motion.
 - g. Explain Total internal reflection with diagram.
3. Derive expressions for Equation of Trajectory, Time of flight and Maximum Height for a projectile projected with initial velocity 'u' by making an angle ' θ ' with the horizontal. [4+3+3]
4. State Kirchhoff's laws. Obtain condition of balance for a Wheatstone bridge by applying Kirchhoff's laws. [4+6]
5. How much heat energy is required to convert 7.5 kg of ice at -30°C to a steam at 100°C . Given that the specific heat capacity of ice is $0.5\text{ cal-gm}^{-1}\text{-}^{\circ}\text{C}^{-1}$, Specific heat capacity of water is $1\text{ cal-gm}^{-1}\text{-}^{\circ}\text{C}^{-1}$, Latent heat of ice is 80 cal-gm^{-1} and Latent heat of water is 540 cal-gm^{-1} . 10
6. Establish a relation between α , β and γ where symbols used carry usual meaning. [10]
7. Write short notes on:- [5+5]
 - (i) Compare Fleming's Right Hand Rule and Fleming's Left Hand Rule.
 - (ii) Properties of magnetic lines of force.

1ST SEM. /COMMON / 2022(W)
Th-2 Engineering Chemistry

Full Marks: 80

Time- 3 Hrs

Answer any five Questions including Q No.1 & 2
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1. Answer **All** questions 2 x 10
 - a. What are insecticides? Give two examples.
 - b. Define isotope with suitable example.
 - c. Mention the basic steps involved in the metallurgical operation.
 - d. Define Huckel's rule for aromaticity.
 - e. What is double salt? Give an example.
 - f. How temporary hardness can be removed?
 - g. What is degree of polymerization?
 - h. Define lubricant. Give an example of a semi-solid lubricant.
 - i. What is Galvanisation?
 - j. To which class of compound C_4H_{10} belongs and how?

2. Answer **Any Six** Questions 6 x 5
 - a. Define covalent bond. Explain the formation of CH_4 molecule.
 - b. What are bio-fertilizers? Give some examples.
 - c. What are the differences between thermoplastic and thermosetting polymers?
 - d. a. Write the structural formula of the following organic compounds:
 - (i) But-1-en-3-yne
 - (ii) 3,4-dimethyl pentan-2-ol
 - (iii) Tert-butyl alcoholb. Write the IUPAC name of
 - (i) $CH_3-CH(C_2H_5)-CH(C_2H_5)-CH_3$
 - (ii) $CH_3CH(Cl)CH(Br)CH_2CH(NO_2)CH_3$
 - e. Explain the froth floatation method of concentration of ores.
 - f. Define Normality. 4 grams of NaOH are present in 2 litre of its solution. Find its normality and molarity.
 - g. What is a lubricant? Write the major functions of lubricants.

- 3 a. State and explain Bohr's atomic model. 6 + 4
b. Write down the composition and uses of Brass and Bronze.
- 4 a. What are saturated and unsaturated hydrocarbons? Is benzene saturated? Justify your answer. 5+5
b. Explain Bronsted-Lowry Theory of Acid and Bases
- 5 State and explain Faraday's 1st and 2nd law of electrolysis. How many grams of calcium will be deposited at the cathode by passing 15 ampere of currents through molten CaCl_2 for 30 minutes? 4+4+2
- 6 a. Write the composition and uses of PVC. 5 + 5
b. Define fuel. What are the characteristics of a good fuel?
- 7 a. How hard water can be softened by Ion-exchange process? 6 + 4
b. Differentiate between calcination and roasting.

1ST SEM ./COMMON / 2022(W)

Th-3 Engineering Mathematics-I

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. Find the value of $\begin{vmatrix} 1 & bc & a(b+c) \\ 1 & ca & b(c+a) \\ 1 & ab & c(a+b) \end{vmatrix}$.

b. Find x and y when $\begin{bmatrix} 1 & 3 \\ 2 & -1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 4 \\ 1 \end{bmatrix}$.

c. Find the minimum and maximum value of $5 \sin x + 12 \cos x$.

d. Find $\tan\left(\frac{\pi}{4} + 2 \cot^{-1} 3\right)$.

e. Determine the ratio in which the line segment joining $(2, -3)$ and $(5, 6)$ is divided by x -axis.

f. Find the perpendicular distance from the point $(2, 1)$ to the straight line $12x - 5y + 9 = 0$.

g. Find the equation of the circle which touches the x -axis and whose centre is at the point $(3, 4)$.

h. Find image of the point $(1, -2, 4)$ with respect to YZ -plane.

i. Find the direction cosines of a straight line whose direction ratios are 1, 2, 3.

j. Find the centre and radius of the sphere $3x^2 + 3y^2 + 3z^2 - 12x - 6y + 9z + 1 = 0$.

2. Answer **Any Six** Questions

6 x 5

a. Without expanding prove that

$$\begin{vmatrix} a & a^2 & a^3 \\ b & b^2 & b^3 \\ c & c^2 & c^3 \end{vmatrix} = abc(a-b)(b-c)(c-a)$$

b. Solve the following equations by Matrix Method,
 $x + 2y = 3$ and $3x + y = 4$

- c. Prove that $\sin 10^\circ \cdot \sin 30^\circ \cdot \sin 50^\circ \cdot \sin 70^\circ = \frac{1}{16}$ 5
- d. Find the equation of the straight line which passes through the point (3, 4) and sum of its intercepts on the axes is 14. 5
- e. Find the equation of plane passing through the point (2, -2, -1) and parallel to the plane $2x + y - 3z - 2 = 0$.
- f. Find the equation of the sphere whose centre at (3, 1, -2) and the sphere passing through the point (1, 1, 2).
- g. If $\tan^{-1} x + \tan^{-1} y + \tan^{-1} z = \pi$, show that $x + y + z = xyz$.
- 3 a. Solve the following equations by Cramer's Rule, 5
 $2x - 3y + 5 = 0$ and $5y - 3x - 8 = 0$
- b. Find the equation of the plane passing through the intersection of planes $2x + 3y - 4z + 1 = 0$ and $3x - y + z + 2 = 0$, and passing through the point (3, 2, 1).
- 4 a. Find the equation of the circle which passes through the points (1, -2) and (4, -3) and has its centre lies on the line $3x + 4y = 7$. 7
- b. If the point (x, y), (1, -2) and (3, -4) are collinear, prove that $x + y + 1 = 0$. 3
- 5 a. Find the equation of the sphere passing through (1, 2, -3) and (3, -1, 2) and centre lying on X-axis. 5
- b. If $A + B + C = \pi$,
 Prove that $\sin 2A + \sin 2B + \sin 2C = 4 \sin A \sin B \sin C$. 5
- 6 a. In a $\triangle ABC$ if $m\angle A = 90^\circ$, prove that $\tan^{-1} \frac{b}{a+c} + \tan^{-1} \frac{c}{a+b} = \frac{\pi}{4}$, 5
 where a, b and c are the sides of the triangle.
- b. Verify that $[AB]^T = B^T A^T$, 5
 where $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 \\ 2 & 0 \\ -1 & 1 \end{bmatrix}$.
- 7 a. Find the equation of a straight line parallel to the line $2x + 3y + 11 = 0$ and sum of its intercepts on the axes is 15. 6
- b. If $A + B = 45^\circ$, show that $(1 + \tan A)(1 + \tan B) = 2$. 4

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

1. Answer All questions

2 x 10

- Define (i) Lumen (ii) Kirchhoff's Voltage Law
- What do you mean by electron emission? Give an example.
- What is Ohm's Law? Also write the mathematical expression associated with it
- Classify the types of DC Generator.
- Write any two differences between intrinsic and extrinsic semiconductor.
- Define (i) RMS value (ii) Form factor in AC supply.
- If in a DC circuit network, two resistors of 2 ohm and 4 ohm connected in parallel are supplied with 20V DC supply, what will be the voltage drop in 4 ohm resistor?
- What is passive transducer? Give an example.
- Draw the CE configuration of transistor.
- What do you mean by impedance triangle?

2. Answer Any Six Questions

6 x 5

- What are the main parts and principle of operation of DC motor?
- Describe about the PMMC type measuring instruments briefly.
- Explain different types of basic filter circuits with proper circuit diagram.
- An AC series RL circuit is made up of a resistor that has a resistance value of 150Ω and an inductor that has an inductive reactance value of 100Ω . Calculate the impedance and the phase angle θ of the circuit.
- Briefly describe the operating principle of LVDT with a neat diagram
- Write a short note on Sodium Vapour Lamp with a neat diagram.
- What are the differences between vacuum tube & semiconductor?

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

- 2 Bulbs of 40 W for 6 h/day
 - 2 Tube lights of 50 W for 8 h/day
 - 1 TV of 120 W for 6 h/day
 - 2 fans of 70 W for 8 h/day
- Given, the cost of electricity is Rs. 2.5/unit

Write short notes on (i) Zener Diode (ii) Transistor oscillator
Describe about Amplitude Modulation & Frequency Modulation in details.
Explain about the thermal power station in details with a neat diagram.
Draw and explain the block diagram of CRO and also state its applications.

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1ST SEM./ COMMON / 2022(W)

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 elasticity.
 - b. Define force, write down its SI units.
 - c. What do you mean by kinematics.
 - d. Define coplanar and collinear forces.
 - e. Define couple.
 - f. State perpendicular axis theorem.
 - g. What is self locking machine.
 - h. Define centroid.
 - i. Define Coefficient of Restitution.
 - j. What is De -Alembert's principle.

2. Answer **Any six** Questions. 6 x 5
 - a. State and prove Lami's theorem.
 - b. Find the angle between two equal forces of magnitude p , when their resultant is (i) p and (ii) $p/2$.
 - c. Derive velocity ratio of a compound gear train.
 - d. Derive the relation between mechanical advantage, velocity ratio and efficiency of a machine.
 - e. A body of weight 50N is pulled along a rough horizontal plane by a force of 18N acting an angle of 14° with horizontal. Find the coefficient of friction.
 - f. 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
 - g. 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.

3. Find the moment of inertia of a T-section having flange and web both 120 mm x 30 mm about X-X axis passing through the centre of gravity of the section. 10

- 4 A uniform ladder 'AB' 3m long weighs 200N. It is placed against a wall making an angle of 60° with the floor. The coefficient of friction between the wall and the ladder is 0.25 and that between the floor and ladder is 0.35. The ladder in addition to its own weight, support a man of 1000N at its top at B. Calculate the horizontal force 'P' to be applied to the ladder at the floor level to prevent slipping. 10
- 5 A simple screw jack has a thread of pitch 12 mm. Find the load that can be lifted by an effort of 20 N applied at the end of handle 500 mm long. Take efficiency of the machine as 50%. 10
- 6 Prove that the moment of inertia of a rectangular section having width 'b' and depth 'd' about x-x axis is $bd^3/12$. 10
- 7 The forces 20N, 30N, 40N, 50N & 60N are acting at one of the angular points of a regular hexagon towards the other five angular points taken in order. Find the magnitude and direction of resultant force. 10