

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
 B.Sc. Engineering 1st Year 1st Term Examination, 2017
 Department of Computer Science and Engineering
 CSE 1107
 Discrete Mathematics

TIME: 3 hours

FULL MARKS: 210

- N.B. i) Answer **ANY THREE** questions from each section in separate scripts.
 ii) Figures in the right margin indicate full marks.

SECTION A

(Answer **ANY THREE** questions from this section in Script A)

1. a) What is contradiction? Determine whether the proposition $[(p \vee q) \wedge (p \rightarrow r) \wedge (q \rightarrow r)] \rightarrow r$ (10)
 is a tautology or contradiction.
 b) What are logical quantifiers? Provide the physical example(s) for the following relations: (10)
 i) $\neg \exists x Q(x) \Leftrightarrow \forall x \neg Q(x)$
 ii) $\neg \forall x P(x) \Leftrightarrow \exists x \neg P(x)$
 c) Express the following statements in the logical arguments using quantifiers, connectives and (10)
 corresponding predicates:
 “All lions are fierce”, “Some lions do not drink coffee”, “Some fierce creatures do not drink
 coffee”.
 d) Prove the validity of mathematical induction. (05)
2. a) What do you mean by recursion? Formulate a recursive solution to the “Tower of Hanoi” (10)
 problem.
 b) Using mathematical induction, prove that the sum of the first n odd positive integer is n^2 . (10)
 c) Elaborate the rules of inference for propositional logic. (10)
 d) Provide the examples of “Converse” and “Contrapositive” statements. (05)
3. a) Let n and d be positive integers. How many positive integers not excluding n are divisible by (08)
 d ?
 b) If a and b are positive integers, then prove that $\gcd(a, b) \times \text{lcm}(a, b) = a \times b$, where the symbols (09)
 have their usual meaning.
 c) Using Caesar cipher method construct a secret message for “MEET YOU IN THE (10)
 CLASSROOM”.
 d) There is a number which is divided by 3, the remainder is 2; when divided by 5, the (08)
 remainder is 3; and when divided by 7, the remainder is 2. What is the number?
4. a) What is a tree? Prove that a tree with n vertices has $n-1$ edges. (08)
 b) What is a graph? Let $G=(V, E)$ be a graph with directed edges. Then prove that (09)

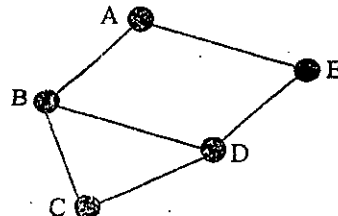
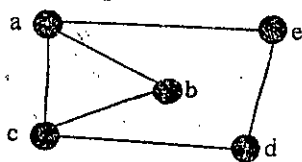
$$\sum_{v \in V} \text{deg}^-(v) = \sum_{v \in V} \text{deg}^+(v) = |E|.$$

 c) List the different methods to represent the graphs. Draw the graphs for the following (10)
 adjacency matrices:

i)
$$\begin{bmatrix} 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 0 \\ 1 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}$$

ii)
$$\begin{bmatrix} 1 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 \\ 1 & 1 & 1 & 0 \end{bmatrix}$$

- d) What are the necessary and sufficient conditions for two graphs to be isomorphic? Are the (08)
 following two graphs isomorphic?



SECTION B

(Answer ANY THREE questions from this section in Script B)

5. a) Justify the statement – “Every function is a relation but not every relation is a function”. (10)
b) Explain graph of function with example. How can it be used to distinguish various types of function? (12)
c) Define equivalence relation. Consider a relation $R = \{(a, b) \in R \times R \mid a - b \text{ is an integer}\}$. Is R an equivalence relation? (13)
6. a) How many relations are there on a set with n elements? (04)
b) Let $A = \{1, 2, 3, 4\}$ and R is a relation on A such that $R = \{(a, b) \mid a \text{ divides } b\}$, show the different representations of R and check whether it is symmetric, anti-symmetric and transitive or not. (14)
c) What is the composite of the relations R and S where R is the relation from $\{1, 2, 3\}$ to $\{1, 2, 3, 4\}$ with $R = \{(1, 1), (1, 4), (2, 3), (3, 1), (3, 4)\}$ and S is the relation from $\{1, 2, 3, 4\}$ to $\{0, 1, 2\}$ with $S = \{(1, 0), (2, 0), (3, 1), (3, 2), (4, 1)\}$? (08)
d) Construct a Hasse Diagram for the poset $(\{1, 2, 3, 4, 6, 8, 12\}, |)$. Is the poset a lattice? (09)
7. a) Answer the following questions concerning the poset $(\{2, 4, 6, 9, 12, 18, 27, 36, 48, 60, 72\}, |)$. (10)
i) Find the maximal elements.
ii) Find the minimal elements.
iii) Find all upper bounds of $\{2, 9\}$.
iv) Find all lower bounds of $\{60, 72\}$.
b) Define sequence. Let the sum of the geometric series a, ar, ar^2, \dots, ar^k is given by (09)
$$S = \sum_{i=0}^k ar^i, \text{ where } a, r \in R. \text{ Reduce the closed form of } S.$$

c) State the following principles with example (06)
i) Pigeonhole principle.
ii) Inclusion-Exclusion Principle.
d) Suppose that the number of bacteria in a colony triples every hour. (10)
i) Set up a recurrence relation for the number of bacteria after n hours have elapsed.
ii) If 100 bacteria are used to begin a new colony, how many bacteria will be in the colony in 10 hours?
8. a) Use generating functions to determine the number of different ways 15 identical stuffed animals can be given to six children so that each child receives at least one but no more than three stuffed animals. (10)
b) Find an explicit formula for the Fibonacci numbers. (10)
c) Define algebraic system. Discuss the properties of operations in an algebraic system. (07)
d) What are the conditions that an algebraic system to be a ring? Give example. (08)

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
 B.Sc. Engineering 1st Year 1st Term Examination, 2017
 Department of Computer Science and Engineering
 EEE 1107
 Basic Electrical Engineering

TIME: 3 hours

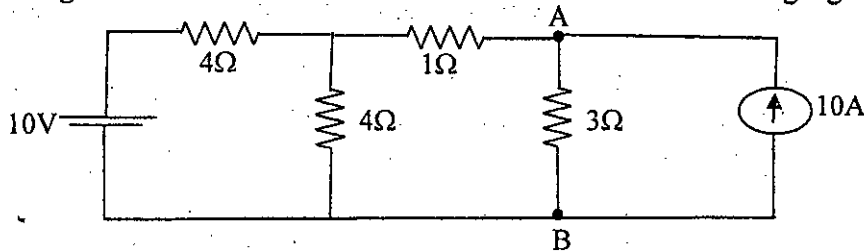
FULL MARKS: 210

- N.B. i) Answer **ANY THREE** questions from each section in separate scripts.
 ii) Figures in the right margin indicate full marks.

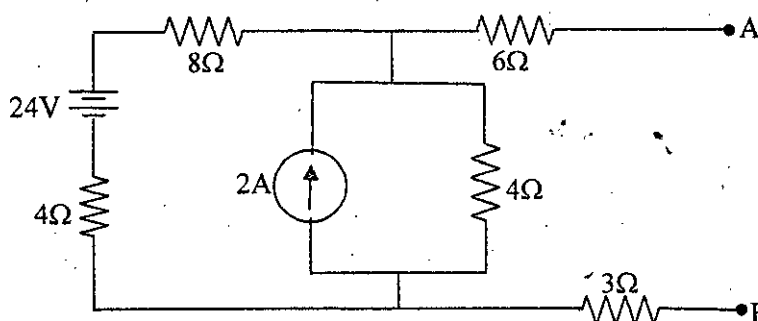
SECTION A

(Answer **ANY THREE** questions from this section in Script A)

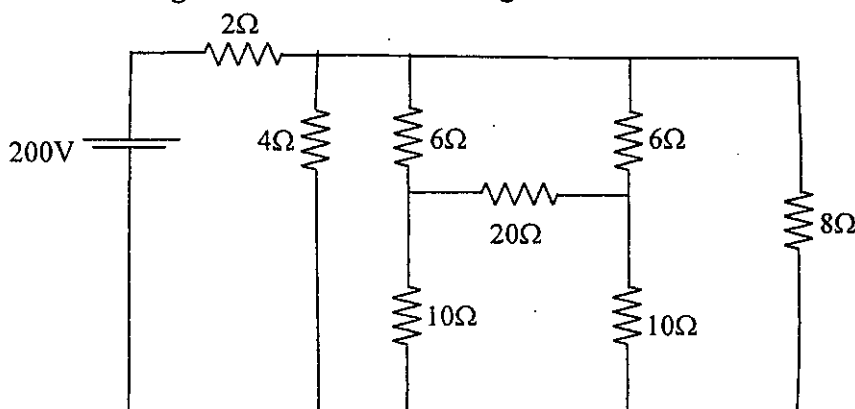
1. a) Write short notes on KVL, KCL and Ohm's law. (06)
 b) State the conditions for applying superposition theorem to a circuit. Use the theorem to find current through 3Ω resistor of the terminal AB shown in the following figure. (12)



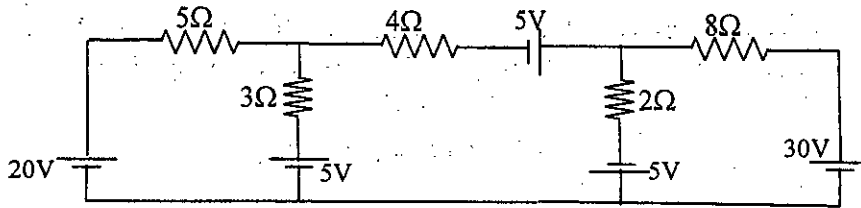
- c) "The power delivered to a load will be maximum when the load resistance is equal to the line resistance"-prove it. Also show that at maximum power the efficiency is 50%. (09)
 d) An electrical heater takes 1 KW from main supply with certain voltage. If the voltage is increased by 20%, the current through the heater is 8 Amp. (i) What is the original voltage? (08)
 (ii) What is the resistance of the coil?
2. a) For transformation from delta network to equivalent wye network, find each of the wye connected resistances in terms of delta resistances. (10)
 b) State Thevenin's theorem and by using the theorem, replace the network shown in the following figure with reference to the terminals AB. (15)



- c) What is electrical source? Classify electrical sources. Define independent and dependent sources. (10)
3. a) Find the current using Norton's theorem through a load of 8Ω in the following circuit. (15)



- b) Determine the current supplied by each battery in the following circuit. (15)



- c) How can a voltage source should be converted into a current source? (05)
4. a) Write down the working principle of a DC generator. (15)
 b) Describe different parts of a DC motor. (15)
 c) Prove that speed of motor depends on applied voltage, flux and armature resistor. (05)

SECTION B

(Answer ANY THREE questions from this section in Script B)

5. a) Define with necessary diagrams (i) Oscillating current (ii) Periodic current (iii) Alternating current (iv) Period and (v) Cycle. (10)
 b) Define impedance. Derive the equation of impedance of R and L branch. Show graphical representation of voltage, current and power variation in that branch. (15)
 c) Find the amount of energy stored by a capacitor during a quarter cycle. (10)
6. a) Show that the crest factor of a sine wave is $\sqrt{2}$ and the form factor of the wave is 1.11. (10)
 b) A voltage $v = 200\sin 377t$ is applied to an inductive branch and the maximum current is 10 A. (i) Find the voltage of L in millihenrys and (ii) If it is known that this inductive coil actually possesses 1.0Ω resistance, what is the true value of L? (12)
 c) What is phasor? Write the significance of operator j . Find all possible roots of the expression. (13)

$$\sqrt[3]{\frac{10\angle 45^\circ 5e^{j60}(-4.047 - j2.94)}{1 - j1.732}}$$

7. a) Write the working principle of a transformer. Mention some applications of it. What are the main components of a transformer? (10)
 b) Explain the transformer on no load and on load. Draw the necessary vector diagrams. (08)
 c) Deduce the expression for induced voltage in a transformer and find out voltage transformation ratio. (07)
 d) Draw the equivalent circuit of a transformer and find out the total impedance between input terminals. (10)
8. a) Describe the working principle of a synchronous motor. Write down the method of starting. (15)
 b) What are the main four parameters of a transformer? How can they be determined? Describe transformer tests briefly. (10)
 c) A single phase transformer has 400 primary and 1000 secondary turns. The net cross-sectioned area of the core is 60 cm^2 . If the primary winding be connected to a 50 Hz supply at 520 V; calculate (i) peak value of the flux density in the core (ii) the voltage induced in secondary winding. (10)

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
B.Sc. Engineering 1st Year 1st Term Examination, 2017
Department of Computer Science and Engineering
HUM 1107
English and Human Communication

TIME: 3 hours

FULL MARKS: 210

- N.B. i) Answer **ANY THREE** questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.

SECTION A

(Answer **ANY THREE** questions from this section in Script A)

1. a) Make appropriate *wh* questions from underlined parts of the following answers: (14)
- i) I get up from my bed early in the morning.
 - ii) I get up from my bed early in the morning.
 - iii) Dhaka is the capital of Bangladesh.
 - iv) He has been suffering for two years long.
 - v) My father can speak both English and Arabic.
 - vi) Being young, the writer was exploited.
 - vii) Industry is the mother of good luck.
- b) Correct the following sentences: (12)
- i) "Gulliver's Travels" are a famous book.
 - ii) Physics are a difficult subject.
 - iii) The committee were annoyed with the students.
 - iv) 100 miles are a fairly long distance.
 - v) Neither the movie nor the books was interesting.
 - vi) Two times two are four.
- c) Change the words as directed and make sentences with changed words: Class(into verb), (09)
Glass(into verb), Grass(into verb), Beauty(into noun), Beauty(into verb), Blood(into verb).
2. a) Frame a new word with each of the prefixes and suffixes and use them in sentences: Be..., (14)
For..., Fore..., Re..., ...age, ...ism, ...ling.
- b) Complete the following sentences with subordinate clauses: (12)
- i) This is... (Noun Clause).
 - ii) I know... (Noun Clause).
 - iii) This is the reason... (Adjective Clause).
 - iv) I know the time... (Adjective Clause).
 - v) ..., I would have helped you. (Adverb Clause of condition).
 - vi) You need not come... (Adverb Clause of reason).
- c) Identify the parts of speech of the underlined words of the following sentences: (09)
- i) One should obey one's parents.
 - ii) Come near.
 - iii) I saw the man near the station.
 - iv) Boys long for holidays.
 - v) There was none but shed tears.
 - vi) You are but a child.
3. a) Make sentences on the following structures using the words given in brackets: (14)
- i) Subj. + intransitive verb + adverb. (Walk as verb).
 - ii) Subj. + linking verb + adj.complement + extension. (Be as verb).
 - iii) Subj. + linking verb + noun complement + extension. (Become as verb).
 - iv) Subj. + transitive verb + gerund as object. (Stop as verb).
 - v) Subj. + transitive verb + infinitive as object. (Want as verb).
 - vi) Subj. + transitive verb + obj. + adj.complement. (Declare as verb).
 - vii) Subj. + transitive verb + obj. + noun complement. (Declare as verb).
- b) Make sentences on the following modals as directed: (12)
- i) Must (To express logical deduction in the present).
 - ii) Must (To express internal obligation).
 - iii) Could (To express inference).
 - iv) Could (To express opportunity in the past which was not executed).
 - v) Be going to (To express strong possibility).
 - vi) Need (To express unnecessary action in the past).

participle

- c) Define ~~participle~~, gerund and infinitive. Give two examples of each of them. (09)
4. a) Transform the following sentences as directed. (14)
- Who taught you grammar? (Passive).
 - It does not matter whether you come or not. (Interrogative).
 - He succeeded although his success was not expected. (Simple).
 - I saw a wounded bird. (Complex).
 - Very few boys are as meritorious as Rahim. (Superlative).
 - I cannot understand as much as you can. (Comparative).
 - If I were young again! (Assertive).
- b) Make sentences expressing the emotions/notions: (i) Approval, (ii) Disapproval, (iii) Congratulation, (iv) Good wish, (v) Seasonal greeting and (vi) Imprecation. (12)
- c) Fill in the gaps with a suitable word. (09)
- The man turned ----- the beggar.
 - Fahim, and not you, ----- won the prize.
 - all his riches, he is unhappy.
 - I bought mangoes some of ----- are rotten.
 - Nothing comes out of -----.
 - What can I do besides ----- him.

SECTION B

(Answer ANY THREE questions from this section in Script B)

5. a) Read the following passage: (20)
- Are you unhappy about the shape of your nose? Or do you feel that your ears are too big or your eyes are too small? You don't need to despair about any of those things. They can all be put right by a surgeon. Surgeons are doctors who make sick people well by operating on them. But some surgeons today are really beauty specialists. Their job is to make ugly or plain people beautiful. This work is called plastic surgery.
- Plastic surgeons are very popular in some countries. They make a lot of money by selling beauty to men and women -- especially women. Plastic surgery is very expensive. A new nose may cost almost as much as a new car. Suppose I can afford to pay so much money and want to change my ugly nose for a more handsome one. I must consult a plastic surgeon. What will he do? First of all, he will ask me to enter a nursing home. I shall have to spend about three weeks there. The surgeon will give me anesthetic. Then he will operate on my nose to give it the shape I want. He will put a plaster case over it to keep it in its new shape. I shall have to spend the next week or two anxiously wondering whether the operation has been successful or not. "Will my nose really look better? Or shall I look uglier than before? Won't there be scars after the operation? What shall I do if my nose is not the shape I wanted?" And so on. And then the great day will come. The surgeon will take off the bandages and the plaster, and I shall my expensive new nose! Will it be worth all the trouble and expense? Sometimes these operations go wrong, and then patient comes away looking worse than before.
- Now answer the following questions:
- What is the job of a plastic surgeon?
 - How much are the possibilities of success in plastic surgery?
 - What do you think is the author's opinion about plastic surgery?
 - What negative aspects of plastic surgery are mentioned in the passage?
 - Would you like to undergo plastic surgery? Give reasons for your answers.
- b) Make a précis of the above passage with a suitable title? (15)
6. a) Write a contrast paragraph on family life and hostel life. (15)
- b) Amplify the idea: "Behave as you like to behave". (20)
7. a) Amplify the idea contained in the statement: "Freedom of speech does not mean license to say whatever you like". (15)
- b) Suppose you have completed your B.Sc. Engineering and want to join some project running in your department. Prepare your CV as a research assistant and apply to the project manager to join the project. (20)
8. a) Write a free composition on anyone of the following: (35)
- Patriotism and ii) Bribery: a Social problem in Bangladesh

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
 B.Sc. Engineering 1st Year 1st Term Examination, 2017
 Department of Computer Science and Engineering
 MATH 1107
 Differential and Integral Calculus

TIME: 3 hours

FULL MARKS: 210

- N.B. i) Answer **ANY THREE** questions from each section in separate scripts.
 ii) Figures in the right margin indicate full marks.

SECTION A

(Answer **ANY THREE** questions from this section in Script A)

1. a) Define limit and continuity of a function. A function $f(x)$ is defined as follows: (15)

$$f(x) = \begin{cases} 3+2x & \text{for } -\frac{3}{2} < x \leq 0 \\ 3-2x & \text{for } 0 < x \leq \frac{3}{2} \end{cases}$$

Discuss the continuity and differentiability of $f(x)$ at any values of x .

- b) Evaluate $\lim_{x \rightarrow \frac{\pi}{2}} \frac{e^{\tan x} - 1}{e^{\tan x} + 1}$. (10)

- c) Find the differential coefficient of $(\tan x)^{\cot x} + (\cot x)^{\tan x} = 0$. (10)

2. a) Find n th derivation of $y = \log(x+a)$. (13)

- b) State Leibnitz's theorem. If $y = (\operatorname{cosec}^{-1} x)^2$ then find y_{n+2} . (12)

- c) Verify Rolle's theorem for $f(x) = (x-2)(x-3)(x-4)$ at $(2, 3)$. (10)

3. a) Define homogeneous function. If $u = \log r$ and $r^2 = x^2 + y^2 + z^2$, then prove that (13)

$$r^2 \left(\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} \right) = 1.$$

- b) Define maxima and minima of a function at a given point. Find the maximum and minimum (12)

values of $u = \frac{4}{x} + \frac{36}{y}$, where $x + y = 2$.

- c) Find the equations of tangent and normal to the curve $y(x-2)(x-3) - x + 7 = 0$ at the (10)
 point where it cuts the x -axis.

4. a) Find the radius of curvature at (x, y) on the curve $ay^2 = x^3$. (10)

- b) Find the asymptotes of $x^4 - x^2 y^2 + x^2 + y^2 - a^2 = 0$. (15)

- c) In the curve $x^p y^q = a^{p+q}$, show that subtangent at any point varies as the abscissa of the (10)
 point.

SECTION B

(Answer **ANY THREE** questions from this section in Script B)

5. Integrate any three of the followings: (35)

i) $\int \frac{x^3 - 3x}{x^2 - 4} dx$

ii) $\int \frac{x^2}{x^4 + x^2 - 2} dx$

iii) $\int \frac{dx}{(1+x)\sqrt{1+x^2}}$

iv) $\int e^{2x} \left(\frac{1 + \sin 2x}{1 + \cos 2x} \right) dx$

6. Evaluate any three of the following definite integrals: (35)

i) $\int_0^a \frac{dx}{a^2 + x^2}$

ii) $\int_0^1 \frac{\log(1+x)}{1+x^2} dx$

iii) $\int_0^\pi \frac{x \sin x}{1 + \cos^2 x} dx$

iv) $\int_0^\infty e^{-ax} \cos bxdx ; a > 0$

7. a) Obtain the reduction formula for $\int \frac{dx}{(x^2 + a^2)^{n/2}}$ and hence find the value of $\int \frac{dx}{(x^2 + a^2)^{7/2}}$. (14)

b) Define Gamma function and Beta function. Prove that $\Gamma(n+1) = n\Gamma(n)$. (11)

c) Evaluate $\lim_{n \rightarrow \infty} \left[\frac{n}{n^2 + 1^2} + \frac{n}{n^2 + 2^2} + \dots + \frac{n}{n^2 + n^2} \right]$. (10)

8. a) i) Find the area under the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, x -axis and the coordinate $x = c$ and $x = d$. (20)

ii) Find the area between its latus-rectum.

b) Find the length of the curve $y^2 = -4x$ from $(0, 0)$ to $(-1, 2)$. (15)

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
 B.Sc. Engineering 1st Year 1st Term Examination, 2017
 Department of Computer Science and Engineering
 PHY 1107
 Physics

TIME: 3 hours

FULL MARKS: 210

- N.B. i) Answer **ANY THREE** questions from each section in separate scripts.
 ii) Figures in the right margin indicate full marks.
 iii) Assume reasonable data if any missing.

SECTION A

(Answer **ANY THREE** questions from this section in Script A)

1. a) Show that the spectral distribution derived by Plank is $n(\nu)d\nu = \frac{8\pi h\nu^3}{c^3} \frac{1}{\exp(h\nu/kt)-1} d\nu$ and (15)

which reduce to the Rayleigh-Jeans law, $n(\nu)d\nu = \frac{8\pi\nu^2 kt}{c^3} d\nu$ in the long wavelength limit.

b) In what sense wave theory is inadequate to explain photoelectric effect? (10)

c) In the spectral distribution of blackbody radiation, the wavelength λ_{\max} at which the intensity reaches its maximum value decreases as the temperature is increased, in inverse proportional to the temperature: $\lambda_{\max} \propto \frac{1}{T}$. That is called the Wein's displacement law. The proportional

constant is experimentally determined to be $\lambda_{\max} T = 2.898 \times 10^{-3} m.k$.

i) At what wavelength does a room temperature ($T = 20^\circ C$) object emit the maximum thermal radiation?

ii) To what temperature must we heat it until its peak thermal radiation is in the red region of the spectrum?

2. a) By deriving the expression for the Compton shift, show that the scattered photon always have (15)
 a larger wavelength than the incident photon.

b) X-rays with a wavelength $0.0045 nm$ are used in a scattering experiment. If the X-rays are (10)
 scattered through an angle of 160° , what is the wavelength of the scattered photon?

c) Discuss vector atom model. Write down the names of all quantum number associated with (10)
 vector atom model.

3. a) Explain physical significance of wave function. Deduce the time-independent Schrödinger (12)
 wave equation.

b) What is understood by stationary state and probability current density? Show that the (13)
 probability density p and probability current density \vec{j} , satisfy the equation of continuity

$$\frac{\partial p}{\partial t} + \nabla \cdot \vec{j} = 0$$

c) A particle of mass " m " in the infinite square well (of width " a ") starts out in the left half of (10)
 the well, and is (at $t=0$) equally likely to be found at any point in the region. What is the
 initial wave function, $\psi(x,0)$?

4. a) Obtain the condition for achromatism of two thin lenses of the same material placed at a (12)
 distance apart.

b) Two monochromatic waves emanating from two coherent sources have the displacements (13)
 represented by

$$y_1 = a \cos \omega t$$

$$y_2 = a \cos(\omega t + \phi)$$

Where ϕ is the phase difference between two waves. Show that the resultant intensity at a
 point due to their superposition is given by $I = 4I_0 \cos^2 \frac{\phi}{2}$, where $I_0 = a^2$. Hence, obtain
 the conditions for constructive interference.

- c) Light of wavelength 6000 \AA falls normally on a thin wedge film of refractive index 1.4, (10) forming fringes that are 2 mm apart. Find the angle of the wedge.

SECTION B

(Answer ANY THREE questions from this section in Script B)

5. a) Discuss seven crystal systems by giving one example of each and describe the various types of Bravais lattices in case of three dimension with the help of neat and clear diagrams. (15)
- b) What is Miller indices? Discuss in brief the procedure for finding Miller indices. (10)
- c) In a unit cell of simple cubic structure, find the angle between the normal to pair of plane whose Miller indices are (i) $[110]$ & $[101]$ and (ii) $[121]$ & $[222]$. (10)
6. a) What is reciprocal lattice? How is reciprocal lattice constructed? List its important properties. (12)
- b) Explain the concept of phonon. Show that the dispersion relation for the lattice waves in a monoatomic linear lattice of mass " m " spacing " a " and the nearest neighbor interaction " f " is $w = \sqrt{\frac{4f}{m}} \left| \sin\left(\frac{ka}{2}\right) \right|$. Where w is the angular frequency and k is the wave vector. (13)
- c) Compare the frequencies of sound waves of wavelength $\lambda = 10^{-7} \text{ cm}$ for (i) homogeneous line, (ii) acoustic waves on a linear lattice containing two identical atoms per primitive cell of inter-atomic spacing 2.46 \AA and (iii) light waves of the same wavelength, given that $v_0 = 10^5 \text{ cm/sec}$. (10)
7. a) What are assumptions of Einstein's theory of specific heat of solid? Derive relation for lattice heat capacity following Einstein model. (15)
- b) Show that the ratio between thermal and electrical conductivity is proportional to absolute temperature. (10)
- c) Show that average kinetic energy of a free electron at 0K is $\frac{3}{5}E_f$, where E_f is Fermi energy (10) and average speed is $\frac{3}{4}V_f$, where V_f is the velocity at Fermi surface.
8. a) Give the brief outlines of the form of input energy of a LASER. Give some characteristics properties of a LASER light. (12)
- b) What is population inversion? How can it be achieved? Explain, with neat diagram, the working of a He-Ne LASER. (13)
- c) The coherence length for the real cadmium line of wavelength $6.55 \times 10^{-7} \text{ m}$ is 30.5 cm . (10) Calculate (i) the number of oscillations corresponding to the coherence length and (ii) the coherence time.