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Roll No. | | | | | | |

Answer Sheet No._____

Sig. of Candidate._____

Sig. of Invigilator._____

BIOLOGY HSSC–II

SECTION – A (Marks 17)

Punjab Text Book Board

Old/Revised Syllabus

Version Number	1	7	0	1

Time allowed: 25 Minutes

NOTE: Section–A is compulsory. All parts of this section are to be answered on the question paper itself. It should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.

Q. 1 Circle the correct option i.e. A / B / C / D. Each part carries one mark.

(i) Synthesis of nitrogenous wastes like NH_3, urea and uric acid is the function of:
A. Kidney B. Liver C. Stomach D. Spleen

(ii) Metanephridia are excretory structure in:
A. Planaria B. Earthworm C. Cockroach D. Man

(iii) The movement in response to touch is called:
A. Phototropism B. Chemotropism C. Thigmotropism D. Geotropism

(iv) Muscle fatigue is caused by:
A. CO_2 B. Accumulation of Lactic acid
C. Ethyl alcohol D. Fumaric acid

(v) Which one of the following is responsible for delay in ageing of fresh leaf crops as well as keeping flowers fresh?
A. Ethene B. Abscisic acid C. Cytokinins D. Auxins

(vi) In humans, how many pairs of cranial nerves are there:
A. 10 B. 12 C. 14 D. 20

(vii) Gastrin is the hormone produced by the:
A. Liver B. Pancreas C. Stomach D. Kidney

(viii) Evolution of pollen tube is an important step in land adaptation by the:
A. Bryophytes B. Thallophytes C. Spermatophytes D. Pteridophytes

(ix) How many nucleotides are present in a codon?
A. One B. Two C. Three D. Four

(x) Who experimentally proved that DNA replicates in a semi-conservative manner?
A. Watson and Crick B. Meselson Stahl
C. Hershey and Martha Chase D. Karl Correns

(xi) Branch of Biology which deals with the study of ageing is called:
A. Parasitology B. Gerontology C. Teratology D. Ecology

(xii) Non-Disjunction takes place during:
A. Mitosis B. Budding C. Meiosis D. Binary fission

(xiii) Certain genes do not settle peacefully on their loci, they keep on hopping on different loci on the same chromosome or other chromosomes and hence are called as:
A. Lost genes B. Fixed genes C. Jumping genes D. Migrated genes

(xiv) Severe Combined Immunodeficiency Syndrome (SCID) is treated by:
A. Radiotherapy B. Chemotherapy C. Physiotherapy D. Gene therapy

(xv) Who presented the book "The Origin of Species"?
A. Wallace B. Mendel C. Darwin D. Lamarck

(xvi) In xerosere succession which is the third stage?
A. Crustose lichen stage B. Moss stage
C. Foliage stage D. Herbaceous stage

(xvii) Grassland present in the temperate climates are also called as:
A. Tundra B. Desert C. Prairies D. Coniferous forest

For Examiner's use only:

Total Marks: 17

Marks Obtained:

BIOLOGY HSSC–II

Punjab Text Book Board
Old / Revised Syllabus

33

Time allowed: 2:35 Hours **Total Marks Sections B and C: 68**

NOTE: **Answer any fourteen parts from Section 'B' and any two questions from Section 'C' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet–B if required. Write your answers neatly and legibly.**

SECTION – B (Marks 42)

Q. 2 **Answer any FOURTEEN parts. The answer to each part should not exceed 3 to 4 lines.** (14 x 3 = 42)

(i) What is Pyrexia?

(ii) What is Sciatica?

(iii) Write a short note on Neurons?

(iv) What do you know about gastrulation?

(v) What was the work of Hans Dietrisch?

(vi) What are the various stages of interphase?

(vii) What is phenylketonuria?

(viii) What do you know about tumors?

(ix) Describe briefly Mongolism?

(x) What do you understand from cystic fibrosis?

(xi) How is sexual dimorphism exhibited in Drosophila?

(xii) What is ecology? Differentiate between Autecology and Synecology.

(xiii) What do you know about the biotic components of an ecosystem?

(xiv) Which idea is known as endosymbiont hypothesis?

(xv) Why the trees are called environmental buffers?

(xvi) What are cerebral hemispheres?

(xvii) Write short note on uremia?

(xviii) What is partial dominance?

(xix) What is the percentage of different types of haemophilia?

SECTION – C (Marks 26)

Note: **Attempt any TWO questions. All questions carry equal marks.** (2 x 13 = 26)

Q. 3 a. Explain Locomotion in Paramecium. (05)

b. What is learning behavior? Describe in detail the various types classified by Thorpe. (08)

Q. 4 a. What are biogeochemical cycles? Describe the nitrogen cycle in detail. (2+7)

b. Classify the chromosomes depending upon the location of centromere. (04)

Q. 5 a. Define Mendel's law of independent assortment. Explain it with an example. (2+6)

b. Describe the factors affecting gene frequency. (05)

Roll No. | | | | | | |

Answer Sheet No._____

Sig. of Candidate._____

Sig. of Invigilator._____

BIOLOGY HSSC–II

SECTION – A (Marks 17)

Punjab Text Book Board

Old/Revised Syllabus

Time allowed: 25 Minutes

Version Number	1	7	0	5

NOTE: **Section–A is compulsory. All parts of this section are to be answered on the question paper itself. It should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.**

Q. 1 **Circle the correct option i.e. A / B / C / D. Each part carries one mark.**

(i) Heat shock proteins are synthesized by the plants of:
A. Temperate region B. Arctic region
C. Antarctic region D. Oceans

(ii) Which one of the following is a uricotelic?
A. Parrot B. Amoeba C. Man D. Paramecium

(iii) The band which can polarize the visible light is called:
A. A-Band B. I-Band C. H-Zone D. M-Line

(iv) Tube feet help in the locomotion of:
A. Amoeba B. Jelly fish C. Birds D. Star fish

(v) Which one of the following can be sprayed on tree crops to regulate fruit drop at the end of the season?
A. Gibberellins B. Cytokinins C. Ethene D. Abscisic acid

(vi) The processes conducting impulses away from cell body are called:
A. Dendrites B. Axons C. Nissl's granules D. Schwann Cell

(vii) High levels of Aluminium may contribute to the onset of the:
A. Parkinson's disease B. Epilepsy
C. Alzheimer's disease D. Typhoid

(viii) Reproductive cycle found in all female mammals except human female is called:
A. Menstrual cycle B. Oestrous cycle
C. Biogeochemical cycle D. Nitrogen cycle

(ix) Hans Spemann and Hilde Mangold carried out research work on:
A. Aging B. Embryonic induction
C. Regeneration D. Cancer

(x) The gene causing the white eye trait in Drosophila resides only on:
A. X-Chromosome B. Y-Chromosome
C. Autosome D. Mesosome

(xi) Okazaki fragments are synthesized on:
A. Leading strand B. Lagging strand
C. Heavy strand D. Light strand

(xii) Mendel devised a cross which is used to test the genotype of an individual showing a dominant phenotype is called a:
A. Single cross B. Double cross C. Test cross D. Back cross

(xiii) Internal programme of events and sequence of morphological changes by which cell commits suicide is collectively called as:
A. Necrosis B. Apoptosis C. Glycolysis D. Pinocytosis

(xiv) Genes can be isolated from the chromosomes by cutting them using special enzymes called:
A. Transcriptase B. Reverse Transcriptase
C. Restriction Endonuclease D. Polymerase

(xv) Organisms that have a foreign gene inserted into them are called:
A. Transformed organisms B. Transduced organisms
C. Transgenic organisms D. Endangered organisms

(xvi) Coniferous forests located at high altitude are called as:
A. Alpine B. Boreal C. Prairies D. Deciduous forests

(xvii) What are called as environmental buffers?
A. Fungi B. Trees C. Rivers D. Mountains

For Examiner's use only:

Total Marks: 17

Marks Obtained:

BIOLOGY HSSC–II

Punjab Text Book Board
Old / Revised Syllabus

Time allowed: 2:35 Hours **Total Marks Sections B and C: 68**

NOTE: **Answer any fourteen parts from Section 'B' and any two questions from Section 'C' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet–B if required. Write your answers neatly and legibly.**

SECTION – B (Marks 42)

Q. 2 **Answer any FOURTEEN parts. The answer to each part should not exceed 3 to 4 lines.** (14 x 3 = 42)

(i) What are the genetic causes for the deformities of skeleton.

(ii) What do you know about "Rigor Mortis"?

(iii) What are effectors?

(iv) What is the function of germinating pollen grain?

(v) What are meristems?

(vi) What is the structure of a typical nucleotide?

(vii) What is metastasis?

(viii) Differentiate between dominance and epistasis.

(ix) What is punnett square?

(x) What is gel electrophoresis?

(xi) What is particle gun?

(xii) What vital roles do soil play?

(xiii) What is important turning point for the evolutionary theory?

(xiv) Who said that plant cells are totipotent? What do you mean by this terminology?

(xv) Define:

a) Clone **b)** Probe **c)** Chimaeric DNA

(xvi) Differentiate between food chain and food web.

(xvii) What are the principle stages of Nitrogen cycle?

(xviii) What is ozone layer?

(xix) What are various parts of limbic system?

SECTION – C (Marks 26)

Note: **Attempt any TWO questions. All questions carry equal marks.** (2 x 13 = 26)

Q. 3 **a.** What is nerve impulse? Describe in detail the process of propagation of nerve impulse. **(2+7)**

b. Describe the repair process of a simple fracture of bone. **(04)**

Q. 4 **a.** Who introduced the one-gene/one-enzyme hypothesis? Describe in detail with the concluding remarks. **(2+7)**

b. What is the role of Cytoplasm in development? Discuss this aspect with reference to a fertilized egg of an ascidian. **(1+3)**

Q. 5 **a.** Define contractility. Describe the Sliding Filament Model in detail. **(1+7)**

b. How is excretion in Cockroach carried out? **(05)**

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Roll No. | | | | | | |

Answer Sheet No._____

Sig. of Candidate._____

Sig. of Invigilator._____

BIOLOGY HSSC–II

SECTION – A (Marks 17)

Time allowed: 25 Minutes (National Book Foundation) Version Number 1 7 0 3

NOTE: **Section–A is compulsory. All parts of this section are to be answered on the question paper itself. It should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.**

Q. 1 Circle the correct option i.e. A / B / C / D. Each part carries one mark.

(i) Which of the following is used as denaturation agent in PCR technique?
A. DNA helicase B. *Taq* polymerase C. Heat D. NaOH

(ii) Which of the following is the precipitate produced by sewage treatment?
A. Sludge B. Detritus C. Humus D. Gyle

(iii) The inspiratory center which involves in the control of breathing is located in:
A. Ventral part of medulla B. Both right and left lungs
C. Dorsal part of medulla D. Lateral part of medulla

(iv) The freshwater animals can actively uptake salts from external dilute medium with the help of special salt cells called:
A. Glomerulus B. Bowman's capsule
C. Rectal glands D. Ionocytes

(v) The cartilage matrix is covered by a dense layer of collagen fibers called:
A. Periosteum B. Perichondrium
C. Chondrocyte D. Osteoblast

(vi) Which of the following is the composition of thick myofilaments?
A. Actin, tropomyosin and troponin B. Tubulin and RNA
C. Actin, myosin and troponin D. Actin, myosin and tropomyosin

(vii) Which of the following is **NOT** the part of forebrain?
A. Cerebral cortex B. Hippocampus
C. Cerebellum D. Amygdalae

(viii) Which of the following is the result of under secretion of adrenal cortical hormones?
A. Addison's disease B. Cushing's disease
C. Cretinism D. Grave's disease

(ix) Some animals like fiddler crab, are busiest during the time of either dawn or dusk or both are called:
A. Diurnal animals B. Dual animals
C. Crepuscular animals D. Nocturnal animals

(x) If after ovulation, the secretion of LH suddenly stops. Which of the following is expected?
A. Fertility is increased B. Pregnancy is established
C. Delayed menstruation D. Early menstruation

(xi) The onset of menstrual cycle for the first time in the life of a female is called:
A. Leutinization B. Menarche
C. Menopause D. Follicle atresia

(xii) If blastocyst is successfully implanted, it begins to secrete a hormone known as:
A. Human chorionic gonadotropin B. Corticosteroid
C. Leutinizing hormone D. Progesteron

(xiii) If two contrasting pairs of traits are tightly linked, what will be the phenotypic ratio in F_2 generation of their dihybrid cross?
A. 1:2:1 B. 1:1:1:1 C. 3:1 D. 9:3:3:1

(xiv) A wheat plant having AAbbCC genotype shows red grain color. Which of the following genotypes also expresses the same phenotype?
A. AaBBCc B. AABBCc C. aaBBcc D. AaBbCc

(xv) Which of the following enzymes can act as polymerase as well as exonuclease?
A. RNA polymerase-I B. DNA polymerase-I
C. RNA polymerase-III D. DNA polymerase-III

(xvi) If the recessive gene frequency in the gene pool of a particular trait is 20%. What will be the genotype frequency of heterozygotes of that trait in the population?
A. 20% B. 80% C. 64% D. 32%

(xvii) On average, about what percent of net energy production at one trophic level is passed on the next level?
A. 50% B. 90% C. 1% D. 10%

For Examiner's use only:

Total Marks:	17
Marks Obtained:	

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BIOLOGY HSSC–II

National Book Foundation

Time allowed: 2:35 Hours **Total Marks Sections B and C: 68**

NOTE: **Answer any fourteen parts from Section 'B' and any two questions from Section 'C' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet–B if required. Write your answers neatly and legibly.**

SECTION – B (Marks 42)

Q. 2 Answer any FOURTEEN parts. The answer to each part should not exceed 3 to 4 lines. (14 x 3 = 42)

(i) Describe the mechanism of Inspiration in human respiratory system.

(ii) How is hypertonic urine formed during the state of dehydration?

(iii) Describe the structure of rib cage.

(iv) Define any three types of synovial joints. Also give at least one example of each.

(v) Give the characteristic of three types of neurons.

(vi) Write the functions of insulin hormone.

(vii) What is the mode of communication among honey bees?

(viii) What is the mechanism of spermatogenesis?

(ix) Write any three causes of male infertility.

(x) Differentiate between Identical twins and fraternal twins.

(xi) a. What did Morgon observe about the phenotypes of offspring in step-3 cross (test cross) during the study of eye color in *Drosophila*?

b. Write the phenotypes of following genotypes of flower color of foxgloves:

1. MM DD WW 2. Mm dd Ww

3. mm Dd ww 4. Mm Dd ww

(xii) A couple, in which both partners have B+ve blood group, they have a daughter of O-ve blood group. What is the probability that their next child will be a son of O-ve blood group?

(xiii) What are the types and functions of DNA polymerases?

(xiv) What is Post transcriptional modification of mRNA?

(xv) Define any three factors that can change allele frequency of a population.

(xvi) What are the types of ecological succession?

(xvii) What are three basic steps of DNA sequencing technique?

(xviii) What are the applications of DNA analysis technique?

(xix) Define Integrated Disease Management (IDM) and give its procedure.

SECTION – C (Marks 26)

Note: Attempt any TWO questions. All questions carry equal marks. (2 x 13 = 26)

Q. 3 a. Describe the mechanism of transport of carbon dioxide in blood as bicarbonate ions. **(05)**

b. Describe the mechanism of generation and transmission of nerve impulse. **(08)**

Q. 4 a. Describe the stages of labour process during child birth. **(04)**

b. What is Erythroblastosis Foetalis? Discuss its causes and risk factors. **(03)**

c. Describe procedure, observations and conclusion of Meselson-Stahl experiment. **(06)**

Q. 5 a. Describe the causes and effects of acid rain. **(04)**

b. Describe the technique of Polymerase Chain Reaction (PCR). **(09)**

Roll No. | | | | | | |

Answer Sheet No._____

Sig. of Candidate._____

Sig. of Invigilator._____

CHEMISTRY HSSC–II

SECTION – A (Marks 17)

Time allowed: 25 Minutes **(Revised Syllabus)** **Version Number** 1 7 0 3

NOTE: **Section–A is compulsory. All parts of this section are to be answered on the question paper itself. It should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.**

Q. 1 Circle the correct option i.e. A / B / C / D. Each part carries one mark.

(i) Which of the following is not present in acid rain?
A. CH_3COOH B. HNO_3 C. H_2CO_3 D. H_2SO_4

(ii) Which region of electromagnetic spectrum is involved in NMR spectroscopy?
A. Radio waves B. Ultraviolet C. Visible D. Microwaves

(iii) Which of the following compounds gives an acidic solution with water?
A. $BaCl_2$ B. $SiCl_4$ C. $NaCl$ D. KCl

(iv) When a Complex reflects back whole of white light, its colour will be:
A. Green B. Red C. White D. Black

(v) Which of the following oxide is used as a Catalyst in Contact process?
A. V_2O_5 B. P_2O_5 C. Fe_2O_3 D. Mn_2O_3

(vi) Full name of Bucky Balls is:
A. Buckminister Carbenes B. Buckminister Abbey
C. Buckministerenes D. Buckminister Fullerenes

(vii) Which of the following alcohols will be most easily dehydrated to give an alkene?
A. 3 –propanol B. 2 –methyl–2 –propanol
C. 1 –propanol D. 2 –propanol

(viii) Benzoic acid is obtained by the oxidation of:
A. p–Xylene B. m–Xylene C. Benzene D. Toluene

(ix) Which of the following alkyl halides cannot be formed by direct reaction of alkanes with halogen?
A. RI B. RF C. RBr D. RCl

(x) When phenol reacts with CH_3COCl the product formed is:
A. Ethanol B. Ethanal C. Ether D. Ester

(xi) Which of the following can undergo Aldol condensation reaction?
A. Benzaldehyde B. Trimethylacetaldehyde
C. Formaldehyde D. Acetaldehyde

(xii) IUPAC name of Valeric acid is:
A. Propanoic acid B. Ethanoic acid C. Pentanoic acid D. Butanoic acid

(xiii) Hydrolysis of nitriles produces:
A. TNT B. Carboxylic acids C. Nitrates D. Nitroalkanes

(xiv) Most abundant macro molecules on earth are:
A. Carbohydrates B. Olive oils C. Lipids D. Vitamins

(xv) Which of the following is a trace mineral in human diet?
A. Potassium B. Calcium C. Zinc D. Sodium

(xvi) Petrochemicals are classified into how many classes?
A. Three B. Four C. One D. Two

(xvii) Ozone layer is present at a height of about:
A. 80 km above the earth B. 100 km above the earth
C. 5 km above the earth D. 28 km above the earth

For Examiner's use only:

Total Marks: 17

Marks Obtained:

CHEMISTRY HSSC–II

(Revised Syllabus)

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Time allowed: 2:35 Hours **Total Marks Sections B and C: 68**

NOTE: **Sections B and C comprise pages 1 – 2. Answer any fourteen parts from Section 'B' and any two questions from Section 'C' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet–B if required. Write your answers neatly and legibly.**

SECTION – B (Marks 42)

Q. 2 **Answer any FOURTEEN parts. The answer to each part should not exceed 5 to 6 lines.** (14 x 3 = 42)

(i) Na, Si and Cl are present in the same period of the periodic table but they have different melting points. Why? (3)

(ii) Salts of Be^{2+} can have four water molecules as water of crystallization. Explain how Be^{2+} is associated with four water molecules. (3)

(iii) What is Ligand? Give an example of a tridentate and a hexadentate ligand? (1+1+1)

(iv) How are chromate and dichromate ions interconverted to one another? Write balanced equation to show this interconversion and mention the colour change during this interconversion. (1+1+1)

(v) State and explain the Morkownikov's rule. (3)

(vi) What are optical isomers? Draw enantiomers of lactic acid. (1+2)

(vii) Write the reaction equations for the preparation of following compounds using Methyl magnesium bromide. (1.5+1.5)

(a) Ter–butyl alcohol
(b) Acetic acid

(viii) Explain the acidic oxidation of Cumene. (3)

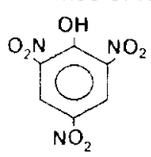
(ix) Write the equations of reaction of 2,4 – $DNPH$ with following compounds: (1.5+1.5)

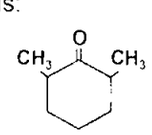
(a) Acetaldehyde

(b) Acetone

(x) What is Fischer esterification? Give an example. Write the name of an ester used as orange flavour

(xi) Write the names of following compounds: (1+1+1)

(a) 

(b) 

c) $(CH_3)_2C = C(CH_3)_2$

(xii) How open chain structure of glucose is converted to its cyclic forms? (3)

(xiii) Define the following: (1+1+1)

(a) Inhibitors
(b) Lipids
(c) Saponification

(xiv) Which functional groups are used as chromophore and auxochromes in azo dyes? Give name of two azo dyes. (2+1)

(xv) Give the composition of following cosmetics: (2+1)

(a) Nail polish
(b) Nail polish remover

(xvi) Write the sources and environmental effects of following pollutants: (1+1+1)

(a) Ozone
(b) PAN
(c) Oxides of Sulphur

(xvii) What is the role of leather tanneries in water pollution? What health problem can be caused by this pollutant? How can we control this pollutant? (1+1+1)

(xviii) What is combustion analysis? Give its drawback. (2+1)

(xix) What is mass spectrometer? How various ions are produced in a mass spectrometer? (1+2)

SECTION – C (Marks 26)

Note: **Attempt any TWO questions. All questions carry equal marks.** **(2 x 13 = 26)**

Q. 3 **a.** Discuss the effect of heat on Carbonates and Nitrates of alkaline earth metals. **(2+2)**

b. What are coordination compounds? Give an example of a positively charged complex, a negatively charged complex and a neutral complex along with their IUPAC name. **(0.5+4.5)**

c. How would you prepare Lassaigne's solution? For what purpose is it used? **(3+1)**

Q. 4 **a.** Discuss the mechanism of Sulphonation of benzene. **(4)**

b. What is Cannizoro's reaction? Explain the mechanism of this reaction using a suitable example. **(1+4)**

c. Starting from acetylene how would you prepare the following compounds? **(2+2)**

(i) Acetaldehyde

(ii) 1, 1, 2, 2 –tetrabromo ethane

Q. 5 **a.** How does an enzyme work? Using labelled diagrams explain two mechanisms of enzyme action. **(2+4)**

b. What is a condensation polymer? Explain the formation of Nylon–6, 6 using chemical equation. **(1+3)**

c. What is industrial smog? Write the conditions for development of photochemical smog. **(1+2)**

Roll No. | | | | | | |

Answer Sheet No._____

Sig. of Candidate._____

Sig. of Invigilator._____

CHEMISTRY HSSC–II

SECTION – A (Marks 17)

Time allowed: 25 Minutes (Revised Syllabus) Version Number 1 7 0 7

NOTE: Section–A is compulsory. All parts of this section are to be answered on the question paper itself. It should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.

Q. 1 Circle the correct option i.e. A / B / C / D. Each part carries one mark.

(i) Which of the following alkyne would not produce a Ketone on hydration?
A. 2-Butyne B. Ethyne C. Propyne D. 1-Butyne

(ii) For which mechanisms the first step involved is the same?
A. E_1 and SN_2 B. E_1 and SN_1 C. E_1 and E_2 D. E_2 and SN_2

(iii) Green is the characteristic flame colour of:
A. Strontium B. Sodium C. Calcium D. Barium

(iv) Magnetic moment (μ) of an atom or ion is the measure of its number of unpaired:
A. Neutrons B. Nucleons C. Electrons D. Protons

(v) When $AgNo_3$ is added to the Lassaign's Solution, which colour is formed for Chlorine?
A. White B. Black C. Yellow D. Blue

(vi) In which of the following compounds benzene rings are isolated?
A. Phenanthrene B. Diphenylethane C. Naphthalene D. Anthracene

(vii) It is possible to distinguish between optical isomers by using:
A. IR spectroscopy B. Polarimetry
C. Chemical tests D. Mass spectrometry

(viii) Reaction of alkylhalides with Na metal yields:
A. Alkenes B. Phenols C. Alkanes D. Alcohols

(ix) Which one of the following compounds does not contain carboxylic group?
A. Benzoic acid B. Picric acid C. Acetic acid D. Formic acid

(x) Which one of the following reagents will react with both aldehydes and Ketones?
A. Fehling's reagent B. Benedict's reagent
C. Grignard's reagent D. Tollen's reagent

(xi) The reaction of Carboxylic acid with an alcohol is called:
A. Ammonolysis B. Esterification C. Saponification D. Hydrolysis

(xii) Prosthetic groups are:
A. Proteins B. Tightly bound to enzymes
C. Required by all enzymes D. Loosely attached with enzymes

(xiii) All lipids are:
A. Heterocyclic B. Hydrophilic C. Homocyclic D. Hydrophobic

(xiv) Polymers which are prepared from more than one kind of monomers are called:
A. Addition polymers B. Linear Polymers
C. Homopolymers D. Copolymers

(xv) In leather industry which one of the following is used:
A. Aluminium B. Chromium(III) C. Chromium(VI) D. Nickel

(xvi) Which of the following radiations can vibrate the bonds?
A. Microwaves B. Radio waves C. Ultraviolet D. Infrared

(xvii) Which of the following is a bidentate ligand?
A. Oxalato B. Ammine C. Fluoro D. Cyano

For Examiner's use only:

Total Marks: 17

Marks Obtained:

CHEMISTRY HSSC–II

(Revised Syllabus)

29

Time allowed: 2:35 Hours **Total Marks Sections B and C: 68**

NOTE: Sections B and C comprise pages 1 – 2. Answer any fourteen parts from Section 'B' and any two questions from Section 'C' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet–B if required. Write your answers neatly and legibly.

SECTION – B (Marks 42)

Q. 2 Answer any FOURTEEN parts. The answer to each part should not exceed 5 to 6 lines. (14 x 3 = 42)

(i) Both Carbon and Silicon belong to the same group but the physical properties of their oxides are very different. Why? (3)

(ii) Write the equations for the reaction of PCl_5 with hot and cold water. (3)

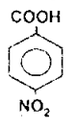
(iii) Write the names of following compounds: (3)

(a) $K_2[PtCl_6]$
(b) $[Co(NH_3)_6]Cl_3$
(c) $[Pt\ Cl\ (NO_2)(NH_3)_4]SO_4$

(iv) What are three possibilities when white light falls on a complex compound? (3)

(v) How would you perform the test for detection of 'N' in an organic compound by using its Lassaigne's filtrate? What colour is observed if Nitrogen is present? Also write the formula of this coloured compound formed in this test. (1+1+1)

(vi) Write IUPAC names of following compounds: (3)

(a) 

(b)

(c) $CH_2 = CH - CH_2 - C \equiv CH$

(vii) Define the following: (3)

(a) Enantiomers
(b) Resonance
(c) Functional group

(viii) How would you prepare a primary and a secondary alcohol from Grignard's reagents? (1.5+1.5)

(ix) Give mechanism of the elimination reaction of ter-butyl bromide in the presence of a strong base. (3)

(x) Why phenols are more acidic than alcohols? How can you increase or decrease the acidity of phenols? (2+1)

(xi) Write the mechanism of condensation of ethyl alcohol molecules to form diethyl ether. (3)

(xii) Draw the structure of following compounds: (3)

(a) 3 --Methyl cyclohexanone
(b) ∝ -- Methyl propionaldehyde
(c) Acetophenone

(xiii) Write a general method of preparation for each of the following compounds: (1.5+1.5)

(a) Acyl chloride
(b) Acid anhydride

(xiv) What are polysaccharides? Draw the structure of a Polysaccharide. (1.5+1.5)

(xv) What is saponification? Write a chemical equation to explain it. (1+2)

(xvi) Differentiate between: (1.5+1.5)

(a) Addition polymer and condensation polymer
(b) Thermoplastic polymer and thermosetting polymer

(xvii) Give any six chemical pollutants present in the photochemical smog. (3)

(xviii) Draw a labelled diagram to show the apparatus used in combustion analysis. (3)

(xix) What will be the effect of following radiations on an organic molecule? (3)

(a) Ultraviolet radiations
(b) Infrared radiations
(c) Microwaves

SECTION – C (Marks 26)

Note: **Attempt any TWO questions. All questions carry equal marks.** **(2 x 13 = 26)**

Q. 3 **a.** Give reactions of period 3 elements (from Na to Ar) with water. **(5)**

b. What is meant by the coordination number of a central metal atom or ion? Describe the geometries (shapes) of the complexes with the coordination numbers 2, 4 and 6. **(1+4)**

c. Explain the followings: **(1.5+1.5)**

(i) Destructive distillation of coal

(ii) Homologous series

Q. 4 **a.** Describe the following reactions with mechanisms: **(4+4)**

(i) Aldol condensation

(ii) Friedel-Crafts Acylation

b. How will you distinguish between 1-Propanol and 2-Propanol? **(2)**

c. Explain with a suitable example that ozonolysis is helpful to locate the position of double bond in an alkene. **(3)**

Q. 5 **a.** Explain the structures of proteins. **(4)**

b. Discuss the sources of raw materials used in chemical industries. **(4)**

c. Explain Green House Effect and discuss its role in Global Warming and give one suggestion to control it. **(3+1+1)**

Roll No. Answer Sheet No.____________

Sig. of Candidate.____________ Sig. of Invigilator.____________

CHEMISTRY HSSC–II

SECTION – A (Marks 17)

Time allowed: 25 Minutes ***(Old Syllabus)***

NOTE: Section–A is compulsory. All parts of this section are to be answered on the question paper itself. It should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.

Q. 1 Circle the correct option i.e. A / B / C / D. Each part carries one mark.

(i) Which one is the correct order of Hydration Energy of Na^+, Mg^{++}, Al^{+++} ions?
A. $Na^+ > Al^{+++} > Mg^{++}$ B. $Al^{+++} < Mg^{++} < Na^+$
C. $Na^+ < Mg^{++} > Al^{+++}$ D. $Al^{+++} > Mg^{++} > Na^+$

(ii) The name of mineral $CaSO_4 \cdot 2H_2O$ is:
A. Gypsum B. Dolomite C. Calcite D. Natron

(iii) Aluminium does not react with nitric acid at any concentration because of the formation of a layer of:
A. Aluminium Nitrate B. Aluminium Nitrite
C. Aluminium Hydroxide D. Aluminium Oxide

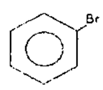
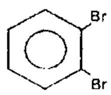
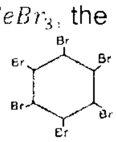
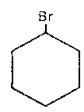
(iv) Laughing gas is chemically:
A. N_2O B. NO C. NO_2 D. N_2O_5

(v) Many fluoro compounds like CF_4 and SiF_6 show inertness due to:
A. Small size of Fluorine
B. High ionization energy of Fluorine
C. Restriction of valence shell of Fluorine to octet
D. High electronegativity of Fluorine

(vi) Which of the following is a non-typical transition element?
A. Cr B. Zn C. Mn D. Fe

(vii) The type of hybridization of carbon in Ethylene molecule is:
A. Sp B. Sp^2 C. Sp^3 D. dsp^2

(viii) β,β' –Dichloroethyl Sulphide is commonly known as:
A. Bio-gas B. Laughing gas C. Mustard gas D. Phosgene gas

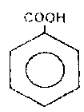
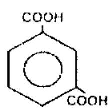
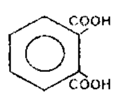
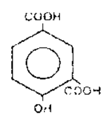
(ix) When benzene reacts with Bromine in the presence of $FeBr_3$, the product obtained is:
A. 
B. 
C. 
D. 

(x) The electrophile in aromatic Sulphonation is:
A. H_2SO_3 B. H_2SO_4 C. SO_3^- D. SO_3

(xi) When Ethyl magnesium bromide is reacted with acetone, followed by acid hydrolysis, the product obtained is:
A. 3–Methyl–3–butanol B. 2–Methyl–3–butanol
C. 2–Methyl–2–butanol D. A secondary alcohol

(xii) Rectified Spirit is converted into absolute alcohol by:
A. Passing through charcoal B. Denaturing with methanol
C. Destructive distillation D. Re-distillation in presence of CaO

(xiii) Iodoform test is used to distinguish:
A. Ethanol from Acetaldehyde B. 3–Hexanone from 3–pentanone
C. Ethanol from Methanol D. Acetone from Acetaldehyde

(xiv) Which of the following is the structure of Benzoic acid?
A. 
B. 
C. 
D. 

(xv) When an alkyl nitrile is hydrolyzed in the presence of an acid or a base, the product obtained is:
A. An Aldehyde B. An Alcohol C. A Ketone D. A Carboxylic acid

(xvi) Which of the following enzymes brings about the hydrolysis of fats?
A. Urease B. Maltase C. Lipase D. Invertase

(xvii) Which of the three elements are needed for healthy growth of plants?
A. N, S, P B. N, Ca, P C. N, S, K D. N, P, K

For Examiner's use only:

Total Marks: 17

Marks Obtained:

CHEMISTRY HSSC–II

(Old Syllabus)

Time allowed: 2:35 Hours **Total Marks Sections B and C: 68**

NOTE: **Sections B and C comprise pages 1 – 2. Answer any fourteen parts from Section 'B' and any two questions from Section 'C' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet–B if required. Write your answers neatly and legibly.**

SECTION – B (Marks 42)

Q. 2 Answer any FOURTEEN parts. The answer to each part should not exceed 5 to 6 lines. (14 x 3 = 42)

(i) (a) Why the second electron affinity of Group-VI A elements is expressed in positive figures? **(1.5)**

(b) Write any three properties of Hydrogen that are similar with Alkali Metals. **(1.5)**

(ii) (a) Why Lithium shows different behaviour in Group IA? Give reason. **(01)**

(b) What happens when:

i) Lithium nitrate is decomposed. **(01)**

ii) Sodium nitrate is decomposed. **(01)**

(iii) (a) Write the composition of Borax. **(01)**

(b) What is Borax Bead Test? Explain its Chemistry **(02)**

(iv) (a) What is Aqua Regia? How does it act on Gold? **(02)**

(b) How does phosphorus trichloride react with methanol? Write chemical equation. **(01)**

(v) (a) Why Hydrogen fluoride is a colourless liquid while Hydrogen Chloride is a colourless gas at room temperature? **(01)**

(b) How does Chlorine react with Cold and Hot Sodium Hydroxide? **(02)**

(vi) Why most of the compounds of Transitron metals are coloured? Explain and write an example. **(03)**

(vii) Name the following complex compounds: **(03)**

(a) $[Ni(CO)_4]$ (b) $K_4[Fe(CN)_6]$ (c) $K_2[PtCl_6]$

(viii) (a) Coal is a source of a large number of organic compounds and is called Solid Fuel. How are these compounds extracted from coal? **(1.5)**

(b) How is steam cracking carried out? **(1.5)**

(ix) Kolbe's Electrolytic Method is used to prepare Ethane from Potassium Acetate. Write its detailed mechanism. **(03)**

(x) How will you synthesize the following compounds starting from Acetylene? **(03)**

(a) Acetaldehyde (b) Benzene (c) Chloroprene

(xi) Nitration is a substitution reaction in which NO_2group is introduced into benzene ring. Write its detailed mechanism. **(03)**

(xii) How does Ethyl magnesium bromide react with the following compounds? **(03)**

(a) Water (b) Carbon dioxide (c) Acetaldehyde

(xiii) (a) Ethanol is obtained from Molasses by Fermentation process. Write detailed reactions. **(02)**

(b) How is ethanol denatured? **(01)**

(xiv) (a) Explain the acidic behaviour of phenol. **(02)**

(b) How is picric acid prepared from phenol? **(01)**

(xv) (a) Define condensation reaction. **(01)**

(b) Differentiate Aldol condensation and Cannizzaro's reaction giving an example of each. **(02)**

(xvi) (a) Draw the general structure of an Amino acid. **(01)**

(b) How are α –amino acids prepared by Strecker synthesis? **(02)**

(xvii) (a) Differentiate Monosaccharides and Oligosaccharides. Write one example from each class. **(02)**

(b) What is denaturing of proteins? **(01)**

(xviii) (a) Write about the reactions taking place in first 24 hours after mixing cement in water. **(02)**

(b) Why is Gypsum added to Clinkers? **(01)**

(xix) (a) What is Reducing and Oxidizing Smog? **(01)**

(b) What are the necessary conditions for smog formation? **(02)**

SECTION – C (Marks 26)

Note: Attempt any TWO questions. All questions carry equal marks. **(2 x 13 = 26)**

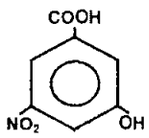
Q. 3 **a.** Sodium metal is prepared on commercial scale by Down's cell. Describe the construction and working of Down's cell with the help of a suitable diagram. **(06)**

b. Carbon dioxide is a gas while Silicon dioxide is a solid at room temperature. Give reason. **(03)**

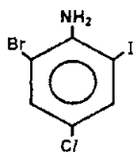
c. How is nitric acid prepared by Birkland and Eyde's process? **(04)**

Q. 4 **a.** How can you differentiate between Primary, Secondary and Tertiary alcohols? **(04)**

b. Write IUPAC name of the followings: **(03)**

i) 

ii) $(C_6H_5)_3CH$

iii) 

c. Compare SN^1 and SN^2 reactions. **(06)**

Q. 5 **a.** Write chemical equation for the followings: **(03)**

i) Hydrolysis of Lipids ii) Saponification of Lipids iii) Hardening of oil

b. Describe the manufacturing process of Urea with the help of flow sheet diagram. **(05)**

c. Write note on:

i) Acid Rain and its effects on environment. **(2.5)**

ii) Destruction of Ozone by CFCs. **(2.5)**

42

Roll No. | | | | | | |

Answer Sheet No._____

Sig. of Candidate._____

Sig. of Invigilator._____

COMPUTER SCIENCE HSSC–II

SECTION – A (Marks 15)

Time allowed: 20 Minutes

NOTE: **Section–A is compulsory. All parts of this section are to be answered on the question paper itself. It should be completed in the first 20 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.**

Q. 1 Circle the correct option i.e. A / B / C / D. Each part carries one mark.

(i) A well-defined set of instructions given to the computer is called:

A. Hardware B. Software C. Data D. Information

(ii) The process of converting source code into object code is known as:

A. Compilation B. Debugging C. Linking D Information

(iii) $a+= b$ is equivalent to:

A. $b+= a$ B. $a = +b$ C. $a = a + b$ D. $b = b + a$

(iv) How many bytes of memory is used by 'char' data type in C?

A. 1 B. 2 C. 3 D. 4

(v) Which of the following format specifier is used for integer data type?

A. $\%f$ B. $\%i$ C. $\%c$ D. $\%d$

(vi) Which of the following is used as 'not equal to' operator in C language relational expressions?

A. |= B. <> C. != D. ><

(vii) In C-language the information about input and output functions is stored in _____ header file.

A. math.h B. stdio.h C. string.h D. conio.h

(viii) If $a = 15$ and $b = 10$, what will be the output of the following expression?

$a > b? a - b: a + b;$

A. 15 B. 25 C. 5 D. 150

(ix) What is a loop within another loop called?

A. Inner loop B. counter loop C. Sub Loop D. Nested Loop

(x) Function declaration (prototype) does **NOT** contain:

A. Function name B. Function return type
C. Parameters D. Function body

(xi) In C which mode opens the existing file for both reading and writing?

A. "w" B. "rw" C. "r+" D. "a+"

(xii) "In file processing system, the same data may be duplicated in several files". What is this drawback called?

A. data redundancy B. data inconsistency
C. data dependency D. data integrity

(xiii) A person, place, thing or event about which data is kept in the database is called:

A. an attribute B. a field C. an entity D. a record

(xiv) "A record from a table cannot be deleted if its associated record exists in related table". What is this database rule called?

A. Relationship B. Referential integrity
C. Normalization D. Schema

(xv) _____ is used to retrieve data from a database and present it to the user in formatted way

A. Report B. Table C. Query D. Form

For Examiner's use only:

Total Marks: 15

Marks Obtained:

COMPUTER SCIENCE HSSC–II

43

Time allowed: 2:40 Hours **Total Marks Sections B and C: 60**

NOTE: Answer any thirteen parts from Section 'B' and any three questions from Section 'C' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet–B if required. Write your answers neatly and legibly.

SECTION – B (Marks 39)

Q. 2 Answer any THIRTEEN parts. The answer to each part should not exceed 5 to 6 lines. (13 x 3 = 39)

(i) What are high level languages? How these languages are different from assembly language? (2+1)

(ii) What is Integrated Development Environment (IDE)? Differentiate between source program and object program. (2+1)

(iii) How variables are declared in C? Give two examples. (2+1)

(iv) Give purpose of the following escape sequences with one example each. (3)

a. \n b. \t c. \r (3)

(v) What are relational operators? Give examples. (2+1)

(vi) State three differences between syntax errors and logical errors. (3)

(vii) Give syntax of the for() loop and describe how it works? (3)

(viii) Give output of the following program code: (3)

```
void main(void)
{
    int a,b;
    for(a=2 ; a<=4 ; a++)
        for(b=a ; b<=3 ; b++)
        printf("\n %d",a*b);      }
```

(ix) Write a program code in C that reads a number (n) and prints its multiplicative table up to 20. (3)

(x) Write a program code in C that reads temperature (t) and prints a message as given below: (3)

Temperature	**Message**
t > 35	It is hot.
t >=20 and t<=35	It is nice day.
t < 20	It is cold.

(xi) Why loops are important in programming languages? Give three reasons. (3)

(xii) What is function header? Give its general form and one example. (1+1+1)

(xiii) Write a C program statement to open a file "test.txt" in writing mode. (3)

(xiv) What is one-to-many relationship between two entities? Give one example. (2+1)

(xv) What is DBMS? Give any two advantages of it. (2+1)

(xvi) Why primary key is important in database file? (3)

(xvii) Give any three advantages of using Forms in Access. (3)

SECTION – C (Marks 21)

Note: Attempt any THREE questions. All questions carry equal marks. (3 x 7 = 21)

Q. 3 a. What is an expression? Explain any three types of expressions and their operators with examples. (1+3)

b. Write a program code in C to find the sum of odd numbers from 1 to 100. (03)

Q. 4 What is decision control structure? Explain different types of decision control statements used in C language (with purpose of use and syntax). (07)

Q. 5 a. Explain the process of compiling, linking and executing a C program. (03)

b. Write a program code in C to read three numbers using scanf() function and find the largest number. (04)

Q. 6 a. Give any four drawbacks of traditional file approach system. (02)

b. What is entity relationship diagram (ERD)? Define the terms Entity, Attribute and Relationship with one example each. (2+3)

Roll No. | | | | | | | Answer Sheet No._____

Sig. of Candidate._____ Sig. of Invigilator._____

MATHEMATICS HSSC–II

SECTION – A (Marks 20)

Time allowed: 25 Minutes Version Number | 1 | 7 | 0 | 2 |

NOTE: Section–A is compulsory. All parts of this section are to be answered on the question paper itself. It should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.

Q. 1 Circle the correct option i.e. A / B / C / D. Each part carries one mark.

(i) Which of the following is a unit vector in the direction of $[2,6]$?
A. $[\frac{1}{\sqrt{10}}, -\frac{3}{\sqrt{10}}]$ B. $[\frac{-2}{\sqrt{40}}, \frac{6}{\sqrt{40}}]$ C. $[\frac{1}{\sqrt{10}}, \frac{3}{\sqrt{10}}]$ D. $[\frac{1}{\sqrt{40}}, \frac{3}{\sqrt{40}}]$

(ii) What is the value of $f^{-1}(6)$ if $f(x) = 5x + 1$?
A. 31 B. -1 C. 1 D. $\frac{7}{5}$

(iii) What is the value of $g(x)$ if $f(x) = \frac{2x}{3x+4}$ and $f[g(x)] = x$?
A. $\frac{2+3x}{4x}$ B. $\frac{4x}{2+3x}$ C. $\frac{4x}{2-3x}$ D. $\frac{2-3x}{4}$

(iv) If $f(x) = a + x$ then which of the following options is correct?
A. $f'(0) \cdot f'(1) = 0$ B. $f'(0) < f'(1)$ C. $f'(0) > f'(1)$ D. $f'(0) = f'(1)$

(v) Which of the following defines a function "f" for $f(-x) = -f(x)$?
A. $f(x) = \log x$ B. $f(x) = x^2$ C. $f(x) = \sin x$ D. $f(x) = \cos x$

(vi) If $f(x) = (x-1)^2 \sin x$ then which of the following options is correct for $f'(0)$?
A. 1 B. -2 C. -1 D. 0

(vii) Which of the following represents $\frac{dy}{dx}$ if $\sin x = e^y$?
A. $-\cot x$ B. $\tan x$ C. $-\tan x$ D. $\cot x$

(viii) What evaluates $\int_2^\infty \frac{dx}{x^2}$?
A. 0 B. $-\frac{1}{2}$ C. $\frac{1}{2}$ D. $\frac{1}{24}$

(ix) For what value of k, $\int_{-3}^{3}(x^5 + k)dx = 30$?
A. -5 B. $-35\frac{1}{2}$ C. 0 D. 5

(x) If $\int_{-2}^{1} f(x)\,dx = 5$ and $\int_1^3 f(x)\,dx = 3$ then what results $\int_{-2}^{3} f(x)dx$?
A. 4 B. 2 C. 8 D. 0

(xi) What is the area under the curve $y = \cos x$ from $x = 0$ to $x = \frac{\pi}{2}$?
A. 2 B. π C. 0 D. 1

(xii) What is the perpendicular distance of the line $4x - 3y - 25 = 0$ from origin?
A. 1 B. 0 C. $\frac{25}{7}$ D. 5

(xiii) Which of the following is an equation of a line passing through $(1,0)$ and $(0,1)$?
A. $x - y = -1$ B. $x - y = 1$ C. $x + y = 1$ D. $x + y = -1$

(xiv) For what value of k, lines $4x - y + k = 0$ and $6kx - 3y + 1 = 0$ are parallel?
A. 2 B. 0 C. 1 D. -2

(xv) Which of the following ordered pairs does not satisfy $4x - 3y < 2$?
A. $(3,0)$ B. $(1,1)$ C. $(-2,1)$ D. $(0,0)$

(xvi) What is the length of the Latus Rectum of the parabola $(y-2)^2 = -4(x-7)$?
A. 8 B. $\frac{1}{4}$ C. 4 D. 16

(xvii) Which of the ordered pairs describes x-intercept of the conic $y^2 + 8x - 6y + 24 = 0$?
A. $(0,\ 3+\sqrt{15})$ B. $(3,\ 0)$ C. $(0,\ 3)$ D. $(-3,\ 0)$

(xviii) Which of the following is an axis of the parabola $(y+3)^2 = 12\left(x + \frac{1}{2}\right)$?
A. $y = -3$ B. $x = -\frac{1}{2}$ C. $x = \frac{1}{2}$ D. $y = 3$

(xix) For what value of α, vectors $5\underline{i} - \underline{j} + \underline{k}$ and $\alpha\underline{i} + 3\underline{j} - 3\underline{k}$ are parallel to each other?
A. -3 B. -15 C. 15 D. 3

(xx) What equals $\underline{a} \cdot \underline{b} \times \underline{c}$ if $\underline{a} = \underline{i} + 2\underline{j} + 3\underline{k}$, $\underline{b} = 2\underline{i} + 4\underline{j} + 6\underline{k}$ and $\underline{c} = 3\underline{i} - \underline{j} + \underline{k}$?
A. -64 B. 24 C. 28 D. 0

For Examiner's use only:

Total Marks: 20

Marks Obtained:

MATHEMATICS HSSC–II

Time allowed: 2:35 Hours **Total Marks Sections B and C: 80**

NOTE: Attempt any ten parts from Section 'B' and any five questions from Section 'C' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet–B if required. Write your answers neatly and legibly. Graph paper will be provided on Demand.

SECTION – B (Marks 40)

Q. 2 Attempt any TEN parts. All parts carry equal marks. **(10 x 4 = 40)**

(i) Let the real valued functions f and g be defined by $f(x) = 2x + 1$ and $(x) = x^2 - 1$. Obtain the expressions for $fg(x)$; $gf(x)$; $f^2(x)$; $g^2(x)$

(ii) Evaluate $\lim_{\theta \to 0} \frac{1-\cos p\,\theta}{1-\cos q\,\theta}$

(iii) Find $\frac{dy}{dx}$ if $x = \frac{a(1-t^2)}{1+t^2}$ and $y = \frac{2bt}{1+t^2}$

(iv) Differentiate $\cos\sqrt{x}$ with respect to x by ab-initio method.

(v) A box with a square base and open top is to have a volume of 4 cubic dm. Find the dimensions of the box which will require the least material.

(vi) Show that $\int \sqrt{a^2 - x^2}\,dx = \frac{a^2}{2}\sin^{-1}\frac{x}{a} + \frac{x}{2}\sqrt{a^2 - x^2} + c$

(vii) Evaluate $\int_0^{\frac{\pi}{4}} \cos^4 t\,dt$

(viii) A quadrilateral has the points $A(9,3), B(-7,7), C(-3,-7)$ and $D(5,-5)$ as its vertices. Find the midpoints of its sides. Show that the figure formed by joining the midpoints consecutively is a parallelogram.

(ix) Find equations of two parallel lines perpendicular to $2x - y + 3 = 0$ Such that the product of the x and y-intercepts of each is 3

(x) Find equations of two tangents drawn from $(2,3)$ to the circle $x^2 + y^2 = 9$

(xi) Find the foci, eccentricity and vertices of an ellipse $\frac{(2x-1)^2}{4} + \frac{(y+2)^2}{16} = 1$

(xii) Find equations of the tangents to the conic $9x^2 - 4y^2 = 36$ parallel to $5x - 2y + 7 = 0$

(xiii) Find the angle between the vectors $2\underline{i} - \underline{j} + \underline{k}$ and $-\underline{i} + \underline{j}$

(xiv) Use vector method to prove $\sin(\alpha - \beta) = \sin\alpha\cos\beta - \cos\alpha\sin\beta$

SECTION – C (Marks 40)

Note: Attempt any FIVE questions. All questions carry equal marks. **(5 x 8 = 40)**

Q. 3 If $f(x) = \begin{cases} 3x & if \quad x \le -2 \\ x^2 - 1 & if \quad -2 < x < 2 \\ 3 & if \quad x \ge 2 \end{cases}$ discuss the continuity at $x = 2$ and $x = -2$

Q. 4 Find extreme values of the function $f(x) = \sin x + \cos x$ occurring in the interval $[0, 2\pi]$

Q. 5 Evaluate $\int \frac{x^3 - 6x^2 + 25}{(x+1)^2(x-2)^2}\,dx$

Q. 6 Show that the lines $4x - 3y - 8 = 0$, $3x - 4y - 6 = 0$ and $x - y - 2 = 0$ are concurrent and the third line bisects the angle formed by the first two lines.

Q. 7 Graph the feasible region of the system of linear inequalities $x + 2y \le 14$; $3x + 4y \le 36$; $2x + y \le 10$; $x \ge 0$; $y \ge 0$ and find the corner points.

Q. 8 Find equations of the circle passing through two points $A(1,4)$, $B(-1,8)$ and tangent to the line $x + 3y - 3 = 0$

Q. 9 Prove that the altitudes of a triangle are concurrent.

Roll No. | | | | | | |

Answer Sheet No._____

Sig. of Candidate._____

Sig. of Invigilator._____

MATHEMATICS HSSC–II

SECTION – A (Marks 20)

Time allowed: 25 Minutes

Version Number | 1 | 7 | 0 | 5 |

NOTE: Section–A is compulsory. All parts of this section are to be answered on the question paper itself. It should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.

Q. 1 Circle the correct option i.e. A / B / C / D. Each part carries one mark.

(i) What is the evaluated value of $\lim_{h\to 0}\frac{|h|}{h}$?

A. ± 1 B. 1 C. 0 D. Limit does not exist

(ii) What evaluates $\lim_{x\to 0}\frac{\cos\left(\frac{3\pi}{2}-x\right)-\cos\left(\frac{3\pi}{2}\right)}{x}$?

A. $\sqrt{2}$ B. -1 C. 1 D. Limit does not exist

(iii) Which of the following represents $f'(x)$ if $e^{f(x)} = 1 + x^2$?

A. $2x(1+x^2)$ B. $2x\ln(1+x^2)$ C. $2x\,e^{1+x^2}$ D. $\frac{2x}{1+x^2}$

(iv) If $f(x) = x^3 - 2x^2 + 4x - 1$ then which of the following represents $f(1+x)$?

A. $x^3 + x^2 + 3x + 2$ B. $x^3 + x^2 - 3x + 2$

C. $x^3 + x^2 + 3x - 2$ D. $x^3 - x^2 + 3x + 2$

(v) What equals $f'(0)$ if $(x) = \sin^2(3-x)$?

A. $-2\sin 3\cos 3$ B. $2\sin 3\cos 3$ C. $6\sin 3\cos 3$ D. $-2\sin 3$

(vi) If $f(x) = (2x+1)^4$ then what will be the 4th derivative of $f(x)$ at $x = 0$?

A. 0 B. 48 C. 324 D. 384

(vii) What evaluates $\int_0^8 \frac{dx}{\sqrt{1+x}}$?

A. -8 B. 4 C. 6 D. $\frac{52}{81}$

(viii) What is the solution of a differential equation $\frac{dy}{dx} = \tan x$?

A. $\ln|\cos x| + c$ B. $\ln|\sec x| + c$ C. $\sec^2 x + c$ D. $\frac{1}{2}\tan^2 x + c$

(ix) For what value of k, $\int_0^{-1}(k + 3x^2)dx = -3$?

A. -2 B. 4 C. 2 D. -4

(x) What is the evaluated value of $\int_0^1 \frac{1}{1-x}dx$?

A. 0 B. undefined C. 1 D. -1

(xi) What is the perpendicular distance of a point (2,3) from y-axis?

A. 2 B. $\sqrt{13}$ C. 3 D. 5

(xii) At what angle lines $7y = 5x + 8$ and $7x + 5y = 16$ intersect each other?

A. 0 B. $\frac{\pi}{2}$ C. $\frac{\pi}{4}$ D. π

(xiii) What is the slope of a line perpendicular to $13x + 26y - k = 0$?

A. $-\frac{1}{2}$ B. -2 C. $\frac{1}{2}$ D. 2

(xiv) Which point in the following is not a solution of $2x - 3y < 5$?

A. $(-1,-1)$ B. $(2,-2)$ C. (2,2) D. (3,3)

(xv) At what point on the graph a conic $\frac{x^2}{4} + \frac{y^2}{9} = 1$ has its centre?

A. (2,3) B. (0,0) C. (4,9) D. (1,1)

(xvi) What is the length of the minor axis of an ellipse $2x^2 + 3y^2 - 6 = 0$?

A. $2\sqrt{2}$ B. $\sqrt{2}$ C. 2 D. $\sqrt{3}$

(xvii) At what point, centre of a circle $4x^2 + 4y^2 - 12x - 16y - 21 = 0$ lies?

A. $(\frac{3}{2}, -2)$ B. $(2, \frac{3}{2})$ C. $(\frac{3}{2}, 2)$ D. $(-\frac{3}{2}, -2)$

(xviii) For what value of "t" vectors $-\underline{i} + \underline{j} + \underline{k}$ and $-\frac{\pi}{2}\underline{i} - \pi\underline{j} + t\underline{k}$ are perpendicular?

A. π B. $\frac{\pi}{2}$ C. $-\pi$ D. $-\frac{\pi}{2}$

(xix) What is the volume of a parallelepiped determined by $\underline{i} + 2\underline{j} - \underline{k}$, $\underline{i} - 2\underline{j} + 3\underline{k}$ and $\underline{i} - 7\underline{j} - 4\underline{k}$?

A. 20 B. 48 C. 8 D. 38

(xx) What are the direction *cosines* of a vector $\underline{i} + \underline{j}$?

A. $\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}, 1$ B. 1,1,0 C. $0, \frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}$ D. $\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}, 0$

For Examiner's use only:

Total Marks: 20

Marks Obtained:

MATHEMATICS HSSC–II

Time allowed: 2:35 Hours **Total Marks Sections B and C: 80**

NOTE: Attempt any ten parts from Section 'B' and any five questions from Section 'C' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet–B if required. Write your answers neatly and legibly. Graph paper will be provided on Demand.

SECTION – B (Marks 40)

Q. 2 Attempt any TEN parts. All parts carry equal marks. **(10 x 4 = 40)**

(i) For a real valued function $f(x) = (-x+9)^3$, find $f^{-1}(x)$ and verify $f[f^{-1}(x)] = f^{-1}[f(x)] = x$

(ii) If a function $f(x) = \begin{cases} mx & if\ x < 3 \\ n & if\ x = 3 \\ -2x+9 & if\ x > 3 \end{cases}$ is continuous at $x = 3$. Find the values of "m" and "n"

(iii) If $x = a\cos^3\theta, y = b\sin^3\theta$, show that $a\frac{dy}{dx} + b\tan\theta = 0$

(iv) Find $\frac{dy}{dx}$ if $y = \frac{\sqrt{x^2-1}\,(x+1)}{(x^3+1)^{\frac{3}{2}}}$

(v) If $y = e^{ax}\sin bx$ then show that $\frac{d^2y}{dx^2} - 2a\frac{dy}{dx} + (a^2+b^2)y = 0$

(vi) Find the area between the curve $y = x(x-1)(x+1)$ and the x-axis.

(vii) Evaluate $\int x^3\tan^{-1}x\ dx$

(viii) Find a joint equation of the straight lines through the origin, perpendicular to the lines represented by $x^2 + xy - 6y^2 = 0$

(ix) Find the equation of the line through the point of intersection of the lines $x - y - 4 = 0$ and $7x + y + 20 = 0$ and parallel to the line $6x + y - 14 = 0$

(x) Find the foci, eccentricity and vertices of a hyperbola $\frac{(y+2)^2}{9} - \frac{(x-2)^2}{16} = 1$

(xi) Find equations of the tangents to the ellipse $\frac{x^2}{4} + y^2 = 1$ which are parallel to the line $2x - 4y + 5 = 0$

(xii) By transforming the equation $x^2 - y^2 - 6x + 2y + 7 = 0$ referred to a new origin and axes remaining parallel to the original axes, the first degree terms are removed. Find the coordinates of the new origin and the transformed equation.

(xiii) Use vector method to prove $\cos(\alpha+\beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta$

(xiv) Find area of the parallelogram whose vertices are $A(-1,1,1), B(-1,2,2), C(-3,4,-5)$ and $D(-3,5,-4)$

SECTION – C (Marks 40)

Note: Attempt any FIVE questions. All questions carry equal marks. **(5 x 8 = 40)**

Q. 3 Find the graphical solution of $x = \sin 2x$

Q. 4 Discuss the function defined as $f(x) = \sin x + \frac{1}{2\sqrt{2}}\cos 2x$ for extreme values in the interval $(0, 2\pi)$

Q. 5 Show that $\int e^{ax}\cos bx\ dx = \frac{1}{\sqrt{a^2+b^2}}\ e^{ax}\cos(bx - \tan^{-1}\frac{b}{a}) + c$

Q. 6 Find area of the region bounded by $x + y + 1 = 0$ and $10x^2 - xy - 21y^2 = 0$

Q. 7 Find the maximum and minimum values of the function defined as $f(x, y) = 2x + 3y$ subject to the constraints $-y \le 2\ ;\ x + y \le 4\ ;\ 2x - y \le 6\ ;\ x \ge 0$

Q. 8 Show that tangent at any point P of a parabola makes equal angles with the line PF and the line through P, parallel to the axis of the parabola, F being focus.

Q. 9 Prove that perpendicular bisectors of the sides of a triangle are concurrent.

Q 2.

Roll No. | | | | | | |

Answer Sheet No._____

Sig. of Candidate._____

Sig. of Invigilator._____

PHYSICS HSSC–II

SECTION – A (Marks 17)

Time allowed: 25 Minutes

Version Number	1	7	0	3

NOTE: Section–A is compulsory. All parts of this section are to be answered on the question paper itself. It should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.

Q. 1 Circle the correct option i.e. A / B / C / D. Each part carries one mark.

(i) As mass number increases, which of the following does not change?
A. Density B. Binding energy C. Mass D. Volume

(ii) The half life of radioactive element is:
A. $T_{\frac{1}{2}} = 0.693\,\lambda$ B. $T_{\frac{1}{2}} = \frac{\lambda}{0.693}$ C. $T_{\frac{1}{2}} = \frac{0.693}{\lambda}$ D. $T_{\frac{1}{2}} = 1.43\,\lambda$

(iii) The direction of field lines due to a test charge "$+q$" is:
A. Circular B. Curve
C. Radially outward D. Radially inward

(iv) The dimensional representation of Planck's constant is the same as:
A. Momentum B. Angular momentum
C. Gravitational constant D. Torque

(v) A capacitor of capacitance 'C' has a charge 'Q' and stored energy is 'w'. If the charge is increased to '2Q'. The stored energy will be:
A. $2w$ B. $4w$ C. $\frac{w}{4}$ D. $\frac{w}{2}$

(vi) The amount of heat produced in a resistor when a current is passed through it, can be found by using:
A. Faraday's law B. Lenz's law C. Joule's law D. Kirchhoff's rule

(vii) The SI units of resistivity is:
A. Ωm B. Ωm^{-1} C. Ωm^2 D. $\Omega^{-1} m^{-1}$

(viii) The $\frac{e}{m}$ of an electron moving with the speed along a circular path in a magnetic field is given as:
A. $\frac{e}{m} = \frac{E^2}{B^2 R}$ B. $\frac{e}{m} = \frac{ER}{B^2}$ C. $\frac{e}{m} = \frac{B^2 R}{E}$ D. $\frac{e}{m} = \frac{E}{B^2 R}$

(ix) An instrument which can measure potential without drawing any current is:
A. Cathode Ray Oscilloscope (CRO) B. Ammeter
C. Voltmeter D. Galvanometer

(x) If L and R represent inductance and resistance respectively, then the dimensions of $\frac{L}{R}$ will be:
A. $[M^0 L^{-1} T^{-2}]$ B. $[M^0 L^0 T]$ C. $[M^0 L^0 T^{-1}]$ D. $[M^0 L^0 T^{-2}]$

(xi) On what principle does a transformer work?
A. Ohm's Law B. Mutual Induction
C. Electrostatic Induction D. Electromagnetism

(xii) "Eddy Currents" are set up in the direction:
A. At an angle 45° to the flux B. Perpendicular to the flux
C. Parallel to the flux D. Anti parallel to the flux

(xiii) The r.m.s value of the current when $I_0 = 2A$ is given by:
A. $4\sqrt{2}A$ B. $\frac{1}{\sqrt{2}}A$ C. $\sqrt{2}A$ D. $2\sqrt{2}A$

(xiv) If the capacitance of LC circuit is made four times then the frequency of the circuit becomes:
A. Four times B. Thrice C. Twice D. One half

(xv) What are substances called which undergo plastic deformation until they break?
A. Amorphous solids B. Polymeric solids
C. Brittle substances D. Ductile substances

(xvi) The substances in which magnetic fields produced by orbital and spin electrons of molecule add up to zero are called:
A. Paramagnetic B. Super magnetic C. Ferromagnetic D. Diamagnetic

(xvii) In which type of logic gate, the output is one, when both inputs are zero?
A. NOT gate B. NOR gate C. OR gate D. AND gate

For Examiner's use only:

Total Marks: 17

Marks Obtained:

25

PHYSICS HSSC–II

Time allowed: 2:35 Hours **Total Marks Sections B and C: 68**

NOTE: Answer any fourteen parts from Section 'B' and any two questions from Section 'C' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet–B if required. Write your answers neatly and legibly.

SECTION – B (Marks 42)

Q. 2 Answer any FOURTEEN parts. The answer to each part should not exceed 3 to 4 lines. **(14 x 3 = 42)**

(i) Electric lines of force never cross why?

(ii) The potential is constant throughout a given region of space. Is the electric field zero or non-zero in this region? Explain.

(iii) Is the filament resistance lower or higher in $500W, 220V$ light bulb than in a $100W, 220V$ bulb?

(iv) What are the difficulties in testing whether the filament of a lighted bulb obeys Ohm's law?

(v) What is meant by A.M. and F.M.?

(vi) Show graphically the phase relationship between the current and the voltage across an inductor.

(vii) Show that ϵ and $\frac{\Delta\phi}{\Delta t}$ have the same units.

(viii) Does the induced emf always act to decrease the magnetic flux through a circuit?

(ix) What is meant by Hysteresis loss? How is it used in the construction of a transformer?

(x) In a transformer there is no transfer of charge from the primary to the secondary coil. How is then power transferred?

(xi) A sinusoidal current has r.m.s (effective) value of $10A$. What is the maximum or peak value?

(xii) Which proton red, green or blue carries the most energy and momentum?

(xiii) If measurements show a precise position for electron. Can those measurements show precise momentum also? Explain.

(xiv) Why a photo diode is operated in reverse biased state?

(xv) How have the results of the special theory of relativity been applied to NAVSTAR navigation system?

(xvi) How can the spectrum of hydrogen contain so many lines when hydrogen contains one electron?

(xvii) If an electron and a proton have the same de-Broglie wavelength. Which particle has greater speed?

(xviii) What do you mean by the term "Critical mass"?

(xix) Which radiation dose would deposit more energy to the body?

(a) $10\ mGy$ to the hand (b) $1\ mGy$ does to the entire body

SECTION – C (Marks 26)

Note: Attempt any TWO questions. **(2 x 13 = 26)**

Q. 3

a. Derive an expression for energy stored in a charged capacitor. Also calculate the energy density stored in any electric field. **(3+2)**

b. Explain how moving coil Galvanometer can be converted into: **(2+2)**
(i) An Ammeter (ii) A Voltmeter

c. What shunt resistance must be connected across a galvanometer of 50Ω resistance which gives full scale deflection with $2mA$ current so as to convert it into an ammeter of range $10A$? **(4)**

Q. 4

a. What are Transistors? How can we use transistor as an amplifier? **(2+5)**

b. What is a voltage gain of an amplifier? **(2)**

c. The current flowing into the base of the transistor is $100\mu A$. Find the collector current I_C, emitter current I_E and the ratio $\frac{I_C}{I_E}$, if the value of the current gain β is 100. **(4)**

Q. 5

a. What is Laser? Describe its principle and operation. **(2+2+2)**

b. What is Compton Effect? How was this phenomenon explained by A.H. Compton on the basis of the particle theory of light? **(2+3)**

c. The half life of $^{91}_{38}Sr$ is 9.70 hours. Find its decay constant. **(2)**

24

Roll No. | | | | | | |

Answer Sheet No._____

Sig. of Candidate._____

Sig. of Invigilator._____

PHYSICS HSSC–II

SECTION – A (Marks 17)

Time allowed: 25 Minutes

Version Number	1	7	0	7

NOTE: Section–A is compulsory. All parts of this section are to be answered on the question paper itself. It should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.

Q. 1 Circle the correct option i.e. A / B / C / D. Each part carries one mark.

(i) Leptons are the particles that do not experience:
A. Electric force B. Magnetic force
C. Weak nuclear force D. Strong nuclear force

(ii) γ-rays can cause photoelectric emission when their energy is:
A. Equal to $0.1\ Mev$ B. Equal to $0.5\ Mev$
C. Less than $0.1\ Mev$ D. Greater than $0.1\ Mev$

(iii) The ratio of gravitational force F_g to the electrostatic force F_e between two electrons, the same distance apart is:
A. 24×10^{12} B. 24×10^{-44} C. 9.8 D. 24×10^{9}

(iv) The electric intensity near an infinite plate of positive charge will be:
A. $\frac{q}{A}$ B. $2\sigma\epsilon_0$ C. $\frac{q}{\epsilon_0}$ D. $\frac{\sigma}{2\epsilon_0}$

(v) The terminal potential difference of a battery of internal resistance r and electromotive force ϵ is:
A. $V_t = \frac{\epsilon - r}{r}$ B. $V_t = \frac{\epsilon - r}{I}$ C. $V_t = \epsilon + Ir$ D. $V_t = \epsilon - Ir$

(vi) The accurate potential measuring device should be of:
A. Neither very low nor very high B. Infinite resistance
C. Very low resistance D. Very high resistance

(vii) The process of combining low frequency signal with a high frequency radio wave is called:
A. Resonance B. Impedance C. Demodulation D. Modulation

(viii) According to Faraday's Law, emf induced in a circuit depends on:
A. Change in magnetic flux B. Initial magnetic flux
C. Maximum magnetic flux D. Rate of change of magnetic flux

(ix) In Compton scattering the change in the wavelength is maximum if:
A. Angle of scattering is $180°$ B. Angle of scattering is zero
C. Angle of scattering is $90°$ D. Angle of scattering is $60°$

(x) The colour of light emitted by LED depends on:
A. The amount of forward current B. The type of semiconductor material used
C. Its forward bias D. Its reverse bias

(xi) The output of a two inputs OR gate is 0 only when its:
A. Both inputs are 1 B. Either input is 0
C. Both inputs are 0 D. Either input is 1

(xii) If an object moves with a velocity of light, its mass becomes:
A. Some extent large B. Infinity
C. Zero D. Very small

(xiii) The atom bomb is an example of:
A. Uncontrolled nuclear fission B. Uncontrolled nuclear fusion
C. Controlled nuclear fission D. Controlled nuclear fusion

(xiv) The existence of positron was discovered in the:
A. Electromagnetic radiation B. Non-electromagnetic radiation
C. Thermal radiation D. Cosmic radiation

(xv) In which region of electromagnetic spectrum of Hydrogen, the Balmer series lies?
A. Ultraviolet B. X-rays C. Infrared D. Visible

(xvi) The rest mass of photon is:
A. 1 B. 0.5 C. Infinity D. Zero

(xvii) The absorption power of a perfect black body is always:
A. -1 B. 100 C. Zero D. 1

For Examiner's use only:

Total Marks: 17

Marks Obtained:

PHYSICS HSSC–II

Time allowed: 2:35 Hours **Total Marks Sections B and C: 68**

NOTE: Answer any fourteen parts from Section 'B' and any two questions from Section 'C' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet–B if required. Write your answers neatly and legibly.

SECTION – B (Marks 42)

Q. 2 Answer any FOURTEEN parts. The answer to each part should not exceed 3 to 4 lines. (14 x 3 = 42)

(i) Suppose you follow an electric field line due to a positive charge. Do the electric field and potential increase or decrease?

(ii) Compare electric and gravitational forces.

(iii) Is it possible to orient a current loop in a uniform magnetic field such that loop will not tend to rotate? Explain.

(iv) If a charge particle moves in a straight line through some region of space, can you say that the magnetic field in the region is zero?

(v) Name the device that will (a) permit flow of direct current but oppose the flow of A.C. current (b) permit flow of A.C. current but not that of the direct current.

(vi) What is meant by A.M and F.M.

(vii) Define elastic limit. Also write SI units.

(viii) What is the effect of forward and reverse biasing of a diode on the width of depletion region?

(ix) A transformer steps down the voltage of $220V$ to $20V$ with the help of 20 turns on the secondary coil. What is the number of turns on the primary?

(x) What do you understand by an equipotential surface in an electric field?

(xi) Verify that an $ohm \times farad$ is equivalent to second.

(xii) Photon A has twice the energy of photon B. What is the ratio of the momentum of A to momentum of B?

(xiii) What factors make a fusion reaction difficult to achieve?

(xiv) If an electron and proton have the same de-Broglie wavelength, which particle has greater speed?

(xv) What happens to a total radiation from a black body if the absolute temperature is doubled?

(xvi) Is energy conserved when an atom emits a photon of light?

(xvii) Why ordinary silicon diodes do not emit light?

(xviii) What is photon?

(xix) Show graphically the phase relationship between the current and voltage across an inductor.

SECTION – C (Marks 26)

Note: Attempt any TWO questions. (2 x 13 = 26)

Q. 3 **a.** What is a capacitor and its capacitance? Discuss the factors upon which capacitance of a capacitor depends. Obtain the expression for the dielectric constant. **(1+1+6)**

b. Describe the change in magnetic field inside a solenoid carrying a steady current I, if: **(2.5+2.5)**

i) The length of the solenoid is doubled, but the number of turns remains same

ii) The number of terms is doubled but length remains same

Q. 4 **a.** What is wheat stone bridge? Explain and prove the principle of wheat stone bridge? How it can be used to find the unknown resistance of a wire? **(1+3+2)**

b. A platinum wire has resistance of 10Ω at $0\ ^\circ C$ and 20Ω at $273^\circ C$. Find the value of temperature co-efficient of resistance of platinum. **(4)**

c. State and explain Kirchhoff's voltage rule. **(3)**

Q. 5 **a.** What is an uncertainty principle? How does uncertainty principle explain that electrons cannot exist inside the nucleus? **(3+4)**

b. What is Hysteresis loop? Write down its main features and its uses. **(1+3+2)**