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
Revised 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) Secondary sewage treatment is mainly a:
A. Mechanical process B. Biological process
C. Physical process D. Chemical process

(ii) Inside nose, underneath the mucous membrane there are blood capillaries that help to warm the air to about:
A. $35^{o}C$ B. $28^{o}C$ C. $37^{o}C$ D. $30^{o}C$

(iii) Which of the following hormones has broadest range of targets?
A. Epinephrine B. ADH C. Oxytocin D. TSH

(iv) Endonephrins that function as both neurotransmitters and hormones and decrease our pain perception are biochemically:
A. Peptides B. Steroids C. Carbohydrates D. Lipids

(v) More than 90% of male infertility is due to:
A. Autoimmune disorder B. Azoospermia
C. Sperm deformities D. Oligospermia

(vi) In which one of the following groups Uric acid is **NOT** the chief nitrogenous waste material?
A. Mammals B. Reptiles C. Birds D. Insects

(vii) In man glucose is present in blood plasma but not in urine. This is because glucose molecules are:
A. Too large to enter Bowman's capsule
B. Actively transported from proximal convoluted tubule to the blood
C. Oxidised to supply energy for ultra filtration
D. Stored in the kidney

(viii) The 12 vertebrae in the second curve of vertebral column are known as:
A. Thoracic vertebrae B. Cervical vertebrae
C. Sacral vertebrae D. Lumbar vertebrae

(ix) Each muscle fibre within the fascicle is covered by a layer of connective tissue called:
A. Endocardium B. Epimysium C. Perimysium D. Endomysium

(x) The migration of Salmon from ocean to fresh water (river) during breeding season is:
A. Latent learning B. Habituation behaviour
C. Inborn behaviour D. Learning behaviour

(xi) Which one of the following layers forms epithelial linings of digestive, respiratory and urinogenital systems?
A. Choanoderm B. Ectoderm C. Endoderm D. Mesoderm

(xii) The phenomenon in which a gene at one locus interferes with effect caused by another gene (located on different locus) is called:
A. Over dominance B. Dominance C. Co-dominance D. Epistasis

(xiii) Approximately every 200 nucleotides pair of the duplex DNA wrap twice around the core of 08 histones to form:
A. Pląsmid B. Nucleosome C. Nucleolus D. Chromosome

(xiv) Which of the followings is **NOT** a stop codon?
A. UAG B. UAA C. UGA D. UGG

(xv) The homologous organs are those that show similarity in:
A. Size B. Appearance C. Function D. Origin

(xvi) The amount of energy that remains for plant growth after subtracting the energy used in respiration is:
A. Exhausted energy B. Gross primary productivity
C. Net primary productivity D. Productivity

(xvii) A genomic DNA library:
A. Is a DNA copy of mature mRNAs
B. Represents all the DNA in a specific chromosome
C. Is made by using reverse transcriptase
D. Is stored in a collection of recombinant bacteria

For Examiner's use only:

Total Marks: 17

Marks Obtained:

BIOLOGY HSSC–II

National Book Foundation
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 is Myoglobin? Give its biochemical nature and function. **(1+2)**

(ii) Describe Pneumonia along with its aetiology, symptoms and treatment. **(1.5+1+0.5)**

(iii) Compare briefly different methods of Osmoregulation found in freshwater and marine water animals. **(03)**

(iv) What is cartilage? Give its nature. How many types of cartilage normally exist in adults? **(1+1+1)**

(v) Define Behaviour. Differentiate between Animal Aggregation and Animal Societies. **(1+2)**

(vi) Give brief account of any three hormones produced by organs or tissues whose function is not primarily an endocrine one. **(03)**

(vii) What are Narcotics? How do they interfare with Particular sites of human brain? Give effects of Heroin. **(1+1+1)**

(viii) a. Define Neurotransmitters. Which one is most common neurotransmitter of human peripheral nervous system. **(0.5+0.5)**

b. How can a nerve gas inhibit acetylcholinesterase enzyme? **(02)**

(ix) What are STDs? How are they passed from one human to another? Give detail of any one STD. **(0.5+0.5+2)**

(x) Differentiate clearly between placenta and embilical cord along with their functions. **(03)**

(xi) Highlight the phenomenon of Gene linkage. Why mendelian ratio of independent assortment deviate due to gene linkage? **(2+1)**

(xii) Write down the functions of the following: **(1+1+1)**

a. Thyroxin b. Tropomyosin c. ADH

(xiii) What are sex related traits? Describe their different types with the help of examples. **(1+2)**

(xiv) Define DNA replication. Describe any two models of DNA Replication presented by scientists. **(1+2)**

(xv) Describe genetic code briefly. Enlist important characteristics of genetic code. **(1+2)**

(xvi) Highlight the Hardy-Weinburg principle. Give various factors that can change allele frequencies within a population. **(1+2)**

(xvii) What is Acid rain? Describe its major causes and effects on environment. **(1+2)**

(xviii) Outline the steps of DNA Analysis procedure. **(03)**

(xix) What is Animal husbandry? Describe briefly the nature of this job and its importance for human welfare. **(1+2)**

SECTION – C (Marks 26)

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

Q. 3 a. How do bones get fracture? What are main types of fractures? Describe in detail the process of Bone repair. **(07)**

b. Describe main steps involved in Urine formation. **(03)**

c. Write down the causes, symptoms and treatment of lung cancer. **(03)**

Q. 4 a. What is Nerve Impulse? Write a comprehensive note on its generation and Transmission. **(08)**

b. Describe Neurulation process in human embryo (as first major event in organogenesis). **(05)**

Q. 5 a. Define Central Dogma. Discuss in detail Transcription. Also support your answer with the help of proper diagram. **(07)**

b. What are Ecological Pyramids? Explain pyramids of Biomass and numbers. **(04)**

c. Define Cystic fibrosis. How is gene therapy of Cystic fibrosis carried out? **(02)**

Roll No. | | | | | | |

Answer Sheet No._____

Sig. of Candidate._____

Sig. of Invigilator._____

BIOLOGY HSSC–II

SECTION – A (Marks 17)

Time allowed: 25 Minutes

Punjab Text Book Board

NOTE: Section–A is compulsory and comprises pages 1-2. 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) In Pakistan temperate moist conditions are found in:
A. Southern Punjab B. Karachi C. Swat D. Shogran

(ii) Bilirubin is the break down product of:
A. Purine bases B. Myoglobin C. Nucleic Acid D. Haemoglobin

(iii) Which hormone is secreted when the level of calcium increases in blood?
A. Cortisone B. Thyroxine C. Parathormone D. Calcitonin

(iv) Which among the following is a short-day plant?
A. Cucumber B. Tomato C. Strawberry D. Cabbage

(v) Which is **NOT** concerned with Arthritis?
A. Haematoma B. Inflammation C. Degeneration D. Stiffness

(vi) During development of chick embryo the hypoblast formed in process of gastrulation is presumptive layer for:
A. Yolk sac B. Ectoderm C. Endoderm D. Mesoderm

(vii) Nucleosome in chromosome appear like beads in a string. Each nucleosome is made up of _____ nucleotides.
A. 1000 B. 150 C. 200 D. 250

(viii) Which is the result of autosomal non-disjunction?
A. Jacob's Syndrome B. Down's Syndrome
C. Klinefelter's Syndrome D. Turner's Syndrome

(ix) Mendel laid the foundation stone of classical genetics by formulating two laws of inheritance. His work was published in:
A. 1866 AD B. 1854 AD C. 1860 AD D. 1865 AD

(x) The cause of sickle cell anaemia was discovered by:
A. Archibald Garrod B. F-Sanger
C. Vernon-Ingram D. Beadle and Tatum

(xi) If both mother and father are A and B heterozygous blood groups, then their children can be with blood types:
A. All of the four blood groups B. AB group only
C. A and B groups only D. AB and O groups only

(xii) MODY (Maturity Onset Diabetes of Young) is caused due to the absence of:
A. Glucokinase B. Isomerase C. Lipase D. Aldolase

(xiii) The plasmid PSC 101 contains antibiotic resistant gene for:
A. Sulphonamide B. Ampicillin C. Tetracycline D. Penicillin

(xiv) In a population that is at a Hardy-Weinberg equilibrium 25% of the individuals show the recessive traits. What is the frequency of the dominant allele in the population?
A. 0.25 B. 0.70 C. 0.50 D. 0.75

(xv) The average annual rainfall in temperate deciduous forest is:
A. 750–1500 mm B. 500 mm C. 750 mm D. 500–1000 mm

(xvi) The term totipotent for plant cell was first coined by:
A. F.C. Steward B. William Bateson
C. Garrod D. Gottlieb Haberlandt

(xvii) The total available Fresh Water in the form of lakes, streams and rivers on the earth is:
A. 1% B. 5% C. 10% D. 2%

For Examiner's use only:

Total Marks: 17

Marks Obtained:

BIOLOGY HSSC–II

Punjab Text Book Board

35

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

(i) Define the following:
a. Lithotripsy b. Plumage Fluffing c. Pyrogen

(ii) Write down the function of the hormones:
a. Thyroxine b. Estrogen c. Oxytocin

(iii) Name the bones of human cranium.

(iv) Define the following:
a. Parthenocarpy b. Follicle atresia c. Menopouse

(v) Define the following:
a. Embryonic Induction b. Teratology c. Discoidal cleavage

(vi) Write a brief note on Nucleosome.

(vii) Write the important features of DNA – Polymerase III.

(viii) Write a brief note on Malagnant tumor.

(ix) Define the following:
a. Epistasis b . Pleiotropy c. Linkage

(x) Write a brief note on Molecular carrier.

(xi) What is endosymbiont hypothesis? How does it help in evolution of Eukaryotic cell?

(xii) Define the following:
a. Niche b. Habitat c. Biome.

(xiii) Name three plants of temperate deciduous forests.

(xiv) What is Predation? Write its significance in ecosystem

(xv) What is geothermal energy? Why it is not feasible?

(xvi) Define the following:
a. Climate b. Weather c. Succession

(xvii) What is Food-Web? Draw Food Web.

(xviii) Write names of excereory organs of the following animals:
a. Planaria b. Earthworm c. Cockroach

(xix) Write a brief note on Sciatica

SECTION – C (Marks 26)

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

Q. 3 **a.** Describe the structure of Nephron and draw its labelled, neat diagram **(05)**

b. What is sliding filament model of muscle contraction? Show diagrammatically both the relaxed and contracted muscle. **(04)**

c. Write role of secretions of posterior lobe of pituitary gland **(04)**

Q. 4 **a.** What is the replication? Describe the process of replication of DNA. **(09)**

b. What is Genomic library? How is it constructed? **(04)**

Q. 5 What is biogeo-chemical cycle? Describe nitrogen cycle. **(9+4)**

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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
Revised 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 of the following is **NOT** a goal of human genome project (HGP)?
A. Cloning B. Molecular medicine
C. Bioarchaeology D. Study of human evolution

(ii) Respiratory control centers are located in the:
A. Upper spinal cord and Medulla B. Midbrain and Medulla
C. Medulla and Pons D. Pons and Midbrain

(iii) Exophthalmic goiter results from Graves' disease is a classic symptom of:
A. Addison's disease B. Hypothyroidism
C. Hyperglycemia D. Hyperthyroidism

(iv) Dancing of honey bees for indication of food is a type of:
A. Innate behaviour B. Biological Rhythm
C. Tropic movement D. Learning behaviour

(v) An egg fertilized in the laboratory and then implanted in the uterus for development is called:
A. Miscarriage B. Test tube baby
C. Cloning D. In vivo fertilization

(vi) During DNA sequencing techniques, use of dideoxynucleotides (dd NTP's) is common in:
A. Dimethod B. Maxam method
C. Sanger's method D. Gilbert method

(vii) Pelvic girdle is composed of three pairs of fused bones:
A. Ileum, Ischium and Pubis B. Ileum, Ischium and Frontal
C. Clavicle, Scapula and Pubis D. Malleus, Incus and Stapes

(viii) As filtrate travels up the ascending limb of Nephron, active uptake of sodium chloride into surrounding area is controlled by:
A. Insulin B. Aldosterone C. ADH D. Calcitonin

(ix) Irritability, abnormal involuntary movements and severe decline in thinking are symptoms of a nervous disorder called:
A. Parkinsons disease B. Multiple sclerosis
C. Alzheimers disease D. Huntingtons disease

(x) Active turning and movement of human foetus inside the mother starts by:
A. 6th week B. 8th week C. 15th week D. 16th week

(xi) When a normal man is married with a normal woman whose father was colorblind, then what will be percentage risk of this disease in their babies?
A. 25% B. 100% C. 75% D. 35%

(xii) During denitrificaiton, which of the following reduces nitrates back to atmospheric nitrogen?
A. Nitrobacter B. Azotobacter C. Nitrosomonas D. Pseudomonas

(xiii) Ozone is a bluish and poisonous gas layer of atmosphere above the Earth extending from:
A. 10-50 kilometers B. 50-80 Kilometers
C. 90-120 kilometers D. 130 kilometers

(xiv) Which one of the following is a stop codon?
A. GAU B. UAC C. UAA D. AUG

(xv) Drugs like alcohol and Heroin belongs to:
A. Antibiotics B. Hallucinogens C. Stimulants D. Depressants

(xvi) Which one of the following observations does not match with Darwin's idea of Natural selection?
A. Over production B. Inheritance of acquired characters
C. Variations D. Survival of the fittest

(xvii) MMR vaccine protects against:
A. Measles and Mumps B. Flu
C. Hepatitis A D. Polio

For Examiner's use only:

Total Marks: 17

Marks Obtained:

BIOLOGY HSSC–II

National Book Foundation
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) Define Tidal volume. Also describe about vital capacity of human lungs. **(1.5+1.5)**

(ii) What is Feed back mechanism? How does negative feedback operate to control water contents in the body? **(1+2)**

(iii) Describe about synovial joints. Also explain any two types of synovial joints. **(1+2)**

(iv) Differentiate clearly between cramp and tetany muscle disorders. **(03)**

(v) Give parts of limbic system along with their functions. **(03)**

(vi) What is MRI test? Give its procedure and benefits. **(1+2)**

(vii) How is the blood calcium level regulated by calcitonin and parathormone? **(03)**

(viii) Define the following terms: **(1+1+1)**
a. Biological Rhythms b. Biological clock c. Circadian Rhythms

(ix) Describe secretory post-ovulatory phase of the menstrual cycle. If fertilization has not occurred then what will be the end of this phase? **(2+1)**

(x) Differentiate between chromosomal mutations and gene/point mutations. Also name this type (44+xo) of syndrome? **(2+1)**

(xi) Differentiate between incomplete dominance and co-dominance along with the help of examples. **(03)**

(xii) Highlight the role of morphogenetic determinants during development of an individual. Enlist results drawn by Spemann during his 'delayed nucleation experiments'. **(1+2)**

(xiii) Give major differences between homologous organs and analogous organs. What types of evolution they represent? **(2+1)**

(xiv) What is demography? What main problems gradually appeared due to population explosion in last few decades? **(1+2)**

(xv) Write down functions of the following: **(1+1+1)**
a. FSH and LH in Male b. Cortisone c. Troponin

(xvi) Describe briefly the three principal methods for the creation of transgenic animals. **(03)**

(xvii) Give the role of Microbes in: **(1.5+1.5)**
a. Yoghurt making b. Vineagar making

(xviii) Differentiate between protein synthesis (translation) of prokaryotes and eukaryotes. **(03)**

(xix) In which form maximum CO_2 transports in the blood towards lungs? Describe briefly chloride shifts or Hamburgers phenomenon. **(1+2)**

SECTION – C (Marks 26)

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

Q. 3 a. What is synapse? Discuss in detail its structure and mechanism of transmission. **(07)**

b. Describe neurosecretory role of posterior lobe of pituitary gland. **(04)**

c. Write down the number and names of brain box bones. **(02)**

Q. 4 a. Describe LAC Operon Model. Give its structure and working during positive regulation of gene expression. **(07)**

b. Discuss the pattern of sex determination commonly found in man and drosophila. **(03)**

c. What is lactation? Name the hormone involved in milk production. Give significance of lactation for a baby. **(03)**

Q. 5 a. Define ecological succession. Give its major kinds. Describe the whole process of xerarch succession. **(07)**

b. Discuss in detail the whole functions of kidney being osmoregulatory organ in human body. **(06)**

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Roll No. | | | | | | |

Answer Sheet No._____

Sig. of Candidate._____

Sig. of Invigilator._____

CHEMISTRY HSSC–II

SECTION – A (Marks 17)

Time allowed: 25 Minutes *(Revised 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) $3Ca + N_2 \rightarrow ?$

A. Ca_2N_3 B. CaN_2 C. Ca_3N_2 D. Ca_3N

(ii) In the organic compounds, the carbon atom generally forms:

A. Covalent bond B. Hydrogen bond C. Ionic bond D. Metallic bond

(iii) Which one of the following oxides is basic in nature?

A. Na_2O B. Al_2O_3 C. P_4O_{10} D. SO_3

(iv) Due to inert pair effect, the elements of group IV having electronic configuration ns^2, np^2 will form:

A. M^{3+} cation B. M^{4+} cation C. M^{+} cation D. M^{2+} cation

(v) The oxidation states $-1, +1, +3, +5$ and $+7$ are shown by all the halogens except:

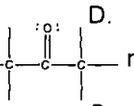
A. Fluorine B. Bromine C. Iodine D. Chlorine

(vi) Pale-green is a characteristic flame colour of:

A. Strontium B. Sodium C. Calcium D. Barium

(vii) Group VIII elements are generally called:

A. Coinage elements B. Halogens
C. Alkali metals D. Noble gases

(viii) The functional group having structure  represents the family called:

A. Carboxylic acid B. Ketones C. Ethers D. Esters

(ix) The IUPAC name of the compound $HC \equiv C - CH = CH - CH_3$ is:

A. Penta – 2 – ene – 4 – yne B. Penta – 3 – ene – 5 – yne
C. Penta – 3 – ene – 1 – yne D. Penta – 4 – ene – 2 – yne

(x) The compounds, n-Butane and Isobutane are best considered as:

A. Functional group isomers B. Chain isomers
C. Positional isomers D. Metamers

(xi) Reduction of Alkyl Nitriles gives:

A. Sec: amines B. Alcohols C. Alkanes D. Primary amines

(xii) Acetone can be obtained by the oxidation of:

A. 2-propanol B. Propanal C. Ethanol D. 1-propanol

(xiii) The Nitration of phenol at 25^oC produces:

A. Phenol nitrate B. Toluene C. O-nitrophenol D. Benzene

(xiv) The long chains of monosaccharides are called:

A. Proteins B. Vitamins C. Oils D. Carbohydrates

(xv) Which of the following is **NOT** an Alternative to ozone depleting Chlorofluorocarbon (CFCs)?

A. Hydrocarbons B. CO_2
C. Hydrofluorocarbons (HFCs) D. Perflourocarbons (PFCs)

(xvi) Which of the following technique **DOES NOT** involve electromagnetic radiations?

A. Nuclear magnetic resonance spectroscopy
B. Ultraviolet
C. Infrared spectroscopy
D. Mass spectroscopy

(xvii) Double bond is formed as a result of:

A. Addition reaction B. Polymerization reaction
C. Substitution reaction D. Elimination reaction

For Examiner's use only:

Total Marks: 17

Marks Obtained:

27

CHEMISTRY HSSC–II

(Revised 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 are the elements of group I called alkali metals? **01**

b. How do the elements of group I resemble with group II elements? **02**

(ii) Write down the chemical reactions of the following elements of 3rd period with chlorine: **03**

a. Sodium

b. Aluminum

c. Silicon

(iii) Briefly discuss the metallic and Non-metallic character of group IV elements. **03**

(iv) Why is Zinc group included in transition elements? Give reason. **03**

(v) What is the trend of following properties of group VII elements? **03**

a. Atomic radius

b. Melting and Boiling points

(vi) Write down the procedure for the detection of carbon and hydrogen in the organic compound. **03**

(vii) a. Define the term homologous series. **01**

b. Give four characteristics of Homologous series. **02**

(viii) How can alkenes be used to prepare? **03**

a. Vicinal dibromide

b. Alkyl halides

c. Alkane

(ix) Predict the major product of bromination of following compounds by their reactions: **03**

a. Toluene

b. Nitrobenzene

c. Benzene

(x) Write down condensation reactions: **03**

a. Between two identical ketones

b. Between aldehyde and ketone

(xi) Starting from Ethyl chloride, how will you prepare: **03**

a. Ethanol

b. Primary Amines

c. n-Butane

(xii) How is phenol prepared from? **03**

a. Chlorobenzene

b. Sodium Benzene sulphonate

c. Aryldiazonium salt

(xiii) a. What are alkanoic acids? **01**

b. Write down the reactions for the preparation of its two derivatives **02**

(xiv) Give step-wise mechanism for Alcohol condensation to give an ether. **03**

(xv) a. What is the difference between organic and inorganic compounds? **01**

b. Write down four uses of organic compounds in our daily life. **02**

(xvi) Define and give one example of each the following: **03**

a. Dyes

b. Thermosetting polymers

c. Petro Chemicals

(xvii) What are Ethers? Give their classification. **01+02**

(xviii) a. What is acid rain? **01**

b. Write down two adverse effects of acid rain on our environment. **02**

(xix) a. What are proteins? **01**

b. Give two important functions of proteins in the human body. **02**

SECTION – C (Marks 26)

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

Q. 3 **a.** Explain the periodicity of following properties of 3rd period elements of periodic table:

(i) Atomic radius **02**

(ii) Ionization Energy **02**

(iii) Electrical Conductivity **02**

b. Discuss the trends in solubility of Hydroxides of group II elements. **04**

c. What is spectroscopy? Name four spectroscopic techniques used in modern methods of analysis. **01+02**

Q. 4 **a.** Give a flow-sheet diagram for the classification of Hydrocarbons on the basis of structure. Also give one example of each type. **05**

b. Write down the steps of free radical chain mechanism for the bromination of methane. **04**

c. Write down two chemical reactions in which Benzene behaves as an unsaturated compound. **04**

Q. 5 **a.** Distinguish Primary, Secondary and Tertiary alcohols with the help of reactions. **04**

b. Write down the structures of following compounds: **04**

(i) Trans-Butene dioic acid

(ii) n-Butyl bromide

(iii) 3-Methyl – 1 – Butyne

(iv) Cyclo-1, 3-hexadiene

c. Explain the following with the help of suitable examples:

(i) Metamerism **02**

(ii) Geometrical Isomerism **03**

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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 and comprises pages 1–2. 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) Keeping in view the size of atoms which order is correct?
A. $Mg > Sr$ B. $Ba > Mg$ C. $Lu > Ce$ D. $Cl > I$

(ii) Rock salt (Halite) is a mineral containing _____ metal.
A. K B. Ca C. Na D. Mg

(iii) Which acid can dissolve vitreous silica?
A. $HClO_4$ B. HNO_3 C. HOF D. HF

(iv) Coating of which element upon iron can lead to sacrificial corrosion if damaged:
A. Sn B. Zn C. Pb D. Cu

(v) Which compound of xenon requires more severe conditions if prepared by direct combination of xenon and molecular fluorine?
A. $XeOF_2$ B. XeF_2 C. XeF_4 D. XeF_6

(vi) The brown gas formed when metal reduces conc. Nitric acid is:
A. N_2O_5 B. N_2O_3 C. NO_2 D. NO

(vii) 1-Butene and 2-Butene are _____ isomers of each other.
A. Functional group B. Tautomeric C. Positional D. Chain

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

(ix) Which of the following compounds can produce white precipitates with ammonical silver Nitrate?
A. Ethyne B. Ethene C. Ethane D. 2-Butyne

(x) Which one is ortho and para directing group in electrophilic substitution reactions of benzene?
A. $-\overset{+}{N}R_3$ B. $-COR$ C. $-N(CH_3)_2$ D. $-NO_2$

(xi) When CO_2 is made to react with ethyl magnesium iodide followed by acid hydrolysis, the product formed is:
A. Propane B. Propanoic acid C. Propanal D. Propanol

(xii) Which of the following alcohols will immediately form oily layer with $conc.HCl$ in anhydrous $ZnCl_2$?
A. Ethanol B. 1-propanol
C. 2-propanol D. 2-methyl-2-propanol

(xiii) Acetone can be prepared by dry distillation of:
A. Calcium formate B. Calcium oxalate
C. Calcium acetate and calcium formate D. Calcium Acetate

(xiv) An aqueous solution of an organic compound reacts with Na_2CO_3 to produce carbondioxide. Which one of the following could be the organic compound?
A. $CH_2 = CH - CH_3$ B. CH_3CHO
C. $CH_3COOC_2H_5$ D. CH_3COOH

(xv) Which one of these polymers is an addition polymer?
A. Nylon-6,6 B. Polystyrene C. Epoxyresin D. Polyester

(xvi) Which one of the following is not micronutrient for plants?
A. Fe B. Cl C. Zn D. S

(xvii) Which substance acts as catalyst in the depletion of Ozone layer?
A. Chlorofluoro carbons B. Atomic oxygen
C. Atomic chlorine D. Peroxy acetyl nitrate

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) Give reasons for the following:

a. The oxidation states vary in a period but remain almost constant in a group. **1.5**

b. Metallic characters decrease from left to right in a period. **1.5**

(ii) Mention three differences between Lithium and other alkali metals. **03**

(iii) How is ordinary mortar prepared? Also mention reactions which take place when mortar hardens? **03**

(iv) a. What are Silicones? **01**

b. Why are silicones preferred over ordinary organic Lubricants? **02**

(v) How can Nitric acid be prepared by Birkeland and Eyde's process? **03**

(vi) Prove by writing chemical equations that $KMnO_4$ and $K_2Cr_2O_7$ can oxidize ferrous sulphate to ferric sulphate in the presence of sulphuric acid. **03**

(vii) Cl_2 can displace bromide and iodide ions from aqueous solutions of their salts but can not displace fluoride ions from aqueous solution of sodium fluoride. Why? **03**

(viii) Write IUPAC names of the following complexes: **03**

a. $\left[pt(C_2O_4)_2\right]^{-2}$ b. $\left[ptCl(NO_2)(NH_3)_4\right]SO_4$ c. $\left[Fe(CO)_5\right]$

(ix) In the following reactions identify each lettered product.

a. Ethyl alcohol $\xrightarrow[180^\circ C]{conc.H_2SO_4} A \xrightarrow{Br_2} B \xrightarrow[alcohol]{KoH} C$ **1.5**

b. Propene $\xrightarrow{Br_2} D \xrightarrow[alcohol]{KoH} E \xrightarrow{HCN} F$ **1.5**

(x) Write mechanism when benzene reacts with chloromethane in the presence of Aluminum Chloride. **03**

(xi) How will you carry out the following conversions?

a. Methane to propanoic acid **02**

b. n-propyl chloride to propene **01**

(xii) a. Define fermentation. **01**

b. How is Molasses is converted to ethanol by fermentation? **02**

(xiii) Why Ketones do not undergo oxidation easily as compared to aldehydes? **03**

(xiv) Using Ethyne as starting material how would you get acetaldehyde and Acetone? **03**

(xv) a. Write neutral structure and Zwitter ion structure for general formula of α –amino acid. **01**

b. How can Alanine be prepared by strecker synthesis? **02**

(xvi) Define the following terms:

a. Saponification number of Fats **1.5**

b. Rancidity of Fats and Oils **1.5**

(xvii) What is acid rain? Briefly describe its harmful effects. **1+2**

(xviii) Describe the steps of digestion in the preparation of pulp. **03**

(xix) Describe mechanism for the preparation of ethane by electrolysis of sodium salt of monocarboxylic acid. **03**

SECTION – C (Marks 26)

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

Q. 3 **a.** How is steel manufactured by open hearth process? **05**

b. How does chlorine react with hot and cold sodium hydroxide? **04**

c. What is Aqua Regia? For what purpose is it employed? **04**

Q. 4 **a.** Write in detail the differences between SN_1 and SN_2 mechanisms of nucleophilic substitution reactions with reference to alkyl halides. **06**

b. How were straight chain structures of benzene ruled out? **04**

c. Write structural formula for the following compounds? **03**

(i) Picric acid (ii) Lactic acid (iii) 2,4,6-Trinitrotoluene (TNT)

Q. 5 **a.** What are proteins? Briefly describe various types of proteins. **04**

b. How does oil spillage affect marine life? **03**

c. Enlist two similarities and two differences between Hydrogen and halogens. **04**

d. Complete and balance the following reactions: **02**

(i) $KO_2 + CO_2 \longrightarrow$

(ii) $Mg_3N_2 + H_2O \longrightarrow$

30

Roll No. | | | | | | |

Answer Sheet No._____

Sig. of Candidate._____

Sig. of Invigilator._____

CHEMISTRY HSSC–II

SECTION – A (Marks 17)

Time allowed: 25 Minutes *(Revised 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 of the following oxides is acidic?
A. Al_2O_3 B. BeO C. CO_2 D. MgO

(ii) $CaO + SO_3 \rightarrow CaSO_4$
The above reaction is a type of:
A. Acid-Base reaction B. Redox reaction
C. Precipitation reaction D. Sulphonation reaction

(iii) Chlorine (VII) oxide (Cl_2O_7) reacts with water to give a strong acid:
A. $HClO$ B. $HClO_2$ C. $HClO_3$ D. $HClO_4$

(iv) The oxidation number of central metal ion in the complex $Na[Mn(CO)_5]$ is:
A. +1 B. +2 C. – 1 D. +5

(v) Bronze is an alloy of:
A. Cu and Sn B. Cu and Zn C. Ni, Cr and Fe D. Cu and Ca

(vi) The refining of petroleum is carried out by the process called:
A. Vacuum distillation B. Fractional distillation
C. Destructive distillation D. Steam distillation

(vii) The electrophile in aromatic sulphonation is:
A. H_2SO_4 B. HSO_4^- C. SO_3 D. SO_4^{-2}

(viii) Chose the mismatched pair from the following:

	Polymer		Monomer
A.	Starch	———	Glucose
B.	Protein	———	Amino acid
C.	Polythene	———	Ethene
D.	PVC	———	Phenyl chloride

(ix) Water adds to acetylene in the presence of mercuric sulphate dissolved in $Conc: H_2SO_4$ to give a stable product called:
A. Acetaldehyde B. Acetic acid C. Ethyl alcohol D. Ethylene glycol

(x) Formaldehyde on reaction with methyl magnesium bromide produces:
A. Methanol B. Ethanol C. 1-propanol D. 2-propanol

(xi) Isobutyric acid is also called:
A. 2-methyl propanoic acid B. Butanoic acid
C. Propan-dioic acid D. 2,2 dimethyl propan-dioic acid

(xii) The formation of soap by the reaction of Fat and Sodium hydroxide is called:
A. Hydrogenation B. Neutralization C. Saponification D. Esterification

(xiii) Isomers of a substance must have:
A. Same chemical properties B. Same Molecular weight
C. Same structural formula D. Same functional group

(xiv) Cyclopropane is an example of:
A. Aromatic compounds B. Alicyclic compounds
C. Aliphatic compounds D. Heterocyclic compounds

(xv) Ecosystem is the smallest unit of:
A. Lithosphere B. Hydrosphere C. Atmosphere D. Biosphere

(xvi) Mass spectroscopy is used to determine:
A. Molecular weight B. Molecular formula
C. Molecular structure D. Alignment of nuclei in magnetic field

(xvii) Benzene can Undergo all the following reactions except:
A. Elimination B. Substitution C. Oxidation D. Addition

For Examiner's use only:

Total Marks: 17

Marks Obtained:

CHEMISTRY HSSC–II

(Revised Syllabus)

31

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 elements of group I Form M^{+} but not M^{2+} ? **01**

b. Why do group I metals show strong reducing properties? Explain. **02**

(ii) Complete the following reactions of 3rd period elements with water: **03**

a. $2Na + 2H_2O \xrightarrow[Cold]{} ?$

b. $Mg + 2H_2O \xrightarrow[Steam]{} ?$

c. $2Cl_2 + 2H_2O \xrightarrow{Sunlight} ?$

(iii) Explain why CO_2 is gas while SiO_2 is solid, although both carbon and silicon belong to same group. **03**

(iv) Write down the chemical formulae of the following complex compounds: **03**

a. Potassium hexacyanoferate (II)

b. Tetraammine copper (II) sulphate

c. Dichlorotetraammine cobalt (II) chloride

(v) Discuss the effect of adding H^{+} ions and OH^{-} ions on the equilibrium of following reaction: **03**

$2CrO_4^{2-} + 2H^{+} \rightleftharpoons Cr_2O_7^{2-} + H_2O$

(vi) Why Lithium salts are more covalent than the salts of other alkali metals?Explain. **03**

(vii) How will you detect the presence of Nitrogen in the organic compound using Lassaign's solution? **03**

(viii) How acetone reacts with: **03**

a. Hydroxylamine

b. Iodiine in the presence of $NaOH$ or Na_2CO_3

c. Hydrazine

(ix) Starting from Ethyne, how will you synthesize the following compounds: **03**

a. Ethane

b. 1,1-dibromoethane

c. Disilver acetylide

(x) How alkyl halides react with: **03**

a. Alcohol

b. Mg in the presence of ether

c. Ammonia

(xi) Write down step-wise mechanism for alcohol condensation to form alkene. **03**

(xii) Phenol is more reactive towards electrophilic aromatic substitution reactions. Explain why? **03**

(xiii) Justify the following decreasing order of reactivity: **03**

Alkenes > Alkynes > Alkanes

(xiv) How are the Carboxylic acids obtained from? **03**

a. Nitriles

b. Grignard's reagent

c. Aldehydes

(xv) a. What are amines? **01**

b. Amines are more basic than corresponding alcohols. Why? **02**

(xvi) a. Define is spectroscopy. **01**

b. Describe the principle of spectroscopy. **02**

(xvii) Write down the structures of following compounds: **03**

a. Vinyl alcohol

b. 1, 3, 5 - cyclohexatriene

c. Carbolic acid

(xviii) a. What are Hydrocarbons? **01**

b. Why is Benzene called aromatic Hydrocarbon? **02**

(xix) "High concentration of CO_2 in the atmosphere is responsible for the climatic changes". Comment. **03**

SECTION – C (Marks 26)

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

Q. 3 **a.** How does Berrylium differ from other elements of its own group? **06**

b. The Acidic character of Hydrides of group VII elements increases on descending down the group. Why? **04**

c. How is V_2O_5 used as a catalyst for the oxidation of SO_2 to SO_3? **03**

Q. 4 **a.** Discuss the following factors affecting substitution versus elimination reactions of alkyl halides: **06**

(i) Structure of substrate

(ii) Nature of base

(iii) Temperature

b. Give two chemical reactions in which Benzene behaves as a saturated compound. **04**

c. How is Grignard's reagent used to prepare Primary, Secondary and Tertiary alcohols? **03**

Q. 5 **a.** Discuss the chemistry and mechanism of cannazzaro's reaction. **03**

b. Differentiate between: **06**

(i) Paraffins and olefins

(ii) Position and Functional group isomerism

(iii) Thermoplastic and thermosetting polymers

c. What are carbohydrates? Give three major functions of carbohydrates in human body. **01+03**

Roll No. | | | | | | |

Answer Sheet No. 42

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) Which of the following key combinations is used to RUN a C program?

A. Alt + F5 B. Alt + F9 C. Ctrl + F5 D. Ctrl + F9

(ii) **.exe** file is produced by:

A. Loader B. Compiler C. Linker D. Editor

(iii) The scope of a variable refers to:

A. Length B. Name C. Accessibility D. Data Type

(iv) A field-width specifier in a printf() function:

A. Controls the margins of the program listing
B. Specifies the maximum value of a number
C. Specifies how many columns will be used to print the number
D. Controls the size of type used to print numbers

(v) After executing **a = 10 ; b = a ++ ;** the value stored in **b** is:

A. 9 B. 10 C. 11 D. 12

(vi) The statement **I + = 3;** has the same effect as:

A. I = I + 3; B. I = 3; C. I – 3 = I; D. I = 3 + 3;

(vii) The logical not (!) operator is a:

A. Unary operator B. Binary operator
C. Ternary operator D. Bitwise operator

(viii) A do-while loop is more appropriate than for loop when:

A. The terminating condition occurs unexpectedly
B. The body of loop will be executed at least once
C. The number of times the loop will be executed is known before the loop is executed
D. The program will be executed more than one time

(ix) An expression in the absence of parentheses, will be evaluated in the following order:

A. Assignment, Relational, Arithmetic B. Arithmetic, Relational, Assignment
C. Relational, Arithmetic, Assignment D. Assignment, Arithmetic, Relational

(x) The parameters specified in function header are:

A. Actual parameters B. Default parameters
C. Command Line parameters D. Formal parameters

(xi) When writing one character at a time to a file the following function is used:

A. putc ( ) B. getc ( ) C. fputs ( ) D. fgets ( )

(xii) What could be the other name for the duplication of data in many different files?

A. Data atomicity B. Data inconsistency
C. Data redundancy D. Data dependency

(xiii) It is not the characteristic of relation:

A. Each row is unique B. Order of column is significant
C. Order of row is insignificant D. Columns are atomic

(xiv) In MS-Access, which of the following forms is used to display single record at a time:

A. Columnar B. Datasheet C. Tabular D. None of these

(xv) The resulting collection of records in a query is called:

A. Macro B. Dynaset C. DFD D. Pointer

For Examiner's use only:

Total Marks: 15

Marks Obtained:

COMPUTER SCIENCE HSSC–II

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) Compare machine and high level languages.

(ii) Differentiate source code and object code.

(iii) For what purpose are header files used in C programs? Give an example also.

(iv) Write down the rules for naming variables.

(v) Why is a logical error difficult to detect as compared to syntax error? Give an example also.

(vi) What are the uses of comments?

(vii) What is operator precedence?

(viii) Write down the purpose and syntax of scanf ( ) function.

(ix) Write down the purpose and syntax of while loop.

(x) Distinguish between local and global variables.

(xi) Briefly describe the purpose and syntax of getc ( ) function.

(xii) List the uses of three file access modes in C language.

(xiii) What would be the output of the following program?

```
#include<stdio.h>
void main (void)
{
        int n =11;
        while (n>=1)
        {
                if(n%2==0)
                        printf("%d\t",n);
                n – – ;
        }
}
```

(xiv) Indicate and correct the errors from the following code (if any)?

```
#include<stdio.h>
void main (void)
{
        int x , y;
        if ( x = y);
            printf("numbers are equal");
        else
            printf("numbers are not equal);
}
```

(xv) What is the purpose of following data types in MS-Access?

a. Text b. Auto number c. Yes / No

(xvi) Differentiate between primary and foreign key.

(xvii) What is one-to-one relationship? Illustrate with an example.

SECTION – C (Marks 21)

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

Q. 3 Create a C program to find the factorial value of any number entered through the keyboard. **(07)**

Q. 4 **a.** Distinguish between the Nested if-else and Switch statement. **(03)**

b. Write down the uses of functions. What is a function prototype? Illustrate with an example. **(04)**

Q. 5 What is a query? What are the uses of queries in data base? Explain different types of queries. **(1+2+4)**

Q. 6 **a.** Write a brief note on: (i) Referential Integrity (ii) Report **(04)**

b. Define DBMS. Discuss advantages of DBMS. **(1+2)**

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

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

MATHEMATICS HSSC–II

SECTION – A (Marks 20)

Time allowed: 25 Minutes

NOTE: Section–A is compulsory and comprises pages 1–2. 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) If $\underline{u}=3\underline{i}+2\underline{k}$, $\underline{v}=\underline{i}+2\underline{j}+\underline{k}$ and $\underline{w}=-\underline{j}+4\underline{k}$ then $(\underline{u}\times\underline{v}).\underline{w}=?$

A. 25 B. $\sqrt{25}$ C. $5\sqrt{2}$ D. $25a$

(ii) What is domain of f^{-1}, when $f(x)=2+\sqrt{x-1}$

A. Real Number B. $[1,\infty]$ C. $[2,+\infty]$ D. $[-1,1]$

(iii) For parametric equations $x=at^2$; $y=2at$ represent the equation:

A. $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ B. $x^2+y^2=1$ C. $y^2=4ax$ D. $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

(iv) $\lim\limits_{n\to+\infty}[1+\frac{1}{n}]^{2n}=?$

A. zero B. e^{2n} C. e^2 D. e^n

(v) Derivative of $\sin^3 x$ *w.r.t* $\cos^2 x$ is:

A. $\frac{3}{2}\tan x.\sec x.$ B. $-\frac{3}{2}\sin x$ C. $\frac{3\sin^2 x}{2\cos x}$ D. $3\sin^2 x$

(vi) $\frac{d}{dx}\ a^x=?$

A. $\ell n\, a$ B. $a^x.\ell n\, a$ C. $a^x.\ell n\, x$ D. a^x

(vii) Notation used for derivative of $y=f(x)$ is:

A. $\int y dx$ B. $\frac{dy}{dx}$ C. $f''(x)$ D. $D^2 f(x)$

(viii) If $y=(2x+5)^{\frac{3}{2}}$, then y_2 will be:

A. $\frac{3}{2x+5}$ B. $3(2x+5)^{\frac{1}{2}}$ C. $\frac{3}{\sqrt{2x+5}}$ D. $6(2x+5)^{-\frac{1}{2}}$

(ix) $\int x\, e^x dx=?$

A. xe^x+c B. xe^x C. xe^x-e^x+c D. xe^x+e^x+c

(x) $\int_1^2 (x^2+1)dx=?$

A. $\frac{x^3}{3}+x+c$ B. $\frac{10}{33}$ C. 10 D. $\frac{10}{3}$

DO NOT WRITE ANYTHING HERE

(xi) Solution of $ydx + xdy = 0$ is:

A. $xy = 1$ B. zero C. $xy = 0$ D. $xy = c$

(xii) Two lines ℓ_1 and ℓ_2 with respective slopes m_1 and m_2 are parallel if:

A. $m_1 - m_2 = -1$ B. $m_1 . m_2 = -1$ C. $m_1 + m_2 = -1$ D. $m_1 = m_2$

(xiii) The equation of the straight line whose slope is 2 and y-intercept is 5 is:

A. $\frac{y-5}{x-2} = m$ B. $y = 5x + 2$ C. $y = x + 2$ D. $y = 2x + 5$

(xiv) If lines are parallel, then solution:

A. Does not exist B. Is finite C. Exists D. Is infinite

(xv) An expression involving any of the symbols $<$, $>$, $\leq$, $\geq$ is called:

A. Inequality B. Equation C. Not inequality D. Identity

(xvi) The equation of the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ has radius:

A. $\sqrt{g^2 + f^2 - c}$ B. $g^2 + f^2 - c$ C. $g^2 + f^2$ D. $(-g, -f)$

(xvii) A line that touches the curve without cutting through it is called:

A. Tangent B. Secant C. Radius D. Normal

(xviii) The point of parabola which is closest to the focus is the vertex of the:

A. Circle B. Parabola C. Ellipse D. Hyperbola

(xix) Unit vector in the same direction of vector $\underline{v} = [3, -4]$:

A. $3(5)\ , -4(5)$ B. $3\underline{i} - 4\underline{j}$ C. $\left[\frac{3}{5}, \frac{-4}{5}\right]$ D. $\left[\frac{3}{5}, \frac{4}{5}\right]$

(xx) Altitudes of a triangle are always:

A. Perfect squares B. Parallel C. Perpendicular D. Concurrent

---

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) Evaluate $\lim_{\theta \to 0} \frac{1-\cos\theta}{\sin^3\theta}$

(ii) Graph the curve of following parametric equations $x = \sec\theta$, $y = \tan\theta$ where θ is a parameter.

(iii) Find $\frac{dy}{dx}$ if $x^2 - 4xy - 5y = 0$

(iv) If $y = \sqrt{\tan x + \sqrt{\tan x + \sqrt{\tan x +}}}$ .....,∞ then prove that $(2y-1)\frac{dy}{dx} = \sec^2 x$

(v) Find $\frac{dy}{dx}$ for $y = x.\ e^{\sin x}$

(vi) Evaluate $\int x(\sqrt{x}+1)\,dx$

(vii) Evaluate $\int_{-2}^{0} \frac{1}{(2x-1)^2} dx$

(viii) Show that the points $A(3\ ,\ 1)$, $B(-2\ ,\ -3)$ and $C(2\ ,2)$ are vertices of an isosceles triangle.

(ix) Find an equation of the line through $(-4,-6)$ and perpendicular to a line having slope $\frac{-3}{2}$

(x) Find an equation of the circle whose ends of a diameter are at $(-3,2)$ and $(5,-6)$.

(xi) Find an equation of the parabola whose focus is $F(-3,4)$ and directrix is $3x - 4y + 5 = 0$

(xii) Find the points of intersection of the given coinc $3x^2 - 4y^2 = 12$; $3y^2 - 2x^2 = 7$

(xiii) Prove that the line segment joining the mid points of two sides of a triangle is parallel to the third side and half as long.

(xiv) Find area of triangle, determined by the points P, Q and R.

P (0, 0, 0) , Q (2, 3,2) , R (-1,1,4)

SECTION – C (Marks 40)

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

Q. 3 If $$f(x) = \begin{cases} \frac{\sqrt{2x+5} - \sqrt{x+7}}{x-2} & x \neq 2 \\ k & x = 2 \end{cases}$$

Then find value of k so that f is continuous at $x = 2$

Q. 4 Show that $\frac{dy}{dx} = \frac{y}{x}$ if $\frac{y}{x} = \tan^{-1}\frac{x}{y}$

Q. 5 Solve the differential equation $(x^2 - yx^2)\frac{dy}{dx} + y^2 + xy^2 = 0$

Q. 6 Find the interior angle of the triangle whose vertices are $A(-2,11)$, $B(-6,-3)$, $C(4,-9)$

Q. 7 Maximize $f(x,y) = 2x + 5y$ subject to the constraints $2y - x \leq 8$; $x - y \leq 4$; $x \geq 0$; $y \geq 0$

Q. 8 Let a be positive number and $0 < c < a$. Let $F(-c,0)$ and $F'(c,0)$ be two given points. Prove that the locus of points of $P(x,y)$ such that $|PF| + |PF'| = 2a$ is an ellipse.

Q. 9 Find a unit vector perpendicular to the plane containing $\underline{a}$ and $\underline{b}$. Also find sine of triangle between them while $\underline{a} = 2\underline{i} - 6\underline{j} - 3\underline{k}$, $\underline{b} = 4\underline{i} + 3\underline{j} - \underline{k}$

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Roll No. | | | | | | |

Answer Sheet No._____

Sig. of Candidate._____

Sig. of Invigilator._____

MATHEMATICS HSSC–II

SECTION – A (Marks 20)

Time allowed: 25 Minutes

NOTE: **Section–A is compulsory and comprises pages 1–2. 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) $\lim_{x\to 0}(1+x)^{\frac{1}{x}} = ?$

A. e^x B. ∞ C. $e^{\frac{1}{x}}$ D. e

(ii) For real valued function $f(x) = 2x+1$ what will be $fof(x)$?

A. $3x-4x$ B. $2x-1$ C. $2x+1$ D. $4x+3$

(iii) Evaluate $\lim_{\theta\to 0}\frac{\sin 7\theta}{\theta}$:

A. Zero B. $\frac{1}{7}$ C. 7 D. One

(iv) $\int \sin 3x\, dx = ?$

A. $3\sin 3x + C$ B. $-\cos 3x$ C. $\frac{-\cos 3x}{3}+C$ D. $\frac{-\cos 3x}{3}$

(v) $\frac{d}{dx}\sec x = ?$

A. $\tan x$ B. $\cos x$ C. $\sec x.\tan x$ D. $\frac{1}{\cos x}$

(vi) If $y = 2x^5 - 3x^4 + 4x^3 + x - 2$ then $y_2 = ?$

A. $\frac{dy^2}{dx}$ B. $40x^3 - 36x^2 + 36x$

C. $y_2 - y_1$ D. dy_2

(vii) $\frac{d}{dx}\sin h\, x = ?$

A. $\frac{e^x - e^{-x}}{2}$ B. $\cosh x$ C. $\frac{1}{\cos echx}$ D. $\frac{e^x + e^{-x}}{2}$

(viii) $\int_1^3 \frac{x^2}{2}dx = ?$

A. 4.3 B. $\frac{x^3}{3}+C$ C. $\frac{x^3}{6}+C$ D. $\frac{x^3}{6}$

(ix) $\int_{-\pi}^{\pi} \sin x\, dx = ?$

A. $\cos x$ B. Zero C. $-\cos x$ D. 1

DO NOT WRITE ANYTHING HERE

(x) Altitudes of a triangle are:

A. Concurrent B. Equivalent C. Equal D. Collinear

(xi) Distance between $(-1,2)$ and $(7,5)$ is:

A. ± 73 B. $2\sqrt{73}$ C. 73 D. $\sqrt{73}$

(xii) Equation of a non-vertical straight line with slope m and y intercept c is:

A. $y \leq mx + c$ B. $y = mx + c$ C. $y = mx$ D. $y > mx + c$

(xiii) Region which is restricted to the 1st quadrant is called:

A. Feasible region B. Feasible area

C. Feasible solution D. Solution

(xiv) $y^2 = 4ax$ is the standard equation of:

A. Circle B. Parabola C. Ellipse D. Hyperbola

(xv) If $0 < e < 1$, then conic is called:

A. Circle B. Hyperbola C. Parabola D. Ellipse

(xvi) The circle is a special case of:

A. An Ellipse B. Distance C. Parabola D. Hyperbola

(xvii) The dot product of vectors $\underline{u}$ and $\underline{v}$ is:

A. $\cos\theta.\sin\theta$ B. $|\underline{u}||\underline{v}|\cos\theta$ C. $uv\sin\theta$ D. $|\underline{u}||\underline{v}|\sin\theta$

(xviii) If $P = (2,3), Q(6,-2)$, then vector $\overrightarrow{PQ}$ is:

A. $\frac{4\underline{j} - 5\underline{i}}{\sqrt{41}}$ B. $\frac{4\underline{i} - 5\underline{j}}{\sqrt{41}}$ C. $4\underline{i} - 5\underline{j}$ D. $4 - 5\underline{k}$

(xix) Unit vector in the direction of vector $\underline{v} = 2\underline{i} - \underline{j}$:

A. $2\underline{i} + \underline{j}$ B. $2\underline{i} - \underline{j}$ C. $\frac{2\underline{i} - \underline{j}}{\sqrt{5}}$ D. $\sqrt{5}$

(xx) $\frac{d}{dx}(ax+b)^3 = ?$

A. $3a(ax+b)^3$ B. $3(ax+b)^2$ C. $3a(ax+b)$ D. $3a(ax+b)^2$

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) Evaluate $\lim_{\theta\to 0}\frac{\tan\theta-\sin\theta}{\sin^3\theta}$

(ii) Graph the curve of following parametric equations $x=t^2$, $y=t$ and $-2\le t\le 2$

(iii) Differentiate $\frac{2x-3}{2x+1}$

(iv) Find $\frac{dy}{dx}$ of following parametric functions $x=\theta+\frac{1}{\theta}$, $y=\theta+1$

(v) Find the extreme value of the function $f(x)=x^2-x-2$

(vi) Evaluate $\int\frac{dx}{\frac{1}{2}\sin x+\frac{\sqrt{3}}{2}\cos x}$

(vii) Solve the differential equation $x.dy+y\ (x-1)\ dx=0$

(viii) Evaluate $\int\frac{1-x^2}{1+x^2}\,dx$

(ix) Using slope, show that the triangle with its vertices $A(6,1)$, $B(2,7)$ and $C(-6,-7)$ is a right angled triangle.

(x) Find the point of intersection of the lines $x-2y+1=0$ and $2x-y+2=0$

(xi) Prove that the normal lines of a circle passes through the centre of the circle.

(xii) Find an equation of the ellipse having centre at $(0,0)$, focus at $(0,-3)$ and one vertex at $(0,4)$. Sketch its graph.

(xiii) Prove that the angle in a semicircle is a right angle.

(xiv) If $\underline{a}\times\underline{b}=0$ and $\underline{a}.\underline{b}=0$ what conclusion can be drawn about $\underline{a}$ or $\underline{b}$?

SECTION – C (Marks 40)

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

Q. 3 If θ is measured in radian, then prove that $\lim_{\theta\to 0}\frac{\sin\theta}{\theta}=1$

Q. 4 If $y=x^4+2x^2+2$, then prove that $\frac{dy}{dx}=4x\sqrt{y-1}$

Q. 5 Evaluate $\int\frac{x^2+3x-34}{x^2+2x-15}\,dx$

Q. 6 Find an equation of the line through $(11,-5)$ and parallel to a line with slope -24

Q. 7 Prove that the Latus rectum of the Ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is $\frac{2b^2}{a}$

Q. 8 Graph the feasible region and corner points of the following linear inequalities:

$2x-3y\le 6$, $2x+3y\le 12$, $x\ge 0$, $y\ge 0$

Q. 9 A Force $F=7\underline{i}+4\underline{j}-3\underline{k}$ is applied at $P(1,-2,3)$. Find its moment about the point $Q(2,1,1)$

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Roll No. | | | | | | |

Answer Sheet No._____

Sig. of Candidate._____

Sig. of Invigilator._____

PHYSICS HSSC–II

SECTION – A (Marks 17)

Time allowed: 25 Minutes

NOTE: **Section–A is compulsory and comprises pages 1–2. 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) Molecular spectra are examples of:

A. Line spectra B. Solar spectra

C. Continuous spectra D. Band spectra

(ii) A radioactive decay rate of 3.7×10^{10} disintegrations per second defines the unit of measurement known as the:

A. Rad B. Curie

C. Rutherford D. Rontgen

(iii) Two charges of $10\mu C$ and $14.4\mu C$ are 12cm apart. The force between them is:

A. $9\times10^{7}N$ B. $0.01N$

C. $90N$ D. $9\times10^{5}N$

(iv) The minimum indivisible unit of charge is:

A. The charge on an electron B. One micro coulomb

C. One Coulomb D. The charge on α–particle

(v) The proportionality constant between current and potential difference is:

A. R B. $\frac{1}{P}$

C. P D. $\frac{1}{R}$

(vi) Which of the following properties affects the resistivity of all metals to a great extent?

A. Temperature B. Applied magnetic field

C. Pressure D. Volume

(vii) The magnetic force on an electron travelling $10^{8}ms^{-1}$ perpendicular to a field of strength $1\,Wbm^{-2}$ is:

A. $10^{-11}N$ B. $1.6\times10^{-11}N$

C. Zero D. $10^{8}N$

(viii) If current in two nearby loops is in same order. They:

A. Neither attract or repel B. Attract and Repel

C. Attract D. Repel

(ix) The direction of induced current is always so as to oppose the change which causes the current. This is the statement of:

A. Gauss's law B. Ampere's Law

C. Faraday's Law D. Lenz's Law

(x) Devices that consume electrical energy in the external circuit of generator are know as:

A. Motors B. Appliances

C. Loads D. Machines

(xi) Which one of the following is **NOT** an Advantage of using A.C?

A. Stopping up or down to required voltage B. Maximum line losses

C. Low cost long distance Transmission D. Minimum line losses

(xii) Impedance of series circuit at resonance is:

A. Resistive B. Inductive and Capacitive

C. Inductive D. Capacitive

(xiii) The smallest 3-dimensional structure of crystalline solid which repeats over and over again is:

A. Crystal B. Unit cell

C. Polymer D. Amorphous

(xiv) A crystalline structure yttrium barium copper oxide ($Y Ba_2 Cu_3 O_7$) becomes super conductor at:

A. 200 K B. 173 K

C. 100 K D. 163 K

(xv) Photo diode is **NOT** used in:

A. Logic circuits B. Photo voltaic cell

C. Detection of light D. Automatic switching

(xvi) The gain of the inverting amplifier of external resistances, $R_1 = 50\ K\Omega$ and $R_2 = 200\ K\Omega$ is:

A. -4 B. -6

C. -1 D. -2

(xvii) The Stefen–Baltzman law which relates rate of radiation for a black body to its surface temperature 'T' has the form:

A. $E = \sigma T^2$ B. $E = \sigma T^{-2}$

C. $E = \sigma T^4$ D. $E = \sigma T^{-4}$

For Examiner's use only:

Total Marks:	17
Marks Obtained:	

PHYSICS HSSC–II

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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)

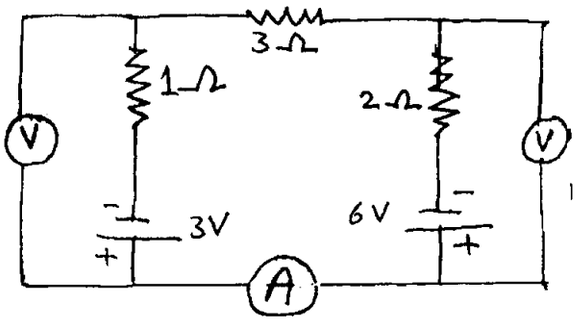
Q. 2 Answer any FOURTEEN parts. The answer to each part should not exceed 3 to 4 lines. (14 x 3 = 42)

(i) How can you identify that which plate of capacitor is positively charged?

(ii) How do Shark fish locate their prey precisely?

(iii) Why does the resistance of a conductor rise with temperature?

(iv) Find the reading of the ammeter in the circuit diagram:



(v) If a solenoid is 1 m long and 10 cm in diameter and wound with 10 turns per cm of wire which carries a current of 100A. Calculate the magnetic flux density within it.

(vi) How can you use a magnetic field to separate isotopes of chemical elements?

(vii) What do you understand by electromagnetic induction?

(viii) Can a D.C motor be turned into a D.C generator? What changes are required to be done?

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

(x) What is meant by strain energy? How can it be determined from the force-extension graph?

(xi) How would you obtain n-type and p-type material from pure silicon? Illustrate it by schematic diagram.

(xii) What is meant by open loop gain of op-amplifier?

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

(xiv) Find the velocity at which the relativistic length 'L' of a body reduces to half of its rest length 'Lo'.

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

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

(xvii) Prove that the shortest wavelength photon emitted in Balmer series is 364.6nm.

(xviii) What is a mass spectrograph?

(xix) What is the phenomenon of fluorescence?

SECTION – C (Marks 26)

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

Q. 3 **a.** Define electric field intensity and its unit. Calculate the electric field intensity at a point in the electric field. **(1+1+3=05)**

b. Find the electric field strength required to hold suspended a particle of mass $1.0\times10^{-6}\ kg$ and charge $1.0\mu C$ between two plates 10 cm apart. **(04)**

c. Describe the construction and working of photocopier machine. **(2+2=04)**

Q. 4 **a.** State and explain Ampere's law. Apply it to calculate the magnetic field due to current flowing through a solenoid. **(1+1+4=06)**

b. What current should pass through a solenoid that is 0.5 m long with 10,000 turns of copper wire so that it will have a magnetic field of 0.4T? **(04)**

c. What is an AVO meter? Describe its any two functions. **(1+2=03)**

Q. 5 **a.** What are X-rays? Describe the production of X-rays. **(1+4=05)**

b. Electrons in an X-ray tube are accelerated through a potential difference of 3000 V. If these electrons are slowed down in a target, what will be the minimum wavelength of X-rays produced? **(04)**

c. What are continuous X-rays spectrum? Describe the properties and uses of X-rays. **(2+1+1=04)**

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Roll No. | | | | | | |

Answer Sheet No._____

Sig. of Candidate._____

Sig. of Invigilator._____

PHYSICS HSSC–II

SECTION – A (Marks 17)

Time allowed: 25 Minutes

NOTE: Section–A is compulsory and comprises pages 1–2. 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) A solid state radiation detector mainly consists of a:

A. Transistor B. Germanium crystal

C. Silicon crystal D. Silicon diode

(ii) In S.I. units ε_o equals:

A. $1.6\times10^{-19}C$ B. $9\times10^{9}Nm^2C^{-2}$

C. $\frac{4}{9}\times10^{9}Nm^2C^{-2}$ D. $\frac{1}{4\pi}(9\times10^{9})C^2N^{-1}m^{-2}$

(iii) The electrostatic force of repulsion between two electrons 1 metre apart is:

A. $1N$ B. $2.30\times10^{-28}N$

C. $9\times10^{9}N$ D. $1.44\times10^{-9}N$

(iv) If the number of coulombs per second through a wire of 10 Ohms resistance across a 120 volts line is 12, the current flowing through it is:

A. 1.2 A B. 1200 A

C. 120 A D. 12 A

(v) Resistance is independent of:

A. Voltage across a conductor B. Temperature of a conductor

C. Size of a conductor D. Material of a conductor

(vi) An electron travels from left to right in the plane of the paper in a magnetic field perpendicular to and directed into the paper. It is deflected:

A. Out of the paper B. Up

C. Down D. Into the paper

(vii) The e/m of a proton is:

A. Smaller or greater B. Equal to that of an electron

C. Greater than that of an electron D. Smaller than that of an electron

(viii) The induced current can **NOT** be increased by:

A. Making no changes

B. Using a stronger magnetic field

C. Moving the loop faster in magnetic field

D. Replacing the loop by a coil of many turns

(ix) To run a D.C Motor _____ is / are used.

A. Commutator B. Slip rings

C. A.C. main D. Engine

DO NOT WRITE ANYTHING HERE

(x) When we peak of A.C. meter reading, we usually mean?

A. Average value B. R.M.S value

C. Instantaneous value D. Peak value

(xi) In parallel A.C circuit, at resonance, the current is:

A. Zero B. Maximum

C. Minimum D. Infinity

(xii) Amorphous solids are also called:

A. Crystalline solids B. Glassy solids

C. Abnormal solids D. Normal solids

(xiii) Good conductors have conductivities of the order of:

A. $10^{7}(\Omega m)^{-1}$ B. $10^{-10}(\Omega m)^{-1}$

C. $10^{4}(\Omega m)^{-1}$ D. $10^{-4}(\Omega m)^{-1}$

(xiv) Depletion region is constituted by:

A. Electrons B. Negative ions

C. Positive ions D. Negative and positive ions

(xv) In a certain circuit, the transistor has a collector current of 30 mA and base current of $30\mu A$.

The current gain of the transistor is:

A. 250 B. 1000

C. 357 D. 500

(xvi) Light is, in short, most refined form of:

A. Matter B. Energy

C. Waves D. Frequency

(xvii) The emission of photons by a metal when electrons are incident is called:

A. X-rays production B. Photoelectric effect

C. Pair production D. Compton effect

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: 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)

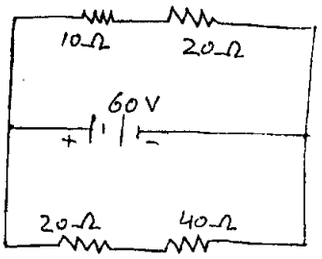
Q. 2 Answer any FOURTEEN parts. The answer to each part should not exceed 3 to 4 lines. (14 x 3 = 42)

(i) What is the difference between electrical potential energy and potential difference?

(ii) What do you understand by electric field lines?

(iii) Explain why the terminal potential difference of a battery decreases when the current drawn from it is increased?

(iv) A circuit is shown in the figure. Find the current through the 10 Ohm resistor and the equivalent resistance of the circuit.



(v) A charged particle enters in a region of magnetic field B. its velocity is perpendicular to the direction of the field. Find a relation for the time period of the revolution of the particle.

(vi) How can a current loop be used to determine the presence of a magnetic field in a given region of space?

(vii) Which factors increase the induced current, when the induced EMF leads induced current in a closed circuit?

(viii) When an electric motor, such as an electric drill, is being used, does it also act as a generator? If so what is the consequence of this?

(ix) How does doubling the frequency affect the reactance of (a) an inductor (b) a capacitor?

(x) Write a note on superconductors.

(xi) Discuss the mechanism of electrical conduction by holes and electrons in a pure semi-conductor.

(xii) What do you mean by rectification?

(xiii) Why charge carriers are not present in the depletion region?

(xiv) If we keep applying force on a material object, can the object gain the speed of light? If not, why?

(xv) Describe NAVSTAR system.

(xvi) Can X-rays be reflected, refracted, diffracted and polarized just like any other waves? Explain.

(xvii) What are the advantages of lasers over ordinary light?

(xviii) How many protons, neutrons and electrons are there in the nucleus of ${}_{86}Rn^{222}$?

(xix) Name the groups in which sub-atomic particles are divided?

SECTION – C (Marks 26)

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

Q. 3 **a.** What is meant by a capacitor and its capacitance? Find an expression of the capacitance of a parallel plate capacitor. Describe the effect of dielectric on capacitance by placing it between the plates of a capacitor. **(2+4+1=07)**

b. A particle having a charge of 20 electrons on it falls through a potential difference of 100 volts. Calculate the energy acquired by it in electron volts (ev). **(04)**

c. Define the term relative permitivity. **(02)**

Q. 4 **a.** Derive an expression for the force on a charged particle moving in magnetic field. Also explain the direction of force on an electron and proton. **(4+1=05)**

b. A coil 0.1 mx0.1m and of 200 turns carrying a current of 1.0 mA is placed in a uniform magnetic field of 0.1T. Calculate the maximum torque that acts on the coil. **(04)**

c. Describe how e/m (charge to mass ratio) of an electron can be determined by projecting it perpendicular to magnetic field. **(04)**

Q. 5 **a.** Explain and derive an expression for the wavelength of the various spectral lines of hydrogen emission spectrum on the basis of Bohr's atomic theory. **(05)**

b. Find the wavelength of the spectral line corresponding to the transition in hydrogen from n=6 to n=3 state. **(04)**

c. How did de-Broglie deduce Bohr's second postulate? **(04)**