BIOLOGY HSSC–I

SECTION – A (Marks 17)

Punjab Text Book Board

Time allowed: 25 Minutes

Version Number	7	1	0	4

Note: Section – A is compulsory. All parts of this section are to be answered on the separately provided OMR Answer Sheet which 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 Choose the correct answer A / B / C / D by filling the relevant bubble for each question on the OMR Answer Sheet according to the instructions given there. Each part carries one mark.

1) Gastric juice is secreted by mucosal layer of the stomach. The Zymogen cells of mucosal layer secrete:
A. Mucus B. Gastrin
C. Hydrochloric acid D. Pepsinogen

2) Respiration is **MORE** efficient and elaborate in:
A. Reptiles B. Amphibians C. Birds D. Mammals

3) **MOST** of the photosynthetic food is transported in phloem in the form of:
A. Lipids B. Sucrose C. Glucose D. Starch

4) The _____ level of organization is **LESS** definite in plants than it is in animals.
A. Organs B. Cells C. Community D. Tissues

5) The removal or degradation of environmental pollutant or toxic material by living organism is called:
A. Biological control B. Bio magnification
C. Bio accumulation D. Bioremediation

6) When a polysaccharide is broken down into monosaccharide units, this phenomenon is called:
A. Synthesis B. Hydrolysis C. Decomposition D. Condensation

7) Insulin hormone is a protein. It consists of 2 chains and both chains contain _____ amino acids.
A. 30 B. 141 C. 51 D. 21

8) A non-protein part of an enzyme covalently bonded to the protein is known as:
A. Cofactor B. Coenzyme
C. Activator D. Prosthetic group

9) Which of the following is **NOT** the function of smooth endoplasmic reticulum?
A. Transmission of impulses B. Lipid metabolism
C. Detoxification of harmful drugs D. Protein synthesis

10) It is also called the factory of ribosome synthesis:
A. Nucleolus B. Nucleoplasm
C. Golgi bodies D. Endoplasmic Reticulum

11) The complete mature and infectious particle is called:
A. Viriod B. Capsid C. Prion D. Virion

12) Which of the following bacterium is an example of facultative anaerobe?
A. Camphylobacter B. Pseudomonas
C. E. Coli D. Spirochete

13) African sleeping sickness is caused by:
A. Trichonymphas B. Trichinella
C. Apicomplexan D. Trypanosoma

14) Parasitic fungi absorb nutrients directly from living host cytoplasm with the help of special hyphal tips called:
A. Appressorium B. Haustoria C. Soredia D. Rhizoid

15) Heterospory is the characteristics of:
A. Lycopsida B. Sphenopsida C. Bryopsida D. Psilopsida

16) Which of the following is **NOT** the property of chondrichthyes (cartilaginous fishes)?
A. Separate sexes B. Presence of operculum
C. No swim bladder D. Placoid scales

17) In the light dependent stage of photosynthesis, the final acceptor of electron is:
A. NADP B. Oxygen C. Plastocyanin D. Ferredoxin

BIOLOGY HSSC–I

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Punjab Text Book Board

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

NOTE: The Questions of sections B, C and D are to be answered 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 21)

(Chapters 1 – 8)

Q. 2 Answer any SEVEN parts from the following. All parts carry equal marks. **(7 x 3 = 21)**

(i) a. What do you know about Biomes? **(1.5)**
b. What is inductive reasoning? **(1.5)**
(ii) Draw the structure of triglyceride.
(iii) Write down the biological roles of plasma membrane.
(iv) a. What will happen if a chromosome loses its centromere? **(01)**
b. Enlist the functions of Leucoplast and Chromoplast. **(02)**
(v) Why are scientific names more useful than the common names?
(vi) Differentiate between lytic and lysogenic life cycle of a bacteriophage.
(vii) How do autotrophic bacteria get food?
(viii) Why are green algae considered as an ancestor group of green plants?
(ix) Give the similarities and differences between fungi and plants.
(x) Why are yeasts heavily used in genetic and molecular biology research?

SECTION – C (Marks 21)

(Chapters 9 – 14)

Q. 3 Answer any SEVEN parts from the following. All parts carry equal marks. **(7 x 3 = 21)**

(i) Write down any three general characteristics of Bryophytes.
(ii) Differentiate between Proterostomia and Deuterostomia.
(iii) What do you know about infestation and disinfestation?
(iv) Write down the economic importance of sponges.
(v) a. What are accessory pigments? Give examples. **(02)**
b. How does the action spectrum in photosynthesis occur? **(01)**
(vi) a. Why omnivores are capable of eating meat and plants? **(02)**
b. What are Nematocysts? **(01)**
(vii) What are the factors that affect the oxygen carrying capacity of haemoglobin?
(viii) Write down the symptoms and causes of pulmonary tuberculosis.
(ix) Transpiration is a necessary evil. Briefly explain your answer with reasons.
(x) What functions are performed by lymphatic system?

SECTION – D (Marks 26)

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

Q. 4 **a.** Describe the structure and working of human heart with diagrams. **(3.5+3.5+2)**
b. Discuss the trends toward seed habit in plants. **(04)**

Q. 5 **a.** Give a detailed account of digestion and absorption in small intestine with diagram. **(6+2)**
b. Discuss the growth and reproduction in bacteria. **(05)**

Q. 6 **a.** Describe Kreb's cycle in detail with a neat sketch. **(6+3)**
b. What are the factors that affect the rate of enzyme action? **(04)**

BIOLOGY HSSC–I

SECTION – A (Marks 17)

National Book Foundation

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Time allowed: 25 Minutes | **Version Number** | 3 | 1 | 0 | 4 |

Note: Section – A is compulsory. All parts of this section are to be answered on the separately provided OMR Answer Sheet which 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 Choose the correct answer A / B / C / D by filling the relevant bubble for each question on the OMR Answer Sheet according to the instructions given there. Each part carries one mark.

1) The secretion of pancreatic juice is controlled by:

A. Secretin B. Acetylcholine C. Erepsin D. Gastrin

2) Deoxygenated blood from Gall bladder is collected by _____ vein.

A. Hepatic Portal B. Splenic C. Mesenteric D. Cystic

3) After removal of infection from the body, the cells which shut down the immune response are _____ T-cells.

A. Cytotoxic B. Helper C. Suppressor D. Memory

4) Which one of the following is **NOT** the function of Smooth Endoplasmic Reticulum?

A. Synthesis of Lipids B. Storage of Calcium
C. Spindle formation D. Detoxification

5) The percentage of water in Jelly Fish is about:

A. 90 B. 85 C. 99 D. 20

6) Vitamin A is an example of:

A. Diterpene B. Triterpene
C. Polyterpene D. Monoterpene

7) Histidine decarboxylase is an example of:

A. Lyases B. Proteases C. Isomerases D. Transferases

8) Flow of electrons from PSII to PSI in Electron Transport chain occurs through:

A. $PC \rightarrow Cyt.b_6 \rightarrow Cyt.f \rightarrow PQ$ B. $PQ \rightarrow Cyt.f \rightarrow Cyt.b_6 \rightarrow PC$
C. $Cyt.b_6 \rightarrow Cyt.f \rightarrow PQ \rightarrow PC$ D. $PQ \rightarrow Cyt.b_6 \rightarrow Cyt.f \rightarrow PC$

9) Which one of the following virus has a polyhedral capsid with glycoprotein spikes at vertex?

A. Bacteriophage B. Adenovirus
C. Influenza Virus D. Tobacco Mosaic Virus

10) The shape of *Pseudomonas* bacterium is:

A. Spherical B. Spiral C. Coma like D. Rod like

11) The transfer of genetic material from one bacterium to the other through the third party is called:

A. Transduction B. Transformation C. Binary Fission D. Conjugation

12) The term Protista was proposed by:

A. Ernst Haeckel B. Robert Whittaker
C. Herbert Copland D. John Hog

13) *Trypanosoma* is a/an:

A. Zooflagellate B. Apicomplexan C. Dinoflagellate D. Ciliate

14) Ascomycota are commonly called _____ fungi.

A. Sac B. Club C. Slime molds D. Conjugating

15) All of the following are parts of female gametophyte in Angiosperms **EXCEPT**:

A. Synergids B. Egg cell
C. Generative Nucleus D. Antipodal cells

16) Sac like digestive system is a characteristic of phylum:

A. Mollusca B. Cnidaria C. Arthropoda D. Annelida

17) TACT theory does **NOT** include:

A. Translocation B. Tension C. Adhesion D. Transpiration

BIOLOGY HSSC–I

National Book Foundation

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

NOTE: The Questions of sections B, C and D are to be answered 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 21)

(Chapters 1 – 7)

Q. 2 Answer any SEVEN parts from the following. All parts carry equal marks. **(7 x 3 = 21)**

(i) Briefly explain any three diseases in Humans caused by Fungi.

(ii) Write down the cause, symptoms and prevention of Pulmonary Tuberculosis.

(iii) How are Red algae and Diatoms important for humans?

(iv) Define Non Competitive inhibitor. Also write about Reversible Non Competitive inhibitors.

(v) How does concentration of enzyme affect the rate of an enzyme action?

(vi) Write any three unifying features of Archaea.

(vii) Give any three differences between mRNA and tRNA.

(viii) Enlist and define the types of Stereoisomers of Monosaccharides.

(ix) Define:

a. Electrophoresis b. Spectrophotometry c. Resolution

(x) Define Autophagy. How are lysosomes involved in it?

SECTION – C (Marks 21)

(Chapters 8 – 13)

Q. 3 Answer any SEVEN parts from the following. All parts carry equal marks. **(7 x 3 = 21)**

(i) Give any three differences between Protostomes and Deuterostomes.

(ii) Briefly explain the Apoplast pathway taken by water to reach the root xylem.

(iii) Write about the structure of Bark in plants.

(iv) In the following two adjacent cells:

Cell A	Cell B
Ψw= –1400 kPa	Ψw= –600 kPa
Ψp= 600 kPa	Ψp= 800 kPa
Ψs= –2000 kPa	Ψs= –1400kPa

a. Which cell has higher Water Potential?

b. What will be the Water Potential and Solute Potential of cells at equilibrium?

(v) Write about the structure of layers of the heart wall.

(vi) a. What is the role of Oral cavity in chemical digestion?

b. Define Peristalsis.

(vii) How are Arterioles involved in Vasoconstriction?

(viii) Write down the steps of action of the Complement System against a bacterium.

(ix) Write about Natural Active and Natural Passive Immunity.

(x) Briefly explain Coronary circulation in humans.

SECTION – D (Marks 26)

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

Q. 4 a. Explain the steps of Oxidative phase of Glycolysis. Also write their respective reactions. **(5+3)**

b. Write down the general characteristics of Class Mammalia in detail. **(05)**

Q. 5 a. Write a detailed account of functions of Human Stomach. **(08)**

b. How does Bacteriophage replicate in a Lytic cycle? Also draw the diagram. **(4+1)**

Q. 6 a. Explain Life cycle of a Fern. Also draw the diagram of its Life Cycle. **(8+2)**

b. Write down the functions of Golgi complex. **(03)**

BIOLOGY HSSC–I

SECTION – A (Marks 17)

National Book Foundation

Time allowed: 25 Minutes

Version Number	3	1	0	5

Note: Section – A is compulsory. All parts of this section are to be answered on the separately provided OMR Answer Sheet which 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 Choose the correct answer A / B / C / D by filling the relevant bubble for each question on the OMR Answer Sheet according to the instructions given there. Each part carries one mark.

1) Which of the following is involved in muscle contraction?

A. Microfilaments B. Microtubules
C. Intermediate Filaments D. Radial Spokes

2) The Stereoisomer of a Monosaccharide which has different arrangement of – H and – OH at only one asymmetric carbon are called:

A. Enantiomers B. Polymer C. Epimers D. Diastereoisomer

3) The enzyme which can work in both alkaline and acidic conditions is:

A. Pepsin B. Erepsin C. Papain D. Trypsin

4) The term "Bacterium" was introduced by _____ in 1882.

A. John Hog B. Ehrenberg C. Ernst Haeckel D. Leeuwenhoek

5) The example of Pleomorphic bacterium is:

A. *Pseudomonas* B. *Spirillum*
C. *Helicobacter pylori* D. *Treponema pallidum*

6) If a tuft of flagella is present at one end of the bacterium, the condition is:

A. Amphitrichous B. Peritrichous
C. Monopolar Monotrichous D. Lophotrichous

7) *Chlorella* is an example of:

A. Dinoflagellate B. Brown algae C. Red algae D. Green algae

8) *Phytophthora infestans* is a:

A. Slime Mold B. Water Mold C. Bread Mold D. Green Mold

9) Hepatitis C is caused by:

A. Picornavirus B. Hepadnavirus C. Flavivirus D. Parovirus

10) Members of phylum Aschelminthes are also called:

A. Ringworms B. Round worms
C. Segmented worms D. Flat worms

11) The tongue like structure – Radula is present in:

A. Tape worm B. Snail C. Leech D. Fruit Fly

12) _____ cells of stomach secrete HCl.

A. Parietal B. Chief C. Zymogen D. Endocrine

13) Choose the **CORRECT** statement about the structure of Heart Wall.

A. Epicardium – Inner – Cardiac Muscles B. Endocardium – Outer – Squamous Epithelium
C. Myocardium – Outer – Smooth Muscles D. Myocardium – Middle – Cardiac Muscles

14) All of the following are functions of Endogenous Pyrogens **EXCEPT**:

A. Reduce Iron in Blood B. Increase Temperature
C. Reduce Viral Replication D. Produce Antibodies

15) *Selaginella* belongs to _____ group of plants.

A. Psilopsida B. Pteropsida C. Lycopsida D. Sphenopsida

16) Which of the following character is **NOT** related to Dicots?

A. Tap root B. Vascular Bundles in a ring in stem
C. Parallel venation in leaf D. Pentamerous flowers

17) Nervous spasm, convulsion and psychotic delusion occur in:

A. Histoplasmosis B. Athlete's foot C. Candidiasis D. Ergotism

BIOLOGY HSSC–I

National Book Foundation

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

NOTE: The Questions of sections B, C and D are to be answered 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 21)

(Chapters 1 – 7)

Q. 2 Answer any SEVEN parts from the following. All parts carry equal marks. **(7 x 3 = 21)**

(i) What is the role of Fungi in medicine industry?

(ii) Name any three groups of Protozoa with one example of each.

(iii) Briefly write about any two types of Archaea which inhabit extreme environmental conditions.

(iv) Draw a flow sheet showing Calvin cycle.

(v) Who proposed Induced Fit model for Enzyme Action? Briefly explain it.

(vi) Define Irreversible Non- competitive inhibitors. Briefly explain with an example.

(vii) Give any three differences between Starch and Glycogen.

(viii) Define:

a. Centrifugation b. Chromatography c. Heterochromatin

(ix) Why are Lysosomes called 'Suicidal Bags'? Explain briefly.

(x) Write the names and functions of any three Plasma membrane proteins.

SECTION – C (Marks 21)

(Chapters 8 – 13)

Q. 3 Answer any SEVEN parts from the following. All parts carry equal marks. **(7 x 3 = 21)**

(i) Briefly write about Land adaptation of Bryophytes for the absorption of Carbon dioxide.

(ii) Briefly explain the role of evolution of pollen tube in evolution of seed.

(iii) How do Chondrichthyes and Osteichthyes differ in Gills, Caudal fins and Skin?

(iv) a. What is the role of liver in Storage of Materials?

b. How does defecation reflex occur in infants?

(v) Write about the groups of plants classified on the basis of Photoperiodism.

(vi) Define vein and write down its structure.

(vii) What do you know about Congenital Heart problem?

(viii) Write down the steps of Inflammatory response in second line of defence.

(ix) Briefly explain Autoimmune diseases.

(x) Write down the structure of a typical Antibody.

SECTION – D (Marks 26)

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

Q. 4 a. Describe Life Cycle of HIV. Also draw the diagram. **(6+2)**

b. Write about the general characteristics of class Aves in detail. **(05)**

Q. 5 a. How does absorption of digested food occur in the Small Intestine of Humans? **(08)**

b. Draw General structure of an amino acid. Write about Structural conformations in Proteins. **(1+4)**

Q. 6 a. Write a detailed account of Mechanism of Translocation of organic solutes in plants. Also draw the diagram. **(4.5+1.5)**

b. Write down the steps of Preparatory phase of Glycolysis. Also write the reactions. **(5+2)**

COMPUTER SCIENCE HSSC–I

SECTION – A (Marks 15)

Time allowed: 20 Minutes

Version Number	3	1	2	4

Note: Section – A is compulsory. All parts of this section are to be answered on the separately provided OMR Answer Sheet which 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 Choose the correct answer A / B / C / D by filling the relevant bubble for each question on the OMR Answer Sheet according to the instructions given there. Each part carries one mark.

1) If data is **NOT** updated in a file in 'File based data management system', what type of problem will it cause?

A. Data overflow B. Data redundancy
C. Data deficiency D. Data inconsistency

2) What is a thing of interest to an organization called, about which data is to be held in a database?

A. Attribute B. Field C. Tuple D. Entity

3) Which of the following database object stores all the information of a database?

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

4) Which of the following is **NOT** a social media network application?

A. Hotmail B. Twitter C. WhatsApp D. Facebook

5) A barcode reader is a _____ device.

A. Output B. Input C. Storage D. Processing

6) Which of the following language translator converts the entire program into machine language before execution by the computer?

A. Interpreter B. Debugger C. Compiler D. Assembler

7) 1 MB (Mega Byte) = _____ Bytes.

A. 2^{20} B. 2^{30} C. 2^{40} D. 2^{10}

8) Which of the following cache memory exists inside the CPU?

A. L2 B. L3 C. L4 D. L1

9) Which of the following bus sends timing and control signals to all parts of the computer?

A. Data bus B. Control bus C. Instruction bus D. Address bus

10) Which of the following instructions transfers data from a memory location to a register, register to memory and register to register?

A. LD B. STO C. JMP D. MOV

11) What is BIOS?

A. Port B. Interface
C. Non-volatile ROM chip D. Program in RAM

12) Which card displays text, graphics and images on the screen?

A. Sound card B. Modem card C. Graphics card D. Network card

13) In which communication mode data can be sent and received in one direction only?

A. Half-duplex B. Full-duplex C. Synchronous D. Simplex

14) Which of the following transmission modes uses a start/stop bit for data transmission?

A. Asynchronous B. Simplex C. Duplex D. Synchronous

15) Which of the following protocols is used for the Internet?

A. TCP/IP B. WAP C. X.25 D. HTTP

COMPUTER SCIENCE HSSC–I

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

NOTE: The Questions of sections B, C and D are to be answered 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 21)

Note: Section – B consists of following topics of the syllabus:

1.	Overview of Computer System	**2.**	Computer Memory
3.	Central Processing Unit	**4.**	Inside System Unit

Q. 2 Answer any SEVEN parts. All parts carry equal marks. **(7 x3 = 21)**

(i) Give any three application areas each of mainframe and super computers.

(ii) Give any three advantages of Cloud Computing.

(iii) What is chip memory? Give two examples.

(iv) What will happen if cache memory is removed from a computer?

(v) State three differences between DVD and Blu-ray disk.

(vi) What is the function of ALU in the computer?

(vii) Name the parts of computer instruction cycle and show them diagrammatically.

(viii) What is the function of expansion slot on the motherboard?

(ix) What is the function of SATA interface on the motherboard?

(x) Give three advantages of DDR SDRAM?

SECTION – C (Marks 21)

Note: Section – C consists of following topics of the syllabus:

5.	Network communication Protocol	**6.**	Wireless Communication
7.	Database Fundamentals	**8.**	Database Development

Q. 3 Answer any SEVEN parts. All parts carry equal marks. **(7 x3 = 21)**

(i) State three differences between synchronous and asynchronous data transmission.

(ii) What is guided communication media? Give two examples.

(iii) Give three characteristics of Metropolitan Area Network (MAN).

(iv) Give any three advantages of wireless networks.

(v) What is Wi-Max technology?

(vi) Give any three applications of GPS (Global Positioning System).

(vii) Give any three disadvantages of file management system over DBMS.

(viii) Why is it necessary to normalize a relational database?

(ix) Differentiate between cardinality and modality.

(x) Give any three advantages of using Reports in Access database.

SECTION – D (Marks 18)

Note: Attempt any THREE questions. All questions carry equal marks. **(3 x 6 = 18)**

Q. 4 What is computer hardware? Explain the purpose of the following devices: **(2+4)**

a.	Touchscreen	**b.**	Scanner
c.	Magnetic stripe card reader	**d.**	Plotter

Q. 5 What is main memory? Explain the three types of main memory in detail? **(1+5)**

Q. 6 Explain the function of general purpose and special purpose registers used in computers. **(3+3)**

Q. 7 What is OSI model? Give brief description of any five layers of OSI model. **(1+5)**

COMPUTER SCIENCE HSSC–I

SECTION – A (Marks 15)

(Old Syllabus)

Time allowed: 20 Minutes

Version Number	7	1	2	1

Note: **Section – A is compulsory. All parts of this section are to be answered on the separately provided OMR Answer Sheet which 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 **Choose the correct answer A / B / C / D by filling the relevant bubble for each question on the OMR Answer Sheet according to the instructions given there. Each part carries one mark.**

1) The electronic circuit that executes computer instructions is called:
   A. Monitor B. Hard disk C. CPU D. Keyboard

2) Another word for pointer is:
   A. Cursor B. Pixel C. Puck D. Chip

3) A computer network must contain at least _____ number of computers.
   A. One thousand B. Three C. Twenty D. Two

4) The set of rules to exchange data in a communication network is called:
   A. Method B. Procedure C. Protocol D. Token

5) The process of transferring data electronically from one place to another is called:
   A. Data processing B. Data communication
   C. Data sequencing D. Data sender

6) The conversion of an analog signal to a digital signal is known as:
   A. Demodulation B. Modulation C. Conversion D. Merging

7) What is used to control all the parts of a manufacturing process?
   A. ATM B. CAD C. CAM D. MICR

8) Which memory is used to speed up the computer processing?
   A. ROM B. RAM C. BIOS D. HDD

9) What happens **FIRST** when CPU executes an instruction?
   A. Fetch B. Execute C. Decode D. Terminate

10) CPU places address in _____ if memory location is to be read.
   A. MAR B. MBR C. Accumulator D. PC

11) The program that contains instructions to operate a device is called:
   A. Device driver B. Device operator
   C. Device linking D. Device system

12) The restricted access to the server computer room is a form of:
   A. Logical security B. Enterprise security
   C. Physical security D. User security

13) A small image that represents a program, an instruction, or a file is called:
   A. Menu B. Dialog box C. Windows D. Icon

14) The tool used to find a similar or an alternative word in a document is called:
   A. Finder B. Thesaurus C. Dictionary D. Style

15) The combination of letters and numbers such as A5, B9 and D15 refers to:
   A. Row identifier B. Cell address C. Locked cell D. Passive cell

COMPUTER SCIENCE HSSC–I

(Old Syllabus)

54

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

NOTE: The Questions of sections B, C and D are to be answered on the separately provided answer book. Write your answers neatly and legibly.

SECTION – B (Marks 21)

Note: Section – B consists of following topics of the syllabus:

a.	Basic concepts of IT	**b.**	Data Communication
c.	Hardware and System Software	**d.**	Information Networks
e.	Applications and use of computers		

Q. 2 Answer any SEVEN parts. All parts carry equal marks. **(7 x3 = 21)**

(i) Define the term information technology (IT).

(ii) Describe shortly the importance of I/O processor.

(iii) What is sequential access memory? Also give an example.

(iv) How does information network provide facility in education?

(v) Define workgroup computing.

(vi) Discuss shortly the basic elements of a data communication system.

(vii) How is data transmitted in a synchronous transmission?

(viii) Briefly discuss e-commerce.

(ix) What is computer architecture?

(x) Differentiate between RAM and ROM.

SECTION – C (Marks 21)

Note: Section – C consists of following topics of the syllabus:

a.	Security copyright and the law	**b.**	Operating systems (Windows)
c.	Word processing (using MS-Word 2000)	**d.**	Spreadsheet (Using MS-Excel 2000)
e.	Internet, Internet browsing and E-mail		

Q. 3 Answer any SEVEN parts. All parts carry equal marks. **(7 x3 = 21)**

(i) Describe any three advantages of data backup.

(ii) What is copyright infringement?

(iii) Why is operating system necessary for computer?

(iv) Discuss the use of windows explorer.

(v) What is word processing software?

(vi) How is spell checking necessary in a word processor?

(vii) Describe the use of spread sheet software.

(viii) What is automatic recalculating in spread sheet?

(ix) Write any advantages of internet.

(x) What are search engines? List any four search engines.

SECTION – D (Marks 18)

Note: Attempt any THREE questions. All questions carry equal marks. **(3 x 6 = 18)**

Q. 4 Explain information system development, implementation and maintenance steps.

Q. 5 Define network topology. Briefly explain its types.

Q. 6 Explain the three types of data communication modes.

Q. 7 What is a computer virus and how is it spread and infects other computers?

CHEMISTRY HSSC–I
SECTION – A (Marks 17)

37

Time allowed: 25 Minutes

Version Number	3	0	9	4

Note: **Section – A is compulsory. All parts of this section are to be answered on the separately provided OMR Answer Sheet which 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 **Choose the correct answer A / B / C / D by filling the relevant bubble for each question on the OMR Answer Sheet according to the instructions given there. Each part carries one mark.**

1) Enthalpy of combustion can be determined by:

A. Bomb calorimeter B. Copper calorimeter
C. Coffee-cup calorimeter D. Glass calorimeter

2) Born – Haber cycle is applied to determine:

A. Lattice energy B. Bond energy
C. Hydration energy D. Potential energy

3) What is added with S in order to balance the following equation? $S \rightarrow H_2S$

A. $2H^+, 1e^-$ B. $2H^+, 3e^-$ C. $2H^+, 4e^-$ D. $2H^+, 2e^-$

4) Which of the following has highest number of molecules in it?

A. $10g$ of NO B. $10g$ of NO_2 C. $10g$ of N_2O_4 D. $10g$ of N_2O

5) How many moles of O_2 are needed for the complete combustion of one mole of Butane (C_4H_{10})?

A. 8 B. 6.5 C. 13 D. 4.5

6) Which of the following orbital is of greater energy?

A. $4d$ B. $6s$ C. $4f$ D. $5p$

7) When fast neutrons are bombarded on nitrogen atoms, what radiations are emitted?

A. β -rays B. γ -rays C. X -rays D. α -rays

8) The C – H bond length will be greater when the hybridization of carbon is:

A. sp^2 B. sp^3 C. dsp^3 D. sp

9) One atmosphere pressure is equal to:

A. $101.325\,Pa$ B. $101.325\,Bars$ C. $101325\ N/m^2$ D. $101325\ Kpa$

10) In which of the following pairs, both gases will diffuse at the same rate?

A. H_2 & He B. N_2 & CO C. CO & CO_2 D. O_2 & SO_2

11) Which of the following, requires least energy for vaporization?

A. Cl_2 B. Br_2 C. I_2 D. F_2

12) Sodium chloride exists in cubic and octahedral forms. This phenomena is called:

A. Polymorphism B. Allotropy C. Anisotropy D. Isomerism

13) A reaction will proceed in forward direction in order to attain equilibrium when (Q = reaction quotient, K_c = equilibrium constant)

A. $Q < K_c$ B. $Q = K_c$ C. $Q = \frac{1}{2}K_c$ D. $Q > K_c$

14) pH of 0.001 M $NaOH$ solution is:

A. 10^{-3} B. 11 C. 10^{-11} D. 3

15) Which of the following compounds will produce acidic solution on hydrolysis?

A. KNO_3 B. $NaCl$ C. NH_4NO_3 D. $NaCN$

16) The units of rate constant and the rate of reaction will be the same when order of reaction is:

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

17) Which of the following is **NOT** a pair of partially miscible liquids?

A. Aniline – water B. Nicotine – water
C. Benzene – water D. Phenol – water

CHEMISTRY HSSC–I

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

NOTE: The Questions of sections B, C and D are to be answered 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 21)

(Chapters 1 to 6)

Q. 2 Answer any SEVEN parts. All parts carry equal marks. **(7 x3 = 21)**

(i) Calculate the number of molecules of O_2 produced by thermal decomposition of 490 g $KClO_3$. (Atomic masses $K = 39\ g/mol$, $Cl = 35.5\ g/mol$, $O = 16\ g/mol$)

(ii) Define limiting reactant. Why is the concept of limiting reactant not applicable to the reversible reactions?

(iii) Calculate the mass of an electron with the help of its charge and e/m ratio.

(iv) Explain the geometries of $PbCl_2$ & SO_3 on the basis of VSEPR theory.

(v) Write down the defects of Valence bond theory.

(vi) Draw molecular orbital diagram for N_2 molecule and calculate its bond order.

(vii) What is an isotherm? How is it affected by change in temperature? Give reason.

(viii) Write down any three uses of liquid crystals.

(ix) Define lattice energy giving an example. Write down the factors affecting the lattice energy.

(x) What is cleavage plane? Give an example. Why is cleavage an anisotropic property?

SECTION – C (Marks 21)

(Chapters 7 to 12)

Q. 3 Answer any SEVEN parts. All parts carry equal marks. **(7 x3 = 21)**

(i) State common ion effect and give an example.

(ii) Justify that CaO is a basic oxide whereas Al_2O_3 is an amphoteric oxide.

(iii) Define buffer solution. Write down its types, giving one example for each.

(iv) What is a first order reaction? Give two examples.

(v) Differentiate between hydrophilic and hydrophobic molecules, giving one example of each.

(vi) Define molarity, molality and mole fraction.

(vii) Write down any three properties of colloids.

(viii) What is the internal energy of a system? Justify that internal energy is a state function.

(ix) Define enthalpy of atomization, enthalpy of solution, enthalpy of neutralization.

(x) What is galvanizing? How does it protect iron from corrosion?

SECTION – D (Marks 26)

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

(Question 4 from Chapters 1 to 6)

Q. 4 a. Derive general gas equation. How can this equation can be modified to determine the molar mass and density of a gas? **(06)**

b. Define London dispersion forces. How are these forces produced in Helium gas? Also describe the factors affecting the London dispersion forces. **(1+1.5+4.5)**

(Question 5 from Chapters 7 to 12)

Q. 5 a. State Le-Chatlier's principle. Apply this principle to describe the effects of decrease in concentration of SO_3 , increase in temperature and increase in pressure on the following reactions at equilibrium. $2SO_2 + O_2 \rightleftharpoons 2SO_3 \quad \Delta H = -198\ kj/mol$ **(1+6)**

b. Define catalysis. How does a catalyst increase the rate of a chemical reaction? Also differentiate between homogenous and heterogeneous catalysis. **(1+2+3)**

(Question 6 Part (a) from Chapters 1 to 6 and Part (b) from Chapters 7 to 12)

Q. 6 a. Drive an expression for the radius of nth orbit of hydrogen atom. **(06)**

b. What is a galvanic cells? Explain the construction and working of Zn/Cu cell. Write down the cell reaction and calculate the cell potential of this cell. **(1+4+1+1)**

CHEMISTRY HSSC–I

SECTION – A (Marks 17)

Time allowed: 25 Minutes | **Version Number** | **3** | **0** | **9** | **8**

Note: **Section – A is compulsory. All parts of this section are to be answered on the separately provided OMR Answer Sheet which 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 **Choose the correct answer A / B / C / D by filling the relevant bubble for each question on the OMR Answer Sheet according to the instructions given there. Each part carries one mark.**

1) Which enthalpy change is always positive?

A. Enthalpy of combustion B. Enthalpy of neutralization

C. Enthalpy of solution D. Enthalpy of atomization

2) The standard enthalpy of formation is zero for:

A. H_2O B. $NaCl$ C. ZnO D. N_2

3) Oxidation state of Nitrogen in $Ca(NO_3)_2$ is:

A. +3 B. +4 C. +5 D. +2

4) The mass of $11.2dm^3$ of CO_2 enclosed in a container at STP is:

A. $22\,g$ B. $11g$ C. $33\,g$ D. $44\,g$

5) Which series of spectral lines is present in the visible region of electromagnetic spectrum?

A. Balmer series B. Paschen series

C. Pfund series D. Lymen series

6) The geometry of a molecule containing two bond pairs and one lone pair around the central atom is:

A. Trigonal planar B. Triangular pyramid

C. Angular D. Tetrahedral

7) According to Graham's law, the rates of diffusion of CH_4 and O_2 are in _____ ratio.

A. $1:\sqrt{2}$ B. $2:1$ C. $\sqrt{2}:1$ D. $1:2$

8) Which gas is more ideal at STP?

A. H_2S B. NH_3 C. H_2 D. SO_2

9) Which of the followings possesses highest boiling point ?

A. HCl B. H_2O C. H_2S D. HF

10) The intermolecular forces present in chloroform $CHCl_3$ are:

A. Dipole-dipole forces B. London dispersion forces

C. Electrostatic forces D. Hydrogen bonding

11) Which of the followings is **NOT** an anisotropic property?

A. Refractive index B. Electrical conductivity

C. Cleavage D. Viscosity

12) CO_2 in solid state forms:

A. Ionic crystal B. Molecular crystals

C. Liquid crystals D. Covalent crystals

13) For the reaction $N_2O_4 \rightleftharpoons 2NO_2$

A. $K_p = K_c(RT)$ B. $K_p = K_c(RT)^2$ C. $K_p = K_c(RT)^{-2}$ D. $K_p = K_c$

14) The value of K_c for the reaction $2SO_2 + O_2 \rightleftharpoons 2SO_3 + Heat$ is increased by:

A. Decreasing the temperature B. Increasing the pressure

C. Decreasing the pressure D. Increasing the temperature

15) Which of the following is an amphoteric oxide?

A. MgO B. Cr_2O_3 C. NO_2 D. Na_2O

16) When concentration of a reactant is doubled, the rate of reaction becomes half. The order of reaction with respect to that substance is:

A. 0 B. 1/2 C. –1 D. 1

17) A colloid, containing a solid dispersed in a liquid is called:

A. Gel B. Aerosol C. Emulsion D. Sol

CHEMISTRY HSSC–I

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

NOTE: The Questions of sections B, C and D are to be answered 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 21)
(Chapters 1 to 6)

Q. 2 Answer any SEVEN parts. All parts carry equal marks. **(7 x3 = 21)**

(i) Define conversion factor. Write down the conversion factor for the preparation of NH_3 from 4 moles of N_2, according to the following reaction. $N_2 + 3H_2 \rightarrow 2NH_3$

(ii) Calculate the wave number of limiting line in Lymen series of hydrogen spectrum.

(iii) Write down any three differences between sigma and pi bonds.

(iv) Why is the energy of σ_{2px} orbital higher than that of π_{2py} & π_{2pz} orbitals in the molecular orbital diagram of N_2?

(v) How will you derive absolute zero from Charle's law?

(vi) 4 g of CH_4 at $27°C$ and 2.5 atm pressure occupies the volume of $2.46\ dm^3$. Calculate the value of general gas constant R.

(vii) What is vacuum distillation? Give its one application.

(viii) Describe the role of hydrogen bonding in cleansing action of soap and solubility of some organic compounds in water. Give an example.

(ix) Differentiate between hexagonal close packing and cubic close packing of atoms in the metals.

(x) Write down the three differences between ionic and covalent solids.

SECTION – C (Marks 21)
(Chapters 7 to 12)

Q. 3 Answer any SEVEN parts. All parts carry equal marks. **(7 x3 = 21)**

(i) Describe the effect of increase in temperature on the value of K_c for the given reactions at equilibrium.

$$2SO_2 + O_2 \rightleftharpoons 2SO_3 \quad \Delta H = -198\ kj/mol$$

$$N_2O_4 \rightleftharpoons 2NO_2 \quad \Delta H = +57.2\ kj/mol$$

(ii) When 60 g CH_3COOH and 46 g C_2H_5OH are heated, 12 g H_2O and 58.7 g $CH_3COOC_2H_5$ are formed at equilibrium. Calculate the value of K_c.

(iii) Calculate the concentration of H^+ ions in a solution that contains $1\ M\ HF (K_a = 7.2\times10^{-4})$

(iv) Define Lewis acid and Lewis base. Give an example to show the significance of this concept.

(v) Define initial rate. How is it determined? (data is not required)

(vi) Describe the effect of increase in temperature on the solubility of gases in water.

(vii) Compare any three properties of colloids, suspensions and true solutions.

(viii) Differentiate between constant pressure and constant volume calorimetry.

(ix) State Hess's law and give one example.

(x) Balance the equation by ion-electron method. $Cr_2O_7^{-2} + Cl^{-1} \rightarrow Cr^{+3} + Cl_2$

SECTION – D (Marks 26)

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

(Question 4 from Chapters 1 to 6)

Q. 4 a. Differentiate between limiting and non-limiting reactant. How will you identify limiting reactant in a chemical reaction? Calculate the volume of NH_3 gas produced at STP when $200\ g$ NH_4Cl is heated with $200\ g$ $Ca(OH)_2$ according to the following reaction. **(2+2+3)**

$$2\ NH_4Cl + Ca(OH)_2 \rightarrow CaCl_2 + 2NH_3 + 2H_2O$$

(Atomic masses $N = 14 g/mol$, $Cl = 35.5 g/mol$, $Ca = 40\ g/mol$, $O = 16\ g/mol$, $H = 1\ g/mol$)

b. Explain the structure of acetylene on the basis of hybridization of central atom. **(06)**

(Question 5 from Chapters 7 to 12)

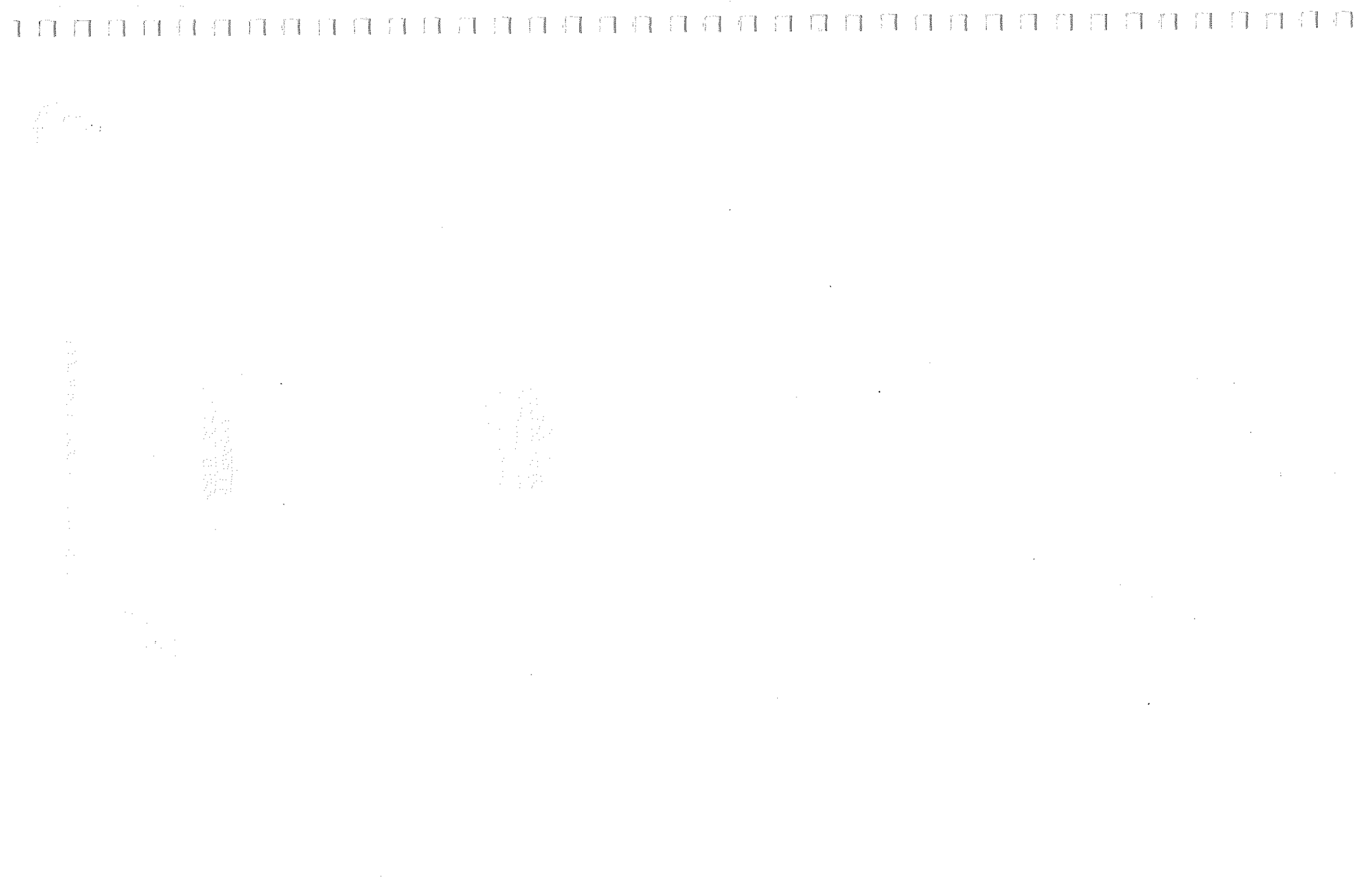
Q. 5 a. Explain collision theory of reaction rates with reference to activation energy, formation of activated complex and enthalpy changes in a chemical reaction. **(3+3+2)**

b. Derive an expression for the determination of relative lowering of vapour pressure and molecular mass of a substance from Raoult's Law. **(2+3)**

(Question 6 Part (a) from Chapters 1 to 6 and Part (b) from Chapters 7 to 12)

Q. 6 a. Derive an expression for total energy of election present in nth orbit of H-atom. **(06)**

b. What is a Fuel Cell? Describe the construction and working of Fuel Cell, giving the reactions taking place at cathode and at anode. What is the application of these cells? **(1+3+2+1)**



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MATHEMATICS HSSC–I

SECTION – A (Marks 20)

Time allowed: 25 Minutes

Version Number	3	1	1	3

Note: **Section – A is compulsory. All parts of this section are to be answered on the separately provided OMR Answer Sheet which 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 **Choose the correct answer A / B / C / D by filling the relevant bubble for each question on the OMR Answer Sheet according to the instructions given there. Each part carries one mark.**

1) What is the range of $y=\sin^{-1}x$?

A. $\frac{-\pi}{4}<y<\frac{\pi}{2}$ B. $0<y<\pi$ C. $\frac{-\pi}{2}\le y\le\frac{\pi}{2}$ D. $0\le y\le\pi$

2) What is the general solution of $\sin x=0$ in $\mathbb{R}$?

A. $\left\{\pm\frac{n\pi}{2}:n\in\mathbb{Z}\right\}$ B. $\left\{\pm\frac{3n\pi}{2}:n\in\mathbb{Z}\right\}$

C. $\{\pm n\pi:n\in\mathbb{Z}\}$ D. $\{\pm 2n\pi:n\in\mathbb{Z}\}$

3) Under which of the following operations, the set $S=\{-1,0,1\}$ is closed?

A. Multiplication B. Division C. Addition D. Subtraction

4) Which of the following sets is equal to $\{x\in\mathbb{Q}:x^2=2\}$

A. $\{\ \}$ B. $\mathbb{Q}$ C. $\{\pm\sqrt{2}\}$ D. $\{\pm 1\}$

5) Which of the following binary relations from $A=\{1,2,3\}$ to $B=\{a,b,c\}$ is a function?

A. $\{(1,a),(2,c),(2,b)\}$ B. $\{(1,a),(2,b),(1,c)\}$

C. $\{(1,a),(1,b),(2,c),(3,c)\}$ D. $\{(1,a),(2,a),(3,c)\}$

6) Let A and B be the square matrices of the same order. Which of the following is true about A and B?

A. $\det(A)=\det(B)$ B. $\det(AB)=\det((AB)')$

C. $\det(A+B)=\det A+\det B$ D. $\det(AB)=\det(BA)$

7) If two roots of a cubic equation are 0 and i, then the cubic equation is:

A. $x^3-x=0$ B. $x^3-1=0$ C. $x^3+1=0$ D. $x^3+x=0$

8) What could be the partial fractions of $\frac{x^2+2x+4}{(x-2)(x^3-8)}$?

A. $\frac{A}{x+2}+\frac{B}{(x-2)^2}+\frac{C}{x^2-2x+4}$ B. $\frac{A}{x+2}+\frac{B}{(x-2)^2}+\frac{Cx+D}{x^2+2x+4}$

C. $\frac{A}{x-2}+\frac{B}{(x-2)^2}+\frac{Cx+D}{x^2-2x+4}$ D. $\frac{A}{x-2}+\frac{B}{(x-2)^2}+\frac{Cx+D}{x^2+2x+4}$

9) What is the sum of n terms of the sequence with n^{th} term $a_n=4n+1$?

A. $2n(2n+3)$ B. $n(2n+3)$ C. $2n+3$ D. $4n+6$

10) What is the sum of the series $1+\frac{1}{3}+\frac{1}{9}+\ldots\ldots$?

A. $\frac{3}{4}$ B. $\frac{3}{2}$ C. 3 D. $\frac{4}{3}$

11) If a fair die is rolled, then what is the probability that the top is a prime number?

A. $\frac{2}{5}$ B. $\frac{3}{2}$ C. $\frac{1}{2}$ D. $\frac{2}{3}$

12) For what values of x, the binomial expansion of $\left(2-\frac{x}{2}\right)^{-1}$ is valid?

A. $|x|>4$ B. $|x|>2$ C. $|x|<4$ D. $|x|<2$

13) How many lines can be drawn between the five points in a plane?

A. 120 B. 60 C. 20 D. 10

14) Which term is the middle term in the expansion of $\left(x-\frac{2}{x}\right)^{2n}$?

A. $(n-1)^{th}$ term B. $\left(\frac{n}{2}-1\right)^{th}$ term C. $\left(\frac{n}{2}+1\right)^{th}$ term D. $(n+1)^{th}$ term

15) The radian measurement of the central angle of a circle of radius $6cm$ which cuts off an arc of $12cm$ long is:

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

16) Which of the following indentities is **TRUE**?

A. $\sin 3\theta = 3\sin\theta + 4\sin^3\theta$ B. $\sin 3\theta = 4\sin\theta + 3\sin^3\theta$

C. $\cos 3\theta = 4\cos^3\theta + 3\cos\theta$ D. $\cos 3\theta = 4\cos^3\theta - 3\cos\theta$

17) Which of the following is equal to $\cos\left(\frac{3\pi}{2}-x\right)$?

A. $\sin x$ B. $\cos x$ C. $-\cos x$ D. $-\sin x$

18) What is primary period of $\frac{1}{2}\sin 2x$?

A. 2π B. $\frac{\pi}{2}$ C. 4π D. π

19) In a right angle triangle ABC, if the lengths of two non-perpendicular sides are 5 and 3, then what will be the length of the third side?

A. 4 B. $\sqrt{34}$ C. 3 D. 4.5

20) If R is circumradius of a triangle ABC, Then $R=$

A. $\frac{abc}{4\Delta}$ B. $\frac{4\Delta}{abc}$ C. $\frac{abc}{\Delta}$ D. $\frac{abc}{4}$

MATHEMATICS HSSC–I

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 request.

SECTION – B (Marks 40)

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

(i) Express the complex number $1+i\sqrt{3}$ in polar form.

(ii) Show that $(A \cup B)' = A' \cap B'$ (Demorgan's Law). Where A and B are subsets of a universal set U.

(iii) If a, b are elements of a group G under the operation of multiplication. Then show that $(ab)^{-1} = b^{-1}a^{-1}$

(iv) If $A = \left[a_{ij}\right]_{3\times 3}$, and $\lambda \in \mathbb{R}$, then show that $\lambda A - A = (\lambda - 1)A$

(v) Determine whether $p \rightarrow (q \rightarrow p)$ is a tautology, a contingency or an absurdity.

(vi) Discuss the nature of roots of $2x^2 - 5x + 1 = 0$.

(vii) If a number exceeds its square root by 56. Find the number.

(viii) Find the $13th$ term of the sequence $x, 1, \ 2-x, \ 3-2x, ...$

(ix) Find the sum of n terms of the series whose n^{th} term is $3n^2 + n + 1$.

(x) A box contains 10 red, 30 white and 20 black marbles. A marble is drawn at random. Find the probability that it is either red or white.

(xi) If x is so small that its square and higher powers can be neglected, then show that $\frac{\sqrt{4+x}}{(1-x)^3} \cong 2 + \frac{25}{4}x$

(xii) Prove that $\frac{\sin^2(\pi+\theta)\tan(\frac{3\pi}{2}+\theta)}{\cot^2(\frac{3\pi}{2}-\theta)\cos^2(\pi-\theta)\operatorname{cosec}(2\pi-\theta)} = \cos\theta$

(xiii) If a triangle ABC is with $a = \sqrt{3}-1$, $b = \sqrt{3}+1$ and $\gamma = 60°$ then find c .

(xiv) Without using calculator or table, prove that $2\tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{7} = \frac{\pi}{4}$

SECTION – C (Marks 40)

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

Q. 3 Find the value of λ for which the system:

$$x + y + z = 0$$
$$2x + y - \lambda z = 0$$
$$x + 2y - 2z = 0$$

has a non-trivial solution. Also solve the system.

Q. 4 Show that roots of $x^2 + (mx + c)^2 = a^2$ will be equal if $c^2 = a^2(1 + m^2)$

Q. 5 Sum the following series to n terms: $\frac{1^2}{1} + \frac{1^2+2^2}{2} + \frac{1^2+2^2+3^2}{3} + ...$ to n terms.

Q. 6 By the principle of mathematical induction, show that $x + y$ is a factor of $x^{2n-1} + y^{2n-1}$ $(x \neq -y)$, for all positive integer n.

Q. 7 Without using calculator / table, prove that $\sin 10° \sin 30° \sin 50° \sin 70° = \frac{1}{16}$

Q. 8 In a triangle ABC, with usual notations, prove that:

Area of Triangle $\Delta = \sqrt{s(s-a)(s-b)(s-c)}$ (The Hero's Formula)

Q. 9 Solve the trigonometric equation $\cos\theta + \cos 3\theta + \cos 5\theta + \cos 7\theta = 0$ for its general solution.

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MATHEMATICS HSSC–I

SECTION – A (Marks 20)

Time allowed: 25 Minutes | **Version Number** | 3 | 1 | 1 | 8 |

Note: **Section – A is compulsory. All parts of this section are to be answered on the separately provided OMR Answer Sheet which 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 **Choose the correct answer A / B / C / D by filling the relevant bubble for each question on the OMR Answer Sheet according to the instructions given there. Each part carries one mark.**

1) The circumradius of an equilateral triangle with length of a side $4m$ and area Δ in square meters is:

A. $\frac{64}{\Delta}$ B. $\frac{4}{\Delta}$ C. $\frac{8}{\Delta}$ D. $\frac{16}{\Delta}$

2) If $\sin^{-1}\left(\frac{1}{2}\right)=\frac{\pi}{2}-x$, then find x

A. $\frac{\pi}{3}$ B. $\frac{\pi}{4}$ C. $\frac{2\pi}{3}$ D. $\frac{\pi}{6}$

3) What is the general solution of the trigonometric equation $\cos x=1$?

A. $\{2n\pi : n\in\mathbb{Z}\}$ B. $\left\{\frac{\pi}{2}+2n\pi : n\in\mathbb{Z}\right\}$

C. $\left\{\frac{n\pi}{2} : n\in\mathbb{Z}\right\}$ D. $\left\{\frac{2\pi}{3}+2n\pi : n\in\mathbb{Z}\right\}$

4) Which of the following numbers is **rational**?

A. e^2 B. $\sqrt{\frac{3}{2}}$ C. π D. $\sqrt{\frac{12}{75}}$

5) What is the modulus of the complex number $\frac{3-4i}{4+3i}$?

A. 1 B. 5 C. -1 D. $\frac{1}{5}$

6) Which of the following sets is equal to the set $\{n\in\mathbb{Z} \mid n^2=-n\}$

A. $\{-1,-2,-3,-4,...\}$ B. $\{0,-1\}$

C. ϕ D. $\{-1,-4,-9,-16,...\}$

7) The set of natural numbers under the operation of addition is:

A. Monoid B. Group

C. Abelian group D. Not a semigroup

8) Let $AX=O$ be a system of linear equations in matrix form, with rank (A) less than the number of unknowns. Then system has:

A. A non-trivial solution B. More than one finite many solutions

C. Infinite many solutions D. A trivial solution only

9) Find the value of $\begin{vmatrix} 1 & 0 & 0 & 0 \\ 2 & 3 & 0 & 0 \\ 2 & -1 & -2 & 0 \\ -4 & 1 & 3 & 4 \end{vmatrix}$

A. 24 B. –24 C. 36 D. –36

10) Let $f(x)$ be a polynomial of degree three such that $f(1)=0=f(2)=f(0)$ then $f(x)=$.....

A. x^3-3x^2-2x B. x^3+3x^2+2x C. x^3-3x^2+2x D. x^3+3x^2-2x

11) What are the distinct roots of the equation $x^2+x^{-2}-2=0$?

A. $\pm 1, \pm i$ B. $\pm i$ C. ± 2 D. ± 1

12) Which of the following types **may be** the partial fractions of the expression $\frac{x^2}{(1-x^2)(4+x)}$?

A. $\frac{A}{1-x^2}+\frac{Bx+C}{4+x}$ B. $\frac{A}{1-x}+\frac{B}{1+x}+\frac{C}{4+x}$

C. $\frac{Ax}{1-x^2}+\frac{Bx+C}{4+x}$ D. $\frac{Ax+B}{1-x^2}+\frac{C}{4-x}$

13) If A.M and G.M between a and b are equal, then $(a-b)^2=$

A. $2ab$ B. $\sqrt{ab}$ C. 0 D. $4ab$

14) If $a_1=-1,\ a_n=n+a_{n-1}$, then find the sum S_3 of first three terms.

A. 5 B. 6 C. 3 D. 4

15) In how many ways a cricket team of 11 players can be selected out of 15 players if the captain must be included in each way?

A. 15! B. $\overset{14}{C}_4$ C. $\overset{15}{C}_{11}$ D. 11!

16) A coin is tossed twice. What is the probability that all two will be the same?

A. $\frac{3}{4}$ B. $\frac{1}{2}$ C. 1 D. $\frac{1}{4}$

17) What is the sum of the series $\binom{7}{0}+\binom{7}{2}+\binom{7}{4}+\binom{7}{6}$?

A. 128 B. 64 C. 48 D. 32

18) The radian measure of the central angle of a sector of the circle is $40°$ and radius of the circle is $3m$. What is the area of the sector?

A. $2\pi\ m^2$ B. πm^2 C. $3\pi m^2$ D. $4\pi\ m^2$

19) What is the range of $y=\tan x$?

A. $0<y<\infty$ B. $\mathbb{R}$ C. $-1\le y\le 1$ D. $-\infty<y<0$

20) For what value of k, the primary period of $\frac{1}{3}\cos kx$ is $\frac{2\pi}{3}$?

A. 9 B. 3 C. 6 D. $\frac{3}{2}$

MATHEMATICS HSSC–I

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 request.

SECTION – B (Marks 40)

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

(i) Simplify the following by justifying each step: $\frac{4+16x}{4}$

(ii) Simplify the following complex number by expressing in the form $a+ib$

$$\frac{2}{\sqrt{5}+\sqrt{-8}}$$

(iii) Find all the fourth roots of unity.

(iv) Complete the following table, to obtain that $S=\{a,b,c\}$ is a semigroup under the operation $*$.

$*$	a	b	c
a	c	a	b
b	a	b	c
c	...	...	a

(v) Find matrix X if $\begin{bmatrix}5 & 2\\ -2 & 1\end{bmatrix}X=\begin{bmatrix}2 & 1\\ 5 & 10\end{bmatrix}$

(vi) Find the numerical value of k if the polynomial x^3+kx^2-7x+6 has a remainder -4 when divided by $x+2$.

(vii) Resolve $\frac{3x-11}{(x^2+1)(x+3)}$ into partial fractions.

(viii) If $y=1+\frac{x}{2}+\frac{x^2}{4}+\ldots$, then show that $x=2\left(\frac{y-1}{y}\right)$

(ix) Find n if $\overset{n}{P}_4 : \overset{n-1}{P}_3 = 9:1$

(x) Evaluate $\sqrt[3]{32}$ correct to three places of decimal, by using binomial expansion.

(xi) Prove that $(\sec\theta-\tan\theta)^2=\frac{1-\sin\theta}{1+\sin\theta}$

(xii) Prove that $\tan 56^\circ=\frac{\cos 11^\circ+\sin 11^\circ}{\cos 11^\circ-\sin 11^\circ}$ without using calculator.

(xiii) A ladder leaning against a vertical wall makes an angle of 24° with the wall. Its foot is $5m$ from the wall. Find its length.

(xiv) Without using table / calculator, prove that $\sin^{-1}\frac{1}{\sqrt{5}}+\cot^{-1}3=\frac{\pi}{4}$

SECTION – C (Marks 40)

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

Q. 3 Prove that $\sim q\wedge(p\to q)\to\sim p$ is a tautology, where p and q are any two logical statements.

Q. 4 Solve the following system by reducing their augmented matrix to the Echelon form:

$$x_1+4x_2+2x_3=2$$
$$2x_1+x_2-2x_3=9$$
$$3x_1+2x_2-2x_3=12$$

Q. 5 Prove that $\frac{x^2}{a^2}+\frac{(mx+c)^2}{b^2}=1$ will have equal roots, if $c^2=a^2m^2+b^2$; $a\neq 0, b\neq 0$

Q. 6 Find the n^{th} term of the geometric sequence if $\frac{a_5}{a_3}=\frac{4}{9}$ and $a_2=\frac{4}{9}$.

Q. 7 Find the 6^{th} term in the expansion of $\left(x^2-\frac{3}{2x}\right)^{10}$.

Q. 8 Prove the fundamental law of trigonometry: $\cos(\alpha-\beta)=\cos\alpha\cos\beta+\sin\alpha\sin\beta$, where α,β are two real angles.

Q. 9 For any triangle ABC with usual notations show that: $r_1=4R\sin\frac{\alpha}{2}\cos\frac{\beta}{2}\cos\frac{\gamma}{2}$

PHYSICS HSSC–I

SECTION – A (Marks 17)

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Time allowed: 25 Minutes | **Version Number** | 3 | 0 | 8 | 4 |

Note: **Section – A is compulsory. All parts of this section are to be answered on the separately provided OMR Answer Sheet which 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 **Choose the correct answer A / B / C / D by filling the relevant bubble for each question on the OMR Answer Sheet according to the instructions given there. Each part carries one mark.**

1) Signals from remote control to the device operated by it travel with the speed of:
A. Light B. Ultrasonic C. Supersonic D. Sound

2) The effect produced by the superposition of waves from two coherent sources passing through the same region is called:
A. Diffraction B. Interference C. Polarization D. Refraction

3) In which of the following processes maximum work can be obtained?
A. Isochoric B. Isothermal C. Adiabatic D. Isobaric

4) Which of the following may be used as valid formula to calculate speed of ocean waves? (v=speed, g=acceleration due to gravity, λ =wavelength, ρ=density, h=depth)
A. gh/λ B. $\sqrt{\lambda g}$ C. $\frac{\lambda}{gh}$ D. ρgh

5) In a cricket match 500 spectators are counted one by one. How many significant figures will be there in the final result?
A. 1 B. 2 C. 3 D. 0

6) A person walks first 10 km north and 20 km east. The magnitude of the resultant vector is:
A. 22.36 km B. 22.46 km C. 25.23 km D. 20.36 km

7) For which angle the equation, $|\overline{A}.\overline{B}| = |\overline{A} \times \overline{B}|$ is correct:
A. 45° B. 60° C. 90° D. 0°

8) When a block of wood of mass 2 kg is pushed along a horizontal flat surface of a bench, the force of friction is 4N. When the block is pushed along the bench with a force of 10N, it moves with a constant:
A. Speed of $5ms^{-1}$ B. Acceleration of $3ms^{-2}$
C. Acceleration of $5ms^{-2}$ D. Speed of $3ms^{-1}$

9) A projectile is thrown so that it travels a maximum range of 100m. How high will it rise?
A. 400 m B. 500 m C. 1000 m D. 250 m

10) One horse power is equal to:
A. 746 Joules B. 746 KW C. 746 N D. 746 Watt

11) What is moment of inertia of a sphere?
A. $\frac{1}{2}M^2R$ B. $\frac{2}{5}MR^2$ C. $\frac{1}{2}MR^2$ D. MR^2

12) If the earth suddenly stops rotating, the value of 'g' at equator would:
A. Remain unchanged B. Increase
C. Become Zero D. Decrease

13) A rain drop of radius 'r' falls in air with a terminal speed v_t. What should be the terminal speed of rain drop of radius '2r'?
A. v_t B. $2v_t$ C. $4v_t$ D. $\frac{v_t}{2}$

14) Bernoulli's equation is based upon law of conservation of:
A. Energy B. Momentum C. Current D. Mass

15) The time period of the same pendulum at Karachi and at Murree are related as: (T_M = Time period at Murree T_K = Time period at Karachi)
A. $T_K \rangle T_M$ B. $T_K \langle T_M$ C. $2T_K = 3T_M$ D. $T_K = T_M$

16) In an isolated system the total energy of vibrating mass and spring is:
A. Variable B. Low C. High D. Constant

17) Which of the following factors has no effect on the speed of sound in a gas?
A. Pressure B. Temperature C. Density D. Humidity

PHYSICS HSSC–I

Revised Syllabus

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

NOTE: Answer any seven parts each from section B and C and any two questions from section D 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 21)
(Chapters 1 to 5)

Q. 2 Answer any SEVEN parts. All parts carry equal marks. **(7 x3 = 21)**

(i) Show that the famous Einstein's equation $E = mc^2$ is dimensionally consistent.

(ii) What does word "micro" signify in the words "microwave oven"?

(iii) Write down the steps for addition of vectors by rectangular components method.

(iv) Explain how cranes are able to lift very heavy load without toppling?

(v) Aeroplane while horizontally drops a bomb when reaches exactly above the target, but missed it. Explain briefly.

(vi) State how impulse is related to linear momentum.

(vii) Show that $W_T = \lim_{\Delta r \to 0} \sum_{i=1}^{n} (F_i \cos\theta_i)\Delta d_i$ for a variable force.

(viii) Differentiate between Solar energy and Wind energy.

(ix) Establish a relation between Linear velocity (v) and Angular velocity (w).

(x) Show that orbital velocity, $v \propto \frac{1}{\sqrt{r}}$

SECTION – C (Marks 21)
(Chapters 6 to 10)

Q. 3 Answer any SEVEN parts. All parts carry equal marks. **(7 x3 = 21)**

(i) What is meant by aerofoils? Explain briefly.

(ii) How do pulsations in pulse show the heart beat?

(iii) Differentiate between free and forced oscillations.

(iv) Give two applications in which resonance plays an important role.

(v) Why do sound waves travel faster in solids than in gases?

(vi) What is the difference between progressive and stationary waves?

(vii) In a Michelson interferometer a second glass plate is also used. Why?

(viii) What is meant by dual nature of light? Explain briefly.

(ix) Differentiate between Reversible and Irreversible processes.

(x) Write the limitations of first law of thermodynamics.

SECTION – D (Marks 26)

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

Q. 4 **a.** Define projectile motion with figure. Also derive mathematical equations for maximum height attained, time of flight and range of projectile. **(2+6)**

b. A ball of mass 100 g is thrown vertically upward at a speed of $25 ms^{-1}$. If no energy is lost, determine the height it would reach. If the ball only rises to 25 m, calculate the work done against air resistance. Also calculate the force of friction. **(05)**

Q. 5 **a.** Derive equations for kinetic and potential energies of a body of mass m executing S.H.M. **(07)**

b. A car is moving at $20 ms^{-1}$ along a straight road with its $500 Hz$ horn sounding. You are standing at the road side. What frequency do you hear as car is:

(i) Approaching you **(ii)** Receding from you at $20 ms^{-1}$

(Take speed of sound $= 340 ms^{-1}$) **(06)**

Q. 6 **a.** Explain the diffraction of X-rays by crystal and derive an expression for Bragg's Law to find the wavelength of light used. **(08)**

b. A refrigerator has a coefficient of performance 8. If the temperature in the freezer is $-23°C$, what is the temperature at which it rejects heat? **(05)**

PHYSICS HSSC–I

SECTION – A (Marks 17)

Time allowed: 25 Minutes | **Version Number** | **3** | **0** | **8** | **5**

Note: **Section – A is compulsory. All parts of this section are to be answered on the separately provided OMR Answer Sheet which 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 **Choose the correct answer A / B / C / D by filling the relevant bubble for each question on the OMR Answer Sheet according to the instructions given there. Each part carries one mark.**

1) Which of the following is a pair of SI base units?
A. Ampere, Joule B. Coulomb, Second
C. Kilogram, Kelvin D. Newton, Meter

2) $\frac{1km}{1Gm} = \_\_\_\_\_?$
A. μ B. μm C. $10^{-6}m$ D. $10^{6}m$

3) A person walks first 10 km north and 20 km east. Then the magnitude of resultant vector is:
A. 20.36 km B. 22.36 km C. 22.46 km D. 25.23 km

4) If the scalar product $\overline{A}.\overline{B}=0$, then which of the following is **NOT** correct?

A	B	C	D
$\lvert\overline{A}\rvert=0$	$\lvert\overline{A}\rvert\neq 0$	$\lvert\overline{A}\rvert\neq 0$	$\lvert\overline{A}\rvert\neq 0$
$\lvert\overline{B}\rvert\neq 0$	$\lvert\overline{B}\rvert=0$	$\lvert\overline{B}\rvert\neq 0$	$\lvert\overline{B}\rvert\neq 0$
$\theta\neq 0°$	$\theta\neq 0°$	$\theta=0°$	$\theta\neq 0°$
$\cos\theta\neq 0$	$\cos\theta\neq 0$	$\cos\theta\neq 0$	$\cos\theta=0$

5) A car takes 1 hour to travel 100 km along a main road and than ½ hour to travel 20 km along a side road. What is the average speed of the car for the Whole Journey?
A. $60kmh^{-1}$ B. $70kmh^{-1}$ C. $80kmh^{-1}$ D. $100kmh^{-1}$

6) Rate of change of velocity is called:
A. Speed B. Distance C. Acceleration D. Displacement

7) An example of non-conservative force is:
A. Electric force B. Magnetic force
C. Gravitational force D. Frictional force

8) The expression for escape velocity is given by:
A. $2gR^2$ B. $\sqrt{2gR}$ C. $\frac{gR^2}{2}$ D. $2gR$

9) Artificial satellites move around:
A. Moon B. Sun C. Stars D. Earth

10) What is the moment of inertia of a solid cylinder?
A. MR^2 B. $\frac{1}{2}M^2R$ C. $\frac{2}{5}M^2R$ D. $\frac{1}{2}MR^2$

11) The pressure will be low where the speed of the fluid is:
A. Zero B. High C. Low D. Constant

12) If the period of oscillation of mass (M) suspended from a spring is 2S. then period of mass 4M should be:
A. 1S B. 2S C. 4S D. 8S

13) In an Isolated system the total energy of a vibrating mass and spring is:
A. Constant B. Variable C. Low D. High

14) There is no net transfer of energy by particles of medium in:
A. Longitudinal wave B. Transverse wave
C. Progressive wave D. Stationary wave

15) Which of the following factors has no effect on the speed of sound in a gas?
A. Humidity B. Pressure C. Temperature D. Density

16) A real gas can be approximated to an ideal gas at:
A. Low density B. High pressure C. High density D. Low temperature

17) Coloured fringes observed in soap bubbles are the examples of:
A. Diffraction B. Interference C. Polarization D. Reflection

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PHYSICS HSSC–I

Revised Syllabus

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

NOTE: Answer any seven parts each from section B and C and any two questions from section D 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 21)

(Chapters 1 to 5)

Q. 2 Answer any SEVEN parts. All parts carry equal marks. **(7 x3 = 21)**

(i) Define the number π and show that 2π radian $= 360°$.

(ii) Give the draw backs to use the period of a pendulum as a time standard.

(iii) Briefly explain how cranes are able to lift very heavy load without toppling?

(iv) Briefly explain why do buses and heavy trucks have large steering wheels?

(v) What is head-on collision? Explain briefly with an example.

(vi) Define elastic and inelastic collisions.

(vii) Why are energy savers used instead of normal bulbs?

(viii) Does a hydrogen filled balloon possess any P.E? Explain briefly.

(ix) Establish a relation between linear acceleration (a) and angular acceleration (α).

(x) Why is the fly wheel of an engine made heavy in the rim?

SECTION – C (Marks 21)

(Chapters 6 to 10)

Q. 3 Answer any SEVEN parts. All parts carry equal marks. **(7 x3 = 21)**

(i) Describe the working of an engine carburettor and paint spray.

(ii) Smoke rises in a chimney faster when a breeze is blowing. Explain briefly.

(iii) Is there any connection between 'F' and 'x' in mass spring system? Explain briefly.

(iv) A singer holding a note of right frequency, can shatter a glass? Explain briefly.

(v) Is it possible for an object which is vibrating transversely to produce sound waves?

(vi) Why do sound waves travel faster in the solids than in gases?

(vii) Can we apply Huygen's principle to radar waves?

(viii) A soap bubble looks black when it bursts. Why?

(ix) Write the limitations of first law of thermodynamics.

(x) Entropy is often called as "time arrow". Explain briefly.

SECTION – D (Marks 26)

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

Q. 4 **a.** State and explain Bernoulli's equation. Explain any three applications of Bernoulli's theorem. **(2+6)**

b. What should be the length of simple pendulum whose time period is one second? What is frequency of seconds pendulum? **(4+1)**

Q. 5 **a.** Define and explain absolute potential energy. Prove that absolute $P.E_{abs} = \frac{GmM_e}{R_e}$. **(2+6)**

b. A wheel of a machine is rotating at a steady rate of $120\ rev\ \min^{-1}$. Find:

(i) Its angular velocity

(ii) The linear velocity of a point on the wheel at 0.25 m from axle. **(05)**

Q. 6 **a.** Explain polarization of light in detail. **(08)**

b. Calculate the change in entropy when 10 kg of water is heated from $90°C$ to $100°C$? (specific heat of water is $4180 J\ mole^{-1}k^{-1}$) **(05)**

PHYSICS HSSC–I

SECTION – A (Marks 17)

(Old Syllabus)

35

Time allowed: 25 Minutes | **Version Number** | **7** | **0** | **8** | **4**

Note: Section – A is compulsory. All parts of this section are to be answered on the separately provided OMR Answer Sheet which 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 Choose the correct answer A / B / C / D by filling the relevant bubble for each question on the OMR Answer Sheet according to the instructions given there. Each part carries one mark.

1) In case of grating spectrometer, the resolving power 'R' is given as:

A. $R=\frac{\lambda}{\lambda_2+\lambda_1}$ B. $R=\frac{1.22\lambda}{D}$ C. $R=\frac{\lambda_2-\lambda_1}{\lambda}$ D. $R=\frac{\lambda}{\Delta\lambda}$

2) The detector in photo-phone is made of:

A. Germanium B. Selenium C. Silicon D. Cadmium

3) No entropy change takes place in an:

A. Adiabatic process B. Isobaric process
C. Isochoric process D. Isothermal process

4) The branch of physics which deals with the structure and properties of solids is called:

A. Nuclear physics B. Solid state physics
C. Atomic physics D. Particle physics

5) The minimum number of unequal forces whose vector sum can be zero is:

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

6) If $\vec{A}\times\vec{B}=\vec{C}$ is directed along positive $Z-axis$, then the vectors $\vec{A}$ and $\vec{B}$ must lie in:

A. ZX -plane B. Vertical plane C. XY -plane D. YZ -plane

7) When a bullet of mass 'm' is fired from a gun of mass 'M' with velocity 'V', then velocity of the gun will be:

A. $V'=-\frac{MV}{m}$ B. $V'=-mvt$ C. $V'=-\frac{mV}{M}$ D. $V'=-\frac{mV}{t}$

8) The maximum height attained by a projectile is:

A. $\frac{Vi^2\sin^2\theta}{2g}$ B. $\frac{Vi^2\cos^2\theta}{g}$ C. $\frac{2Vi^2\sin^2\theta}{g}$ D. $\frac{Vi^2\sin^2\theta}{g}$

9) The work done in moving a body from one place to another in gravitational field is independent of:

A. The applied force B. The path followed by the body
C. The power consumed D. Force of gravity

10) Kilo watt hour is the unit of:

A. Work B. Force C. Momentum D. Power

11) The dimensions of angular velocity are:

A. $\left[LT^{-2}\right]$ B. $\left[L^{-1}T\right]$ C. $\left[T^{-1}\right]$ D. $\left[LT^{-1}\right]$

12) The S.I unit of flow rate is:

A. m^3s^{-2} B. m^3s^{-1} C. m^2s^{-2} D. m^2s^{-1}

13) The fundamental equation in fluid dynamics that relates pressure to fluid speed and height is:

A. Bernoulli's equation B. Stoke's equation
C. Mass-energy equation D. Equation of continuity

14) The angular velocity of the mass attached to a spring is:

A. $\omega=2\pi\sqrt{\frac{m}{K}}$ B. $\omega=\sqrt{\frac{m}{K}}$ C. $\omega=2\pi\sqrt{\frac{K}{m}}$ D. $\omega=\frac{1}{2\pi}\sqrt{\frac{m}{K}}$

15) Acceleration of a mass-spring system is:

A. Variable due to change in direction only
B. Variable due to change in magnitude only
C. Variable due to change in direction and magnitude
D. Uniform

16) Under stationary waves set up in a medium, the nodes are located at : (Where $n=1,2,3,.....$)

A. $\frac{n\lambda}{4}$ B. $\frac{n\lambda}{2}$ C. $(2n+1)\frac{\lambda}{2}$ D. $(n+1)\frac{\lambda}{4}$

17) When light passes through a pin hole type opening, it seems to spread out. This phenomenon is known as:

A. Reflection B. Diffraction C. Polarization D. Dispersion

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PHYSICS HSSC–I

(Old Syllabus)

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

NOTE: Answer any seven parts each from section B and C and any two questions from section D 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 21)
(Chapters 1 to 6)

Q. 2 Answer any SEVEN parts. All parts carry equal marks. **(7 x3 = 21)**

(i) Under what conditions zeros are **NOT** significant figures?

(ii) How would the two vectors of the same magnitude have to be oriented, if they were to be combined to give a resultant equal to a vector of the same magnitude?

(iii) Can a body be in equilibrium under the action of a single force?

(iv) A Ghauri missile is fired at an angle of $90°$ with horizontal axis with a velocity of $300ms^{-1}$. Find the time for which the missile remains in air.

(v) What happens when a very heavy ball collides with a light stationary ball?

(vi) In which case is more work done? When 50kg bag of books is lifted through 50cm, or when a 50kg crate is pushed through 2m across the floor with a force of 50N?

(vii) A diver of 50g mass dives from a 10m high diving board in a swimming pool. Calculate its P.E. before jump.

(viii) a. What is meant by angular momentum?

b. Explain the law of conservation of angular momentum.

(ix) The cylinders A and B are of the same mass but the radius of A is greater than that of B. Which one will require more force to come into rotation? And why?

(x) What is Venturi's effect? Write its equation.

SECTION – C (Marks 21)
(Chapters 7 to 11)

Q. 3 Answer any SEVEN parts. All parts carry equal marks. **(7 x3 = 21)**

(i) a. What is meant by phase angle?

b. Does the phase angle define angle between maximum displacement and the driving force.

(ii) Time period of a mass-spring system is given by $T = 2\pi\sqrt{\frac{m}{K}}$. If '$x$' is the extension from mean position, what would be the time period in terms of extension 'x'?

(iii) Write three characteristics of stationary waves.

(iv) Explain three uses of Doppler's effect.

(v) State Huygen's principle.

(vi) What is Bragg's equation? Describe its two applications.

(vii) In a compound microscope, magnification produced by objective lens is 5 and that produced by eye-piece is 50. What is the total magnification produced by the microscope.

(viii) How is power lost in optical fibre through scattering and absorption?

(ix) Find the average speed of an oxygen molecule in the air at S.T.P.

(x) 336 J of energy is required to melt 1g of ice at $0°C$. What is the change in entropy of 30g of water at $0°C$ as it is changed to ice at $0°C$ by a refrigerator?

SECTION – D (Marks 26)

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

Q. 4 **a.** Define and explain scalar product of two vectors with example. Show that the scalar product is commutative with the help of a figure. Describe its three characteristics. **(2+2+2)**

b. A load of 10N is suspended from a clothes line. This distorts the line so that it makes an angle of $15°$ with the horizontal at each end. Find the tension in the clothes line. **(04)**

c. Explain the phenomenon of error and uncertainty in measurements. **(03)**

Q. 5 **a.** Prove that the work done in a gravitational field is independent of the path followed by the body and along closed path is zero. **(3+3)**

b. A force of 400 N is required to overcome road friction and air resistance in propelling an automobile at $80 Kmh^{-1}$. What power in KW must the engine develop? **(04)**

c. Write a note on momentum and explosive forces. **(03)**

Q. 6 **a.** Describe the diffraction of X-rays by crystals and obtain Bragg's equation. Write its two uses. **(2+2+2)**

b. Sodium light $(\lambda = 589nm)$ is incident normally on a grating having 3000 lines per centimetre. What is the highest order of the spectrum obtained with this grating? **(04)**

c. Describe the construction and working of a spectrometer. **(03)**