



BIOLOGY HSSC-II

SECTION – A (Marks 17)

Time allowed: 25 Minutes

Punjab Text Book Board

Version Number 8 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) If a heterozygous yellow seeded plant is crossed with a homozygous green seeded plant, what is the probability of progeny having green seeds?
A. 25% B. 50% C. 100% D. Zero
- 2) A gardener wants to regulate fruit drop from apple crop to reduce the time for picking them, he will be spraying:
A. Auxins B. Abscisic acid C. Gibberellins D. Ethane
- 3) If the recombination frequency between A & B is 11%, A & C is 19%, B & C is 30% what would be the arrangement of genes?
A. ACB B. BCA C. BAC D. ABC
- 4) In urea cycle citrulline combines with a precursor molecule called:
A. Arginine B. Ornithine
C. Arginase D. Arginosuccinate
- 5) The joint that fixes teeth in your jaw is:
A. Fibrous B. Synovial C. Pivot D. Cartilaginous
- 6) Select the **mismatched** one in the following:
A. Pectoral girdle – Clavicle B. Metatarsals – Palm of hand
C. Cervical vertebrae – Neck D. Pelvic girdle – Ilium
- 7) In human female secondary oocyte is released from the ovary at the stage of:
A. Metaphase – I B. Anaphase – II C. Metaphase – II D. Anaphase – I
- 8) Increase in the intensity of light increases the number of cell:
A. Elongation B. Division C. Maturation D. Differentiation
- 9) Which of the following syndrome is **NOT** related to the abnormality of sex-chromosomes?
A. Down's B. Klinefelter's C. Turner's D. Jacob's
- 10) Select a start codon for the synthesis of a polypeptide chain:
A. AGA B. AUG C. AAU D. AAG
- 11) During final moments of a football match your heart beat accelerates due to the secretion of:
A. Adrenaline B. Cortisol C. Parathormone D. Thyroxin
- 12) Considering R for red and r for white eye colour, if a heterozygous female Drosophila is crossed with a white eye male, what would be the percentage of white eye colour in male flies in the next generation?
A. 25% B. 100% C. 50% D. Zero
- 13) Taq polymerase is the other name of:
A. Primase B. DNA ligase
C. DNA Polymerase D. RNA polymerase
- 14) Variation in gene frequency just by a chance is called:
A. Non random mating B. Genetic drift
C. Probability D. Random mating
- 15) In the following there is **NO** difference between:
A. Primary consumers & herbivores B. Primary carnivores & trophic level-II
C. Secondary consumer & omnivores D. Trophic level I & herbivores
- 16) A tree-less region is called:
A. Alpine B. Tundra C. Taiga D. Boreal
- 17) All are the consequences of deforestation **EXCEPT**:
A. Silting of lakes B. Interception of heavy rainfall
C. Heavy floods D. Soil erosion

THE HISTORY OF THE

ROYAL SOCIETY OF LONDON

FROM ITS INSTITUTION

TO THE PRESENT TIME

BY JOHN DESHAUNES

ESQ. OF THE SOCIETY

AND OF THE UNIVERSITY OF OXFORD

IN TWO VOLUMES

THE SECOND VOLUME

LONDON

PRINTED BY R. CLAY AND COMPANY

PRINTERS, BUNGAY, SUFFOLK

1893

BY APPOINTMENT TO HER MAJESTY

THE QUEEN, AND TO THE ROYAL SOCIETY

OF LONDON

AND TO THE UNIVERSITY OF OXFORD

AND TO THE SOCIETY OF FRIENDS

OF LONDON

AND TO THE SOCIETY OF FRIENDS

OF BRISTOL

AND TO THE SOCIETY OF FRIENDS

OF BIRMINGHAM

AND TO THE SOCIETY OF FRIENDS

OF GLoucester

AND TO THE SOCIETY OF FRIENDS

OF LEICESTER

AND TO THE SOCIETY OF FRIENDS

OF LONDON

AND TO THE SOCIETY OF FRIENDS

OF MANCHESTER

AND TO THE SOCIETY OF FRIENDS

OF NEWCASTLE

AND TO THE SOCIETY OF FRIENDS

OF NOTTINGHAM

AND TO THE SOCIETY OF FRIENDS

OF OXFORD

AND TO THE SOCIETY OF FRIENDS

OF SHEFFIELD



BIOLOGY HSSC-II

Punjab Text Book Board

31

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)

(Chapter 15 – 20)

- Q. 2** Answer any SEVEN parts. The answer to each part should not exceed 5 to 6 lines. (7 x 3 = 21)
- Discuss the role of hormones for maintaining the concentration of urine.
 - Describe briefly the characteristics of a bone.
 - Name the synthetic auxins and describe their commercial applications.
 - How do fresh water organisms maintain osmoregulation?
 - Is it true that low temperature treatment is significant for flower formation? If so discuss it briefly.
 - How is a lagging strand synthesized in the replication process?
 - Discuss the contribution of Macleod and McCarty in identifying transforming principle.
 - Define the following terms:
a) Anticodon b) Photoperiodism c) Haptonasty
 - Discuss the role of parathyroid gland.
 - How is a blastula formed in a developing chick embryo?

SECTION – C (Marks 21)

(Chapter 21 – 27)

- Q. 3** Answer any SEVEN parts. The answer to each part should not exceed 5 to 6 lines. (7 x 3 = 21)
- Define metastasis. What are the properties of cancer cells?
 - What is the test cross? Discuss its significance by making a cross.
 - Discuss Ex-vivo gene therapy to replace faulty genes in the body.
 - How is a recombinant DNA formed?
 - Discuss how a eukaryotic cell evolved from prokaryotic cell according to endosymbiont hypothesis.
 - What is meant by "Mycorrhizal association"?
 - What type of organisms are present in limnetic and profundal zone of a lake ecosystem.
 - Briefly describe the causes of ozone depletion. What are its consequences?
 - Differentiate between:
a) G_1 & G_2 Phase
b) Locus & Allele
c) Autecology & Synecology
 - Write an account of Type-I diabetes mellitus.

SECTION – D (Marks 26)

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

- Q. 4** a. Explain sliding filament model of muscle contraction. Also describe the formation and control of cross bridges with the help of diagram. (4+3+1)
- b. Define epistasis. Explain this with reference to Bombay Phenotype. (2+3)
- Q. 5** a. Define nerve impulse. What are the major factors maintaining RMP on a nerve fibre? Also draw diagram. (2+5+1)
- b. Write an account of Genomic Library. (05)
- Q. 6** a. Explain nitrogen cycle in detail with diagram. (5+2)
- b. What is meant by apical dominance? How is this phenomena related to growth of a plant? (2+4)



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BIOLOGY HSSC-II

SECTION – A (Marks 17)

32

Time allowed: 25 Minutes

National Book Foundation

Version Number 4 1 0 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) Which of the following is the function of thermocycler?
 - A. It controls the pH of PCR mixture
 - B. It inhibits contamination in PCR mixture
 - C. It regulates the temperature of PCR mixture
 - D. It maintains the composition of PCR mixture
- 2) Which of the following is the precipitate produced by sewage treatment?
 - A. Algal blooms
 - B. Pond scum
 - C. Sludge
 - D. Humus
- 3) Which of the following combination of events is related to the inspiration phase of breathing?

	Diaphragm	External intercostal muscles	Internal intercostal muscles
A.	Relaxation	Relaxation	Contraction
B.	Relaxation	Contraction	Contraction
C.	Contraction	Contraction	Relaxation
D.	Contraction	Relaxation	Contraction

- 4) The type of urinary tract infection in which kidneys are particularly infected is called:
 - A. Encephalitis
 - B. Pyelonephritis
 - C. Urethritis
 - D. Cystitis
- 5) Which of the following pairs of ribs are called floating ribs?
 - A. 8th, 9th and 10th
 - B. 11th and 12th
 - C. 6th, 7th and 8th
 - D. 7th, 8th and 9th
- 6) Which of the following terms can be used for axon fibre of a neuron?
 - A. Pre synaptic fibre or pre ganglionic fibre
 - B. Post ganglionic fibre or post synaptic fibre
 - C. Pre ganglionic or post synaptic fibre
 - D. Pre synaptic fibre or post ganglionic fibre
- 7) Which of the following components of nervous system are **NOT** involved in reflex arc?
 - A. Central nervous system
 - B. Brain
 - C. Receptors and effectors
 - D. Neurons other than sensory and motor neurons

- 8) Infundibulum is the stalk, composed of blood vessels and the fibres of neurosecretory cells, by which:
- Adrenal glands are attached to the kidney
 - Brain sends signals to the spinal cord
 - Two cerebral hemispheres are attached together
 - Pituitary gland is attached to hypothalamus
- 9) Insulin promotes all of the following events **EXCEPT**:
- Use of glucose in cellular respiration
 - Conversion of excess glucose to fats
 - Glycogenesis
 - Gluconeogenesis
- 10) When an animal learns the same response for two different stimuli which are given to the animal simultaneously, it is called?
- Latent learning
 - Habituation
 - Classical conditioning
 - Insight learning
- 11) After ovulation, the ruptured follicle is transformed into a glandular structure called:
- Blastocyst
 - Inner cell mass
 - Graffian follicle
 - Corpus luteum
- 12) During embryonic development, all of the following parts have been developed from neural crest cell **EXCEPT**:
- Skull bones
 - Brain and spinal cord
 - Peripheral nerves
 - Medulla of the adrenal gland
- 13) Mr. James has A+ve blood group while his wife has A-ve, they have one child, who has O-ve blood group. What is probability of O+ve daughter in next pregnancy?
- $\frac{1}{8}$
 - $\frac{1}{16}$
 - Zero
 - $\frac{1}{4}$
- 14) In Morgon's experiment, what was the F_2 ratio of cross between F_1 male and female flies having long wing, broad abdomen phenotypes?
- 9:3:3:1
 - 1:1:1:1
 - 1:1
 - 3:1
- 15) Which of the following is correct about the nucleotide sequence TATAAT?
- It is -35 sequence located in coding strand
 - It is -35 sequence located in template strand
 - It is -10 sequence located in coding strand
 - It is -10 sequence located in template strand
- 16) Which of the following is represented by "1" in the given equation ($p^2 + 2pq + q^2 = 1$)?
- Sum of all genotype frequencies
 - Sum of all gene frequencies
 - Genotype frequency of recessive homozygotes
 - Genotype frequency of dominant homozygotes
- 17) In the absence of oxygen in soil, which of the following bacteria breakdown nitrates releasing nitrogen back into the atmosphere using the oxygen for their own respiration?
- Rhizobium*
 - Pseudomonas*
 - Azotobacter*
 - Clostridium*



BIOLOGY HSSC-II

(National Book Foundation)

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)

(Chapter 14 – 20)

- Q. 2 Answer any SEVEN parts. The answer to each part should not exceed 5 to 6 lines. (7 x 3 = 21)**
- (i) a. How do haemoglobin molecules lose oxygen when they reach at tissue bed? (1)
 - b. Write any two differences between haemoglobin and myoglobin? (2)
 - (ii) What is sinusitis? Give its cause and symptoms? (3)
 - (iii) Human nephrons have association of three types of capillary beds. Give their names and location in the kidney. (3)
 - (iv) How and when is concentrated urine formed in human kidneys? (3)
 - (v) Write any three differences between bones and cartilages. (3)
 - (vi) a. What is the difference between true and false ribs. (1)
 - b. What is sprain? How can it be treated? (2)
 - (vii) What is headache or cephalalgia? Differentiate between primary and secondary headache. (3)
 - (viii) What are the effects of abnormal secretions of antidiuretic hormone? (3)
 - (ix) Explain briefly the hostile and helpful intraspecific interaction by giving suitable example. (3)
 - (x) What do you know about the location and function of sertoli cells and leydig cells in male reproductive system. (3)

SECTION – C (Marks 21)

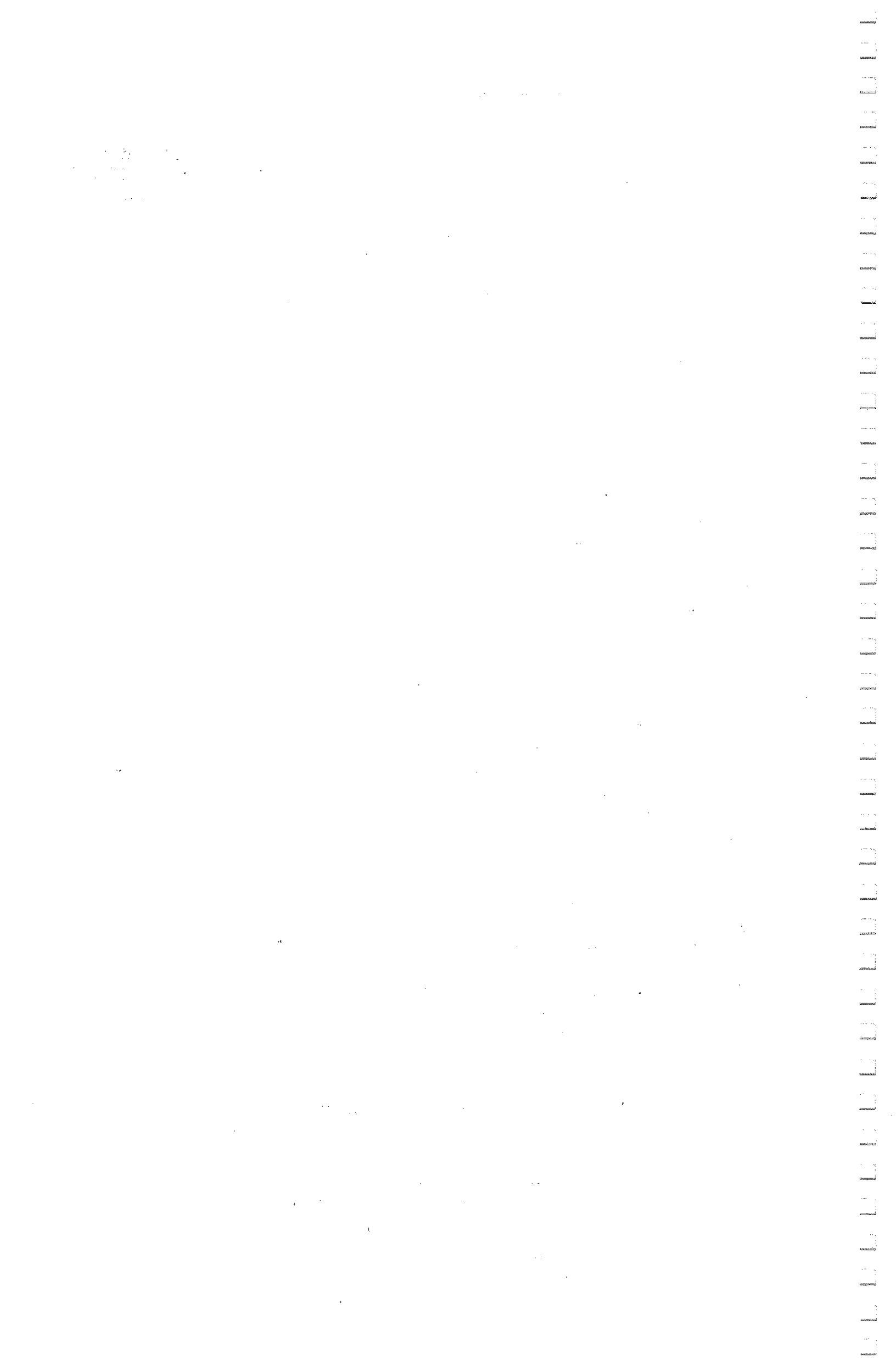
(Chapter 21 – 27)

- Q. 3 Answer any SEVEN parts. The answer to each part should not exceed 5 to 6 lines. (7 x 3 = 21)**
- (i) Explain briefly the formation of neural crest and its role in development. (3)
 - (ii) a. Workout all possible types of gametes from the individual having genotype "AaBbCc". (1)
 - b. What do you know about the dominance relations among multiple alleles of ABO blood group system? (2)
 - (iii) Explain the mechanism of sex determination in *Drosophila*. (3)
 - (iv) "Genetic code is universal but not quite universal" Justify this statement. (3)
 - (v) a. Write the difference between karyotype of patients of Down syndrome and of Klinefelter's syndrome. (1)
 - b. Give any two differences between positive and negative regulation of gene expression. (2)
 - (vi) Why was the theory of evolution proposed by Lamarck rejected? (3)
 - (vii) What is productivity of an ecosystem? Differentiate the concept of gross primary productivity and net primary productivity. (3)
 - (viii) What are restriction endonucleases? Explain their mode of action by giving a suitable example. (3)
 - (ix) Explain briefly the two major techniques of animal cell culture. (3)
 - (x) What is integrated disease management? How can it be administered? (3)

SECTION – D (Marks 26)

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

- Q. 4**
- a. Describe the mechanism of contraction of skeletal muscles. Draw labelled diagram. (3 + 2)
 - b. Describe female reproductive cycle and its hormonal regulation. Also draw labelled diagrams showing the changes in ovaries and uterus during the cycle. (5 + 3)
- Q. 5**
- a. Describe range of phenotype and their genetic basis in ABO blood group system. Also discuss the compatibility of different blood type of this system for transfusions. (2 + 2 + 4)
 - b. Describe Griffith's experiment and its conclusion. Also draw its diagram. (3 + 2)
- Q. 6**
- a. Describe different steps of nitrogen cycle and draw its concept map. (6 + 2)
 - b. Describe the procedure of Sanger – Coulson Method of DNA Sequencing. Also draw its diagram. (3 + 2)





BIOLOGY HSSC-II

SECTION – A (Marks 17)

Time allowed: 25 Minutes

National Book Foundation

Version Number	4	1	0	6
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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 process of introducing new plants from their growing place to new locality with different climate is termed as:

- A. Plant introduction
- B. Selection
- C. Hybridization
- D. Acclimatization

2) Which of the following combination of events is related to the expiration phase of breathing?

	Diaphragm	External intercostal muscles	Internal intercostal muscles
A.	Relaxation	Contraction	Contraction
B.	Contraction	Contraction	Relaxation
C.	Contraction	Relaxation	Contraction
D.	Relaxation	Relaxation	Contraction

3) The animals which are hypotonic to their outer environment are:

- A. Only terrestrial animals
- B. Freshwater fishes and marine bony fishes
- C. Freshwater fishes and terrestrial animals
- D. Marine bony fishes and terrestrial animals

4) Which of the following type of joints is found between the shaft regions of the long bones in the forearm and in the leg?

- A. Synovial joint
- B. Fibrous joint
- C. Cartilaginous joint
- D. Hinge joint

5) After an action potential, nerve fibre undergoes a period of recovery in which it regains its original ionic distribution and polarity and prepares itself for the next stimulation. This period of recovery of nerve fibre is called:

- A. Active period
- B. Refractory period
- C. Recovery period
- D. Resting period

6) All of the following are excitatory neurotransmitters EXCEPT:

- A. Acetylcholine
- B. Serotonin
- C. Dopamine
- D. Endorphins

7) Which of the following hormones acts as first messenger that binds with its receptor on the plasma membrane of target cell, starting a series of events in the cell which generates second messenger?

- A. Oxytocin
- B. Cortisone
- C. Aldosterone
- D. Testosterone

8) A type of learning behaviour in which an animal temporarily learns to ignore a repeated, irrelevant stimulus, is called:

- A. Habituation
- B. Classical conditioning
- C. Insight learning
- D. Latent learning

- 9) Based upon changes and hormonal regulation the female reproductive cycle can be divided into three phases i.e., menstrual phase, proliferative phase and:
- A. Post menstrual phase B. Follicular phase
C. Secretory phase D. Pre-ovulatory phase
- 10) The blastocyst is a fluid-filled hollow sphere composed of single layer of large, flattened cells called _____ and a small cluster of 20 to 30 rounded cells inside it.
- A. Amniotic cells B. Inner cell mass
C. Ectodermal cells D. Trophoblast cells
- 11) Mr. John has B+ve blood group while his wife has B-ve, they have one child, who has O-ve blood group. What is the probability of daughter with O+ve blood group in next pregnancy?
- A. $\frac{1}{16}$ B. Zero C. $\frac{1}{4}$ D. $\frac{1}{8}$
- 12) If a light red wheat grain plant having genotype (AaBbCc) is self-fertilized, what will be the expected ratio of dark red wheat grain plants (AABBCC) to white grain wheat plants (aabbcc)?
- A. 1:6:15:20:15:6:1 B. 1:1
C. 3:1 D. 9:3:3:1
- 13) In DNA replication process, the replacement of primers by DNA nucleotides is carried out by:
- A. Primase B. DNA helicase
C. DNA polymerase-I D. DNA ligase
- 14) Which of the following causes the RNA polymerase to stop the synthesis of RNA?
- A. 3'-Tail B. Any of the three stop codons
C. GC hairpin D. 5'-Cap
- 15) Which of the following is represented by "1" in the given equations ($p = 1 - q$), ($q = 1 - p$)?
- A. Sum of all gene frequencies
B. Genotype frequency of recessive homozygotes
C. Genotype frequency of dominant homozygotes
D. Sum of all genotype frequencies
- 16) Which of the following are important members of crustose lichen stage in ecological succession on rock surface?
- A. *Permelia* and *Dermatocarpom* B. *Azotobacter* and *Clostridium*
C. *Licanora* and *Rhinodina* D. *Rhizobium* and *Dermatocarpom*
- 17) In DNA test, after hybridization, excess probes are washed from the membrane and the pattern of hybridization is visualized on X-ray film by exposing the membrane to an X-ray source. This technique is known as:
- A. RFLP analysis B. Gel electrophoresis
C. Autoradiography D. X-ray diffraction analysis



BIOLOGY HSSC-II

(National Book Foundation)

35

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)

(Chapter 14 – 20)

- Q. 2 Answer any SEVEN parts. The answer to each part should not exceed 5 to 6 lines. (7 x 3 = 21)**
- (i) Enlist the changes that occur in diaphragm and ribcage while inspiration and expiration. (3)
 - (ii) Why breathing through nose is supposed to be more advantageous? (3)
 - (iii) How do marine osmoconformers become isotonic to their outer environment? (3)
 - (iv) a. Differentiate the terms nephrolithiasis and pyelonephritis. (1)
b. Define urethritis and cystitis. Why are these conditions fifty times more common in women than in men? (2)
 - (v) Name the muscles involved in the movement of tibio-femoral joint. Also give origin and insertion of these muscles. (3)
 - (vi) Define three most common types of bone fractures? (3)
 - (vii) Highlight any three features of neuron that influence the velocity of nerve impulse? (3)
 - (viii) Explain briefly the mode of action of protein and peptide hormones. (3)
 - (ix) The response to a stimulus can be positive, negative, or ignored. Demonstrate them by giving one suitable example of each? (3)
 - (x) a. Differentiate the terms azoospermia and oligospermia. (1)
b. How does ovulation occur in female reproductive cycle? (2)

SECTION – C (Marks 21)

(Chapter 21 – 27)

- Q. 3 Answer any SEVEN parts. The answer to each part should not exceed 5 to 6 lines. (7 x 3 = 21)**
- (i) a. Define meroblastic cleavage. Also give its example. (1)
b. Explain briefly the structure of human blastocyst. (2)
 - (ii) A pink flower four o'clock plant is crossed with a red flower plant. Find: (3)
 - a. Probability of Red flower plant
 - b. Probability of Pink flower plant
 - c. Ratio of pink flower to red flower plant.
 - (iii) How can we determine if the two genes are linked or not? (3)
 - (iv) Enlist the types of chromosomes based upon position of centromere and define each of them. (3)
 - (v) a. What is the role of DNA polymerase-I in DNA replication process? (1)
b. How do promoter regions of prokaryotic and eukaryotic genes differ from each other? (2)
 - (vi) Explain the concept of genetic drift with the help of suitable example. (3)
 - (vii) What is nitrogen fixation and give its types? (3)
 - (viii) Analyse the gel pattern (in Fig. Q3 (viii)) carefully and: (3):
 - a. Suggest method of gene sequencing which is used while obtaining this gel.
 - b. Read the sequence of nucleotides from the gel and highlight its 5' and 3' ends.
 - c. Propose the actual target sequence which is used to obtain this gel pattern
 - (ix) What are the methods to obtain gene of interest in recombinant DNA technology?(3)
 - (x) Suggest what types of vaccines are available for prevention of the polio infection? (3)

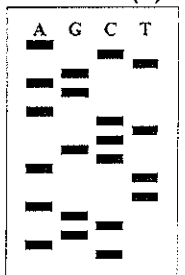


Fig. Q3 (viii)

SECTION – D (Marks 26)

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

- Q. 4**
- a. Explain the structure of synapse. Draw its labelled diagram. Also discuss the mechanism of synaptic transmission. (1 + 2 + 3)
 - b. Describe neurulation in human embryo. Also draw its labelled diagram (2 + 2)
 - c. Explain and diagrammatically represent the mechanism of haemodialysis. (1.5 + 1.5)
- Q. 5**
- a. Describe the inheritance of Coat colour in the *Labrador retriever* and highlight the phenomenon of epistasis in this trait. (6 + 2)
 - b. Write a comparative note on different models of DNA replication. Draw the diagrams of models (3 + 2)
- Q. 6**
- a. Define Hardy-Weinberg principle and describe the factors that can change the gene and genotype frequencies of a natural population. (1 + 4)
 - b. Describe the mechanism/procedure of DNA analysis/testing Represent its procedural steps diagrammatically. (6 + 2)

MEMORANDUM

TO: THE PRESIDENT

FROM: [Name]

SUBJECT: [Topic]

1. [Text]

2. [Text]

3. [Text]

4. [Text]

5. [Text]

6. [Text]

7. [Text]

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15. [Text]

16. [Text]

17. [Text]

18. [Text]

19. [Text]

20. [Text]

21. [Text]

22. [Text]

23. [Text]

24. [Text]

25. [Text]

26. [Text]

27. [Text]

28. [Text]

29. [Text]

30. [Text]

31. [Text]

32. [Text]

33. [Text]

34. [Text]



BIOLOGY HSSC-II

SECTION – A (Marks 17)

36

Time allowed: 25 Minutes

National Book Foundation

Version Number 8 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) Vasa recta are thin walled capillaries emerging from the:
A. Afferent arterioles
B. Efferent arterioles
C. Glomerulus
D. Renal vein
- 2) Which of the following is the bone of human fore limbs?
A. Femur
B. Radius
C. Metatarsal
D. Fibula
- 3) The hormone that forces the corpus luteum in the ovary to continue to secrete progesterone is called:
A. FSH
B. Human chorionic gonadotropin
C. Estrogen
D. Prolactin
- 4) Low ADH in Blood is connected with:
A. Dilution of urine
B. Concentration of urine
C. Slow heartbeat
D. Rapid heartbeat
- 5) Fallopian tube is a part of:
A. Uterus
B. Ovary
C. Oviduct
D. Vas deference
- 6) If a haemophilic man marries a normal but carrier woman what is the probability of their child/children to be a haemophilic.
A. 100%
B. 75%
C. 50%
D. 0%
- 7) The possible blood group of children born to parents having A and AB blood group are:
A. O, A and AB
B. O, A and B
C. O and A
D. A and AB
- 8) In mitochondria UGA reads as:
A. Stop codon
B. Tryptophan
C. Arginine
D. Glycine
- 9) The wall of alveolus is only _____ thick.
A. 0.1nm
B. 0.1 μ m
C. 1nm
D. 1 μ m
- 10) _____ noted that human population has the capacity to increase exponentially and food supply has a capacity to increase arithmetically.
A. Alfred Wallace
B. Thomas R. Malthus
C. Charles Layell
D. Darwin

- 11) The pattern of distribution in which there is unpredictable spacing among individual is called:
- A. Group
 - B. Clumped
 - C. Uniform
 - D. Random distribution
- 12) In which of the following processes of DNA analysis, a sheet of nitro-cellulose membrane is placed on the top of the gel?
- A. Collection of DNA sample
 - B. Placement and separation of RFLP
 - C. Denaturation of RFLP fragment
 - D. Blotting
- 13) The synthesis of gene from mRNA is carried out by:
- A. Prob
 - B. Cosmid
 - C. Ligase
 - D. Reverse transcriptase
- 14) Water is disinfected physically or chemically prior to discharge into streams, river and wet lands in:
- A. Primary treatment
 - B. Secondary treatment
 - C. Tertiary treatment
 - D. Quaternary treatment
- 15) The loss of response to a stimulus after repeated exposure is called:
- A. Classical conditioning
 - B. Latent learning
 - C. Habituation
 - D. Imprinting
- 16) The part of brain that controls feelings and emotions of love, hate, anger and fear etc. is:
- A. Hippocampus
 - B. Amygdalae
 - C. Pons
 - D. Cerebellum
- 17) Quadriceps femoris is an extensor muscle which originates at:
- A. Ilium and femur
 - B. Ilium and fibula
 - C. Ilium and tibia
 - D. Ilium and humorous
-



BIOLOGY HSSC-II

(National Book Foundation)

37

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) (Chapter 14 – 20)

- Q. 2 Answer any SEVEN parts. The answer to each part should not exceed 5 to 6 lines. (7 x 3 = 21)**
- What is hamburger phenomenon?
 - Write the function of:
 - Ionocytes
 - Rectal glands
 - Osmolytes
 - Write at least one cause of the following:
 - Muscle Fatigue
 - Cramps
 - Tetany
 - Write the names of facial bones and their numbers in human.
 - Briefly write about internal structure of Spinal Cord.
 - Write about any one mode of Hormonal actions.
 - How are Cretinism and myxoedema different?
 - How is Habituation different from Imprinting?
 - How is Human reproductive system Unique?
 - Write about any three causes of female infertility.

SECTION – C (Marks 21) (Chapter 21 – 27)

- Q. 3 Answer any SEVEN parts. The answer to each part should not exceed 5 to 6 lines. (7 x 3 = 21)**
- Why are neural Crest Cells called fourth germinal layer?
 - What are the limitations of Mendelian law of independent Assortment?
 - Write about the transfusion Principal of Rh blood group.
 - Write any three characteristics of Genetic Code.
 - How is regulation of gene Expression Important?
 - What is Sympatric Speciation?
 - What are the causes of Ozone layer depletion?
 - Write the steps involved in the DNA sequencing techniques.
 - Write about the two major techniques of Animal cell culture.
 - What is Acclimatization?

SECTION – D (Marks 26)

- Note: Attempt any TWO questions. All questions carry equal marks. (2 x 13 = 26)**
- Q. 4**
- Explain ultra-structure of skeletal muscle with the help of diagram. (4+2)
 - Write about Repolarization and Hyperpolarization of Neuron fibre. (3.5+3.5)
- Q. 5**
- Explain the Mechanism of translation with the help of diagram. (8+2)
 - What are the kinds of successions? (3)
- Q. 6**
- Write the mechanism of PCR reaction with the help of diagram. (7+2)
 - Describe the Blood circulation to human Nephron. (4)



CHEMISTRY HSSC-II

SECTION - A (Marks 17)

26

Time allowed: 25 Minutes

Version Number 4 0 9 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 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.

- Electronic configuration of a transition element X in +2 oxidation state is $[Ar]3d^5$. What is its atomic number?
A. 25 B. 26 C. 27 D. 24
- Which of the following metal hydroxide is **LEAST** soluble in water?
A. $Ba(OH)_2$ B. $Ca(OH)_2$ C. $Sr(OH)_2$ D. $Mg(OH)_2$
- The abnormal enlargement of thyroid gland is due to deficiency of _____ in diet.
A. Fluorene B. Chlorine C. Iodine D. Bromine
- Nucleic acids are the repeating units of:
A. Nucleosides B. Nucleotides C. Bases D. Sugars
- Polyethylene is an example of:
A. Condensation polymers B. Addition polymers
C. Biopolymers D. Thermosetting polymers
- Which of the following alloys is used in the preparation of Raney nickel?
A. Ni-Al B. Ni-Cu C. Ni-Ag D. Ni-Cd
- A mixture consists of 40%(+) tartaric acid and 60%(-) tartaric acid. This mixture rotates plane polarized light:
A. Clock wise B. Anti-clock wise
C. Does not rotate D. Unpredictably
- Which of the following is **CORRECT**?
A. SN_1 and E_1 are one step reactions B. SN_2 and E_2 are one step reactions
C. E_1 and E_2 are one step reactions D. SN_1 and SN_2 are one step reactions
- Hydrogen bonding is maximum in:
A. Methoxyethane B. Ethanol C. Triethylamine D. Ethanal
- Acetic acid reacts with Na metal to form:
A. Salt + $CO_2(g)$ B. Salt + $H_2(g)$ C. Only Salt D. Salt + H_2O
- Which region of electromagnetic radiations is used in IR spectroscopy?
A. $0.8\mu m - 2.5\mu m$ B. $2.5\mu m - 16\mu m$
C. $0.8nm - 2.5nm$ D. $2.5nm - 16nm$
- The hard and rigid rocky earth crust is called:
A. Atmosphere B. Biosphere C. Lithosphere D. Hydrosphere
- Which of the following elements form alloys?
A. Alkali metals B. Alakaline earth metals
C. Halogens D. Transition elements
- Which of the following pair has both members from the same period of periodic table?
A. Na - Ca B. Na - Cl C. Ca - Cl D. Cl - Br
- The carbon atom in formaldehyde is:
A. sp hybridized B. sp^2 hybridized C. sp^3 hybridized D. dsp^2 hybridized
- R - CN gives _____ when it is reacted with $LiAlH_4$.
A. 1° Amine B. 2° Amine C. 3° Amine D. No reaction
- Pyridine is:
A. Heterocyclic aromatic compound B. Heterocyclic aliphatic compound
C. Carbocyclic aromatic compound D. Carbocyclic aliphatic compound

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CHEMISTRY HSSC-II

27

Time allowed: 2:35 Hours

Total Marks Sections B, C and D: 68

NOTE: Sections B, C and D comprise pages 1 – 2. Answer any seven parts each from Section 'B', '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 13, 14, 21 – 24

Q. 2 Answer any SEVEN parts. All parts carry equal marks.

(7 x 3 = 21)

- (i) Na_2O is more basic than MgO . Give two reasons.
- (ii) Calculate the magnetic moment of a divalent ion in aqueous solution, if its electronic configuration is $[\text{Ar}]3d^5$.
- (iii) Define the terms *diamagnetic* and *paramagnetic*. What feature of electronic structure is directly related to these properties? (1)
- (iv) (a) Define commodity chemicals. (2)
(b) Sulfuric acid (H_2SO_4) is the most important commodity chemical. Give reason. (2)
- (v) Describe the role of CO_2 and H_2O in keeping the earth's atmosphere warm. What is this phenomenon called? (1)
- (vi) (a) What is TMS? (2)
(b) Describe the role of TMS in NMR (2)
- (vii) What are polysaccharides? Draw the structure of cellulose.
- (viii) Justify the following: (1.5)
(a) Electron affinity of fluorine is less than that of other halogens. (1.5)
(b) Fluorine has the least bond enthalpy among halogens. (1.5)
- (ix) Why are the tetrahalides of C not hydrolysed while those of Si, Ge and Sn get readily hydrolysed? (1)
- (x) (a) What is coordination number in a complex compound? (2)
(b) Write the structure and name of a hexadentate ligand. (2)

SECTION – C (Marks 21) Chapters 15 – 20

Q. 3 Answer any SEVEN parts. All parts carry equal marks.

(7 x 3 = 21)

- (i) How would you detect Carbon and Hydrogen in an organic compound? Elaborate your answer with suitable chemical equations. (1)
- (ii) (a) What is resonance energy? (2)
(b) Draw the resonating structures and resonance hybrid of benzene. (2)
- (iii) Classify the following compounds if these are primary, secondary and/or tertiary halides.
(a) 2-Bromo-3-methylpentane
(b) 1-Bromo-2-methylpentane
(c) 2-Bromo-4-methylpropane
- (iv) Compound 'A' with molecular formula $\text{C}_4\text{H}_9\text{Br}$ is treated with aq. KOH solution. The rate of this reaction depends upon the concentration of the compound 'A' only. Write down the structural formula and IUPAC name of compound 'A'.
- (v) How can butan-2-one be converted into 2-methylbutan-2-ol by using Grignard's reagent? Give reactions with conditions.
- (vi) Draw the structures of the following:
(a) Resorcinol
(b) Hydroquinone
(c) Catechol
- (vii) Which of the following Aldehydes can give Aldol condensation reaction? Justify your choice with scientific reason. Also draw the structure of product obtained through Aldol condensation reaction.
(a) Benzaldehyde
(b) Formaldehyde
(c) Acetaldehyde
- (viii) Give suitable mechanism of alkaline hydrolysis of an Ester.
- (ix) Why does Benzene prefer electrophilic substitution reaction and not electrophilic addition reactions?
- (x) Hydrobromination of 2-methyl-1-butene gives major and minor products. Draw the structures and name the rule which governs the formation of major product.

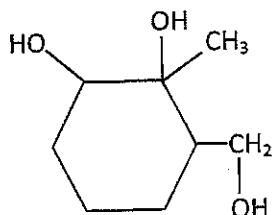
SECTION – D (Marks 26)

Note: Attempt any TWO questions. All questions carry equal marks.

(2 x 13 = 26)

(Chapters 15 – 20)

- Q. 5** a. How would acetone react with the following. Give reactions with mechanism. (3+3)
- 2,4-dinitrophenyl hydrazine in acidic medium
 - Hydrogen cyanide (HCN) in Basic Medium (2+2)
- b. Explain the following terms using ethyl alcohol as an example: (2+2)
- Dehydration
 - Ether formation
- c. Give the structure of the product of the following when reacted with $K_2Cr_2O_7 + H_2SO_4$ (3)



(Chapters 13, 14, 21 – 24)

- Q. 4** a. Write the behaviour of Hexaaquacopper(ii) ions with: (6)
- Hydroxide ions
 - Ammonia solution
 - Carbonate ions
- b. Define the term spectroscopy. Also describe the principles of Atomic emission and atomic absorption spectroscopy. (7)

(Chapters 15 – 20)

- Q. 6** a. Describe the rule to determine if a group present in mono substituted benzene is Ortho-Para director or Meta director. Elaborate your answer with examples. (6)

(Chapters 13,14, 21-24)

- b. Beryllium differs from other members of its group. Give any seven points of differences. (7)

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CHEMISTRY HSSC-II

SECTION – A (Marks 17)

28

Time allowed: 25 Minutes

Version Number 4 0 9 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.

- Metal carbonates decompose on heating to give metal oxides and carbon dioxide. Which of the following metal carbonates is thermally **MOST** stable?
A. MgCO_3 B. CaCO_3 C. SrCO_3 D. BaCO_3
- For a mixture containing 50% (+) tartaric acid and 50% (–) tartaric acid, which of the following statement is **CORRECT**?
A. It is a racemic mixture and optically active
B. It is a racemic mixture and optically inactive
C. It is not a racemic mixture and optically active
D. It is not a racemic mixture and optically inactive
- Which of the following occurs during the initiation stage of radical mechanism?
A. Non radicals are formed from radicals
B. Radicals are formed from other radicals
C. Radicals are formed from non radicals
D. Non radicals are formed from other non radicals
- Which of the following will give benzoic acid, when reacted with alkaline KMnO_4 ?
A. Phenol B. Nitrobenzene C. Toluene D. Aniline
- Which of the following is **NOT** monohydric alcohol?
A. Ethanol B. Methanol C. Glycol D. Isopropyl alcohol
- Identify X in the following reaction: $\text{X} + 4\text{NaOH} + 3\text{I}_2 \longrightarrow \text{CHI}_3 + \text{HCOONa} + 3\text{NaI} + 3\text{H}_2\text{O}$
A. Acetaldehyde B. Acetone C. Benzaldehyde D. Formaldehyde
- The order of reactivity of alcohol with respect to $-\text{O}-\text{H}$ bond cleavage is:
A. $\text{CH}_3\text{OH} > 1^\circ \text{Alcohol} > 2^\circ \text{Alcohol} > 3^\circ \text{Alcohol}$
B. $3^\circ \text{Alcohol} > 1^\circ \text{Alcohol} > 2^\circ \text{Alcohol} > \text{CH}_3\text{OH}$
C. $\text{CH}_3\text{OH} > 2^\circ \text{Alcohol} > 1^\circ \text{Alcohol} > 3^\circ \text{Alcohol}$
D. $2^\circ \text{Alcohol} > 1^\circ \text{Alcohol} > \text{CH}_3\text{OH} > 3^\circ \text{Alcohol}$
- Indicate the **MOST** acidic carboxylic acid:
A. Ethanoic acid B. Bromoethanoic acid
C. Chloroethanoic acid D. Dichloroethanoic acid
- The hydrolysis of triglycerides by alkalies is called:
A. Saponification B. Dehydration C. Chlorination D. Esterification
- Which of the following compounds is **NOT** used to adhere two items together?
A. Adhesives B. Resins C. Glue D. Dye
- The designing and creation of chemicals that are **NOT** hazardous to people or environment is related to:
A. Industrial Chemistry B. Green Chemistry
C. Biochemistry D. Environmental Chemistry
- Very high energy electron beams are used in:
A. IR Spectroscopy B. UV Spectroscopy
C. Mass Spectrometry D. NMR Spectroscopy
- Good leaving group among the following is:
A. H_2O B. HO^- C. RO^- D. NH_2^-
- Which of the following is **NOT** a hydrocarbon?
A. Mesitylene B. Resorcinol C. Durene D. Cumene
- Which of the following is an amphoteric hydroxide?
A. $\text{Al}(\text{OH})_3$ B. NaOH C. $\text{Si}(\text{OH})_4$ D. $\text{Mg}(\text{OH})_2$
- The coordination number of carbonyl in $[\text{Ni}(\text{CO})_4]$ is:
A. 4 B. 3 C. 2 D. 0
- 1,3-dibromobutane is:
A. Vicinal dihalide B. Geminal dihalide
C. A dihalide D. A halide

THE UNIVERSITY OF CHICAGO

PHYSICS DEPARTMENT

PHYSICS 311
LECTURE 10
MAY 12, 2010

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CHEMISTRY HSSC-II

29

Time allowed: 2:35 Hours

Total Marks Sections B, C and D: 68

NOTE: Sections B, C and D comprise pages 1 – 2. Answer any seven parts each from Section 'B', '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 13, 14, 21 – 24

Q. 2 Answer any SEVEN parts. All parts carry equal marks.

(7 x 3 = 21)

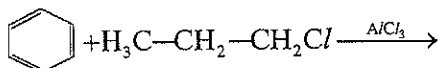
- (i) PbO_2 is amphoteric in nature. Give two chemical reactions showing its amphoteric nature.
- (ii) Write the formulas of the following coordination compounds.
 - (a) Tetraamineaquachlorocobalt(III) chloride
 - (b) Tetracarbonylnickel(0)
 - (c) Potassium trioxalatoaluminate(III)
- (iii) Define enzymes and give any two industrial applications of enzymes.
- (iv) Write down the raw materials needed for the preparation of hair dye.
- (v) Ozone is harmful as well as useful. Justify the statement.
- (vi)
 - (a) What information can be obtained from NMR spectrum?
 - (b) What is cm^{-1} in IR spectrum?
- (vii) Hydrogen iodide (HI) is stronger acid than Hydrogen fluoride (HF). Give reason.
- (viii) Beryllium salts never have more than four molecules of water of crystallization. Justify this statement.
- (ix) Transition elements or their compounds are used as catalyst in chemical reactions. Justify the statement with example.
- (x) How is oil spillage dangerous for under water plants?

SECTION – C (Marks 21) Chapters 15 – 20

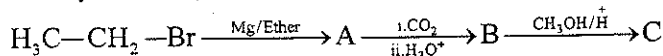
Q. 3 Answer any SEVEN parts. All parts carry equal marks.

(7 x 3 = 21)

- (i) Complete the reaction with mechanism:



- (ii) Identify the compounds A, B and C in the following reaction.



- (iii) How can you prepare disilver acetylid and dicopper acetylid? (Give reactions)
- (iv) Write the steps involved in the preparation of terephthalic acid from toluene. (Mechanism is not required)
- (v) Give reasons;
 - (a) Primary amines have high melting and boiling points as compared to their analogous alkanes. (1.5)
 - (b) Methyl amine is stronger base than ammonia. (1.5)
- (vi) How would you prepare diethyl ether from ethanol? Give reaction with mechanism.
- (vii) Write the structure of the following compounds:
 - (a) *cis*-1,2-dimethylcyclopentane
 - (b) Lactic acid
 - (c) Durene
- (viii)
 - (a) What is decarboxylation? (1)
 - (b) Give mechanism of thermal decarboxylation of malonic acid (2)
- (ix) Complete the following reactions.
 - (a) $\text{H}_3\text{C}-\overset{\text{O}}{\parallel}{\text{C}}-\text{NH}_2 \xrightarrow{\text{LiAlH}_4}$
 - (b) $\text{H}_3\text{C}-\overset{\text{O}}{\parallel}{\text{C}}-\text{OH} \xrightarrow{\text{LiAlH}_4}$
 - (c) $\text{H}_3\text{C}-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_3 \xrightarrow{\text{LiAlH}_4}$
- (x) Acetic acid is more acidic than phenol. Give reason.

SECTION – D (Marks 26)

Note: Attempt any TWO questions. All questions carry equal marks.

(2 x 13 = 26)

(Chapters 15 – 20)

- Q. 4**
- a. Explain the following electrophilic substitution reactions of benzene with mechanism: **(3+3)**
- Sulphonation
 - Nitration
- b. Which type of aldehyde gives Cannizzaro's reaction? Explain with mechanism. **(1+6)**

(Chapters 13, 14, 21 – 24)

- Q. 5**
- a. Explain the treatment of industrial waste water to remove contamination from it. **(7)**
- b. Describe the reactions of hexaaquairon(II) ions with: **(3+3)**
- Hydroxide ions
 - Ammonia solution

(Chapters 15 – 20)

- Q. 6**
- a. Describe the role of the following in substitution and elimination reactions of alkyl halides. **(2+2+2)**
- Structure of substrate
 - Nature of Base
 - Nature of solvent

(Chapters 13,14, 21-24)

- b. What is meant by pesticides? Describe any six of its types. **(1+6)**

— 2HA 1909 (ON) —



COMPUTER SCIENCE HSSC-II

SECTION – A (Marks 15)

42

Time allowed: 20 Minutes

Version Number 4 1 2 2

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) Which of the following is **NOT** a file opening mode?
A. ios::bin B. ios::in C. ios::out D. ios::app
- 2) Which of the following creates user groups and assigns privileges to them?
A. Network management B. Memory management
C. I/O management D. File management
- 3) In which operating system response time is very critical?
A. Quick response B. Time sharing C. Batch D. Real time
- 4) In _____ phase, the project team determines the end-user requirements.
A. Implementation B. Analysis C. Design D. Coding
- 5) What is the output produced by the statement? `cout << "\\nnow\\n";`
A. "nnow" B. "\\nnow" C. \\nnow D. "\\nnow"
- 6) The equivalent statement of `sum=sum+num` is:
A. `num+=sum` B. `sum+=num` C. `sum=num++` D. `sum+=num`
- 7) Which of the following can be used to replace ternary operator?
A. switch statement B. if statement
C. if-else statement D. else-if statement
- 8) Which of the following statements is used to skip some statements inside loop and transfer control to the beginning of loop?
A. skip B. continue C. default D. switch
- 9) The dereference operator is denoted by:
A. ! B. * C. & D. &&
- 10) Which of the following is correct declaration of an array?
A. `int arr(10);` B. `int arr;` C. `int arr{10};` D. `int arr[10];`
- 11) All strings end with a special character called null character. That character is represented by:
A. '\0' B. '\n' C. '\e' D. '\u'
- 12) The first line of function definition is known as:
A. Function prototype B. Function header
C. Function body D. Argument
- 13) The phenomenon of having two or more functions in a program with the same names but with different numbers and types of parameters is known as:
A. Recursive function B. Inline function
C. Nested function D. Function overloading
- 14) The ability of a class to derive properties from a previously defined class is:
A. Information hiding B. Encapsulation
C. Inheritance D. Polymorphism
- 15) A constructor is called whenever:
A. A class is used B. An object is destroyed
C. An object is created D. A class is declared





COMPUTER SCIENCE HSSC-II

43

Time allowed: 2:40 Hours

Total Marks Sections B, C and D: 60

NOTE: Answer any Seven parts each from Section 'B' and 'C' any three questions from Section 'D' 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:

- | | |
|--|---------------------------------------|
| 1. Operating Systems (10%) | 2. System Development Life Cycle(10%) |
| 3. Object Oriented Programming In C++(10%) | 4. Control Structure (15%) |
| 5. Pointers (05%) | |

Q. 2 Answer any SEVEN parts. All questions carry equal marks.

(7 x 3 = 21)

- Differentiate between multiprocessing and multithreading by giving one example of each.
- What is determined in different types of feasibility studies?
- What is the purpose of operating system in the computer?
- Highlight six responsibilities of system analyst.
- Why is escape sequence used? Give any four examples with brief explanation.
- Determine the output of the following code segment:

```
int i=2;
cout <<i;
cout <<i++;
cout <<++i;
```
- What is the usage of break and continue statement in C++ program?
- Write a program that reads an integer and prints whether it is odd or even number.
- Differentiate between while and do while loop.
- What is pointer variable? Describe two advantages of using pointer variable.

SECTION – C (Marks 21)

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

- | | |
|------------------------------|------------------------|
| 1. Arrays and Strings (15%) | 2. Functions (15%) |
| 3. Classes and Objects (10%) | 4. File Handling (10%) |

Q. 3 Answer any SEVEN parts. All questions carry equal marks.

(7 x 3 = 21)

- Differentiate between one dimensional and two dimensional array.
- What is the advantage of using cin.get() function over cin statement for reading a string? Give an example.
- Trace output of the following program segment:

```
int a[5]={10,3,5,1,2};
for (int i=4; i>0; i--){
a[i]+=a[i-1];
cout <<a[i]<<" "; }
```
- What is function? Describe different types of functions used in C++.
- Distinguish between formal parameters and actual parameters used in functions.
- Define default arguments. Give two advantages of using default arguments.
- Briefly explain the concept of data hiding in C++.
- What are access specifiers? How are private and public access specifiers used in C++?
- Describe different modes of opening files in C++.
- What is the role of bof() and eof() functions in file handling?

SECTION – D (Marks 18)

Note: Attempt any THREE questions. All questions carry equal marks.

(6 x 3 = 18)

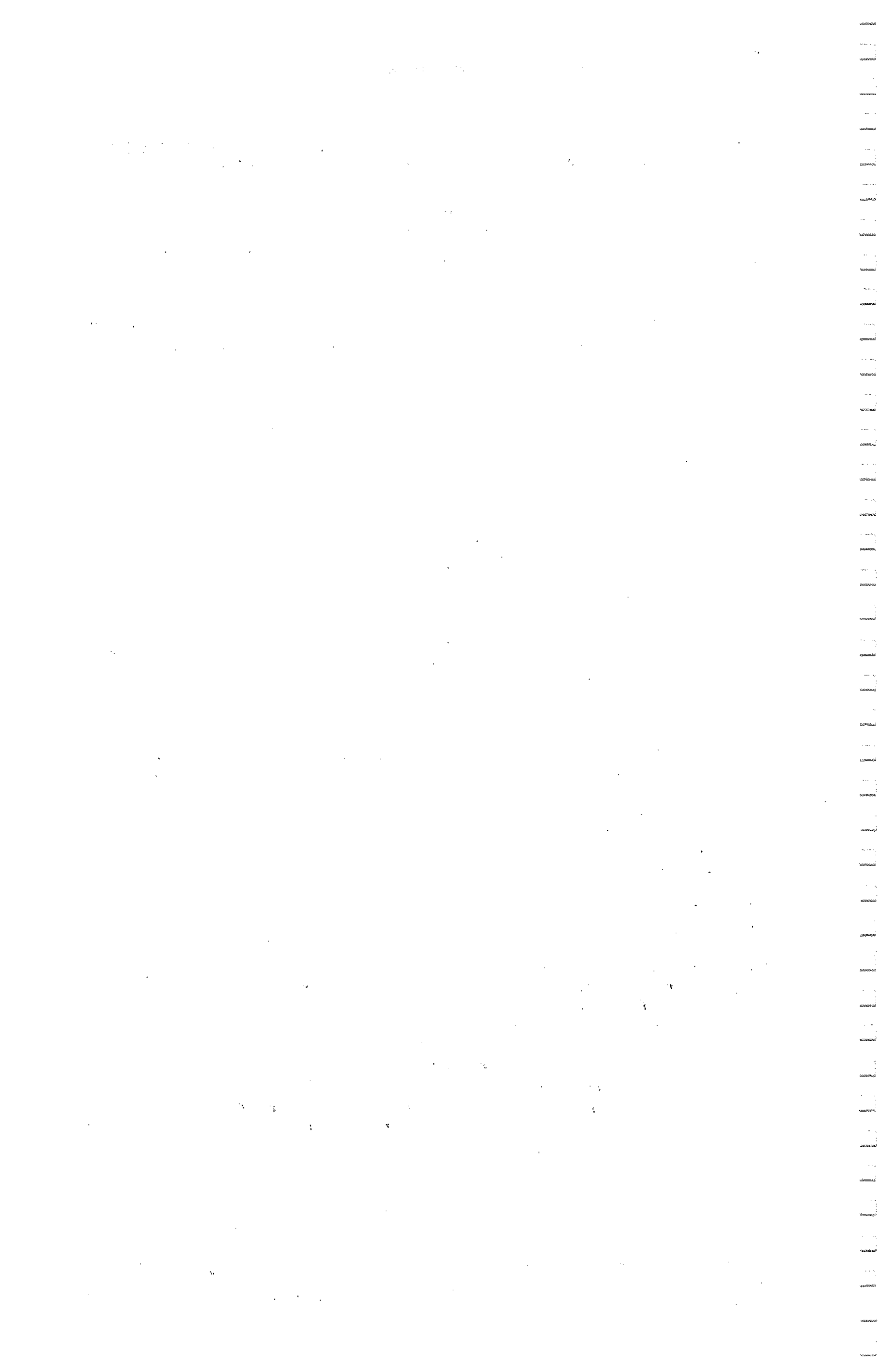
- Q. 4 a. What is a process? Draw and describe the process states model diagram. (01+03)
b. Which is the safest method of implementation in SDLC, and why? (01+01)

Q. 5 Write a program to print the following pattern using nested loop. (06)

```
1 2 3 4 5
2 3 4 5
3 4 5
4 5
5
```

Q. 6 Write a program with a function named rectangle that inputs the length and width of a rectangle and finds its area. The result is returned to main() to be displayed on screen. (06)

Q. 7 Explain the concept of inheritance and polymorphism in C++ with daily life examples. (03+03)





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COMPUTER SCIENCE HSSC-II

SECTION – A (Marks 15)

(Old syllabus)

Time allowed: 20 Minutes

Version Number	8	1	2	1
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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 process of linking library files with object code is known as:
A. Compilation B. Execution C. Linking D. Saving
- 2) The scope of the variable refers to:
A. Length B. Name C. Accessibility D. Lifetime
- 3) What will be the result of the expression $1*1+2--$?
A. 3 B. 0 C. 2 D. 4
- 4) Which of the following is used to add comments on a single line?
A. ? B. // C. /* D. %
- 5) It is NOT the characteristics of relation:
A. Each row is unique B. Order of column is significant
C. Order of row is insignificant D. Columns are atomic
- 6) The parameters specified in function header are _____ parameters.
A. Actual B. Formal C. Default D. Command line
- 7) An association between two or more entities is called:
A. Table B. Relation C. Relationship D. Link
- 8) The logical not (!) operator is a _____ operator.
A. Unary B. Binary C. Ternary D. Relational
- 9) Which of the following is actual container of data?
A. Table B. Form C. Query D. Report
- 10) A table must have:
A. Primary Key B. Composite key C. Secondary key D. Sort key
- 11) The expression `printf("%d", 10 % 3);` has a value equal to:
A. 3 B. 5 C. 0 D. 1
- 12) Which problem does occur when data is repeated in different files?
A. Data redundancy B. Data consistency
C. Data atomicity D. Data integrity
- 13) In 2NF, all non-key attributes are fully _____ dependent on primary key.
A. Functional B. Non-functional C. Associative D. Transitive
- 14) Which of the following functions is used for writing one character at a time to a file?
A. `putc()` B. `getc()` C. `fputc()` D. `fgets()`
- 15) Which of the following is **NOT** a valid identifier?
A. `return` B. `myInt` C. `myInteger` D. `total3`

THE UNIVERSITY OF CHICAGO

PHYSICS DEPARTMENT

1952





COMPUTER SCIENCE HSSC-II

(Old syllabus)

45

Time allowed: 2:40 Hours

Total Marks Sections B, C and D: 60

NOTE: Answer any Seven parts from Section 'B' and 'C' any three questions from Section 'D' on the separately provided answer book. Write your answers neatly and legibly.

SECTION – B (Marks 21)

Note: Section – B consist of Part – I (Programming Using C Language)

Q. 2 Answer any SEVEN parts. All questions carry equal marks.

(7 x 3 = 21)

- (i) Differentiate between while and do-while loop.
- (ii) Define function. Give two benefits of using functions in a program.
- (iii) (a) How many times will the following loop display "OK"?

```
for (int i = 1; i<20 ; i++)  
{ printf ("OK"); }
```
- (b) Rewrite the while loop as do-while loop.

```
int i = 1;  
while (i<=15)  
{ printf ("a");  
i=i+1; }
```
- (iv) Differentiate between local and global variables.
- (v) Write down variable naming rules.
- (vi) Describe scanf(). Why gets() is preferred over scanf() while taking input into a string variable?
- (vii) If there is a function named "factorial" of integer type and has an integer parameter "n"
 - (a) Write the prototype for this function.
 - (b) What will be the header of its function definition?
 - (c) What will be the return type of this function?
- (viii) Explain switch statement.
- (ix) We use fopen() to open a file. What can happen to a file if it already exists and we used fopen() with parameters "a", "w+" and "a+"?
- (x) Write a program in C that accepts three numbers from user and displays the smallest number.

SECTION – C (Marks 21)

Note: Section – C consist of Part – II (Database)

Q. 3 Answer any SEVEN parts. All questions carry equal marks.

(7 x 3 = 21)

- (i) What is the purpose of following data types in MS Access?
 - (a) Number
 - (b) AutoNumer
- (ii) Differentiate between Primary Key and Composite key.
- (iii) (a) Define the tuple and the attribute with an example.
- (b) What is the degree in the following table:

EMP_Code	Address	Contact
010	Lahore	2254101
022	Rawalpindi	3042951
015	Lahore	9800250

- (iv) What are the uses of queries in database?
- (v) Write down the advantages of using Reports in MS Access.
- (vi) List the main problems that can be faced in a file-based management system.

- (vii) What is the correct variable type to store following information?
 (a) Name of student (b) Temperature of a day (c) Age of a student
- (viii) How record, file and database are related to one another?
- (ix) Identify the type of relationship between:
 (a) Student and Book (b) Student and Teacher (c) Student and College
- (x) Differentiate between data and information with examples.

SECTION – D (Marks 18)

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

Q. 4 Read the following scenario to make a program for taking SALARY as an input and print an appropriate activity accordingly:

Salary	Allowance
Less than or equal to 6000	Allowance 5% of salary
More than > 7000 and less than or equal 8000	Allowance 10% of salary
More than > 8000 and less than or equal 9000	Allowance 15% of salary
More than > 9000 and less than or equal 10000	Allowance 20% of salary
More than 10000	Allowance 25% of salary

- (a) Write down a program using any selection structure. (4)
- (b) Which selection structure do you think is more appropriate and state the reason? (2)

Q. 5 A college uses a database to keep details of its teachers. Here is a Table of this database.

Name	Father's Name	Address	Salary
Aslam	Khalid	RAWALPINDI	10000
Naved	Ashraf	LAHORE	20000
Khalid	Zeshan	JHELUM	15000
Zafar	Tanveer	MULTAN	10000
Shahid	Shafqat	RAWALPINDI	7000
Kamran	Ali	MIANWALI	8500

- (a) Identify the fields that contains:
 i) Numeric data
 ii) Alphabetic data (1)
- (b) Suggest two additional fields with data types that could be added to this table. (2)
- (c) Write down the output using only SALARY field if the following search condition is input to query: (SALARY>7000)OR(ADDRESS IS "RAWALPINDI") (1)
- (d) The records need to be sorted into the key field order. Suggest which field would be used or added as Primary key field and why? (2)

- Q. 6** a) How is referential integrity achieved? (2)
 (b) Define database model? Also discuss its different types. (4)

Q. 7 Write a program in C that prints the following output. (6)

```

1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
  
```




MATHEMATICS HSSC-II

SECTION – A (Marks 20)

Time allowed: 25 Minutes

Version Number	4	1	1	2
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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) If $\underline{a} = [1, 2, -1]$, $\underline{b} = [1, -2, 3]$ and $\underline{c} = [1, -7, -4]$ then $(\underline{a} \cdot \underline{b}) \times \underline{c}$ is:
- A. 38 B. Meaningless C. 48 D. 20
- 2) $\lim_{x \rightarrow \infty} \frac{x+e}{x-e}$ is equal to:
- A. 0 B. ∞ C. 1 D. -1
- 3) Which of the following equations represents an odd function?
- A. $f(x) = (x+2)^2$ B. $f(x) = \frac{3x}{x^2+1}$
- C. $f(x) = 3x^4 - 2x^2 + 7$ D. $f(x) = \sin x + \cos x$
- 4) If $f(x) = (-x+9)^3$ and $g(x) = 6$ then which of the following represents $g[f(x)]$
- A. -27 B. $(-x+9)^3$ C. 6 D. 27
- 5) What is the value of $\sqrt{1-x^2} \frac{d}{dx} (\sin^{-1} x + \cos^{-1} x)$
- A. 0 B. $\sqrt{1-x^2}$ C. 2 D. $\frac{1}{x}$
- 6) If $f(x+h) = a^{x+h}$ then $f'(x)$ is equal to:
- A. $a^{x+h} \ln(x+h)$ B. $a^x \ln a$ C. $a^x \ln x$ D. $a^{x+h} \ln a$
- 7) What is the derivative of $\frac{x^3-x}{x+1}$ with respect to x
- A. $1-2x$ B. $\frac{2x^3+3x^2-2x-1}{(x+1)^2}$
- C. $\frac{2x^3+3x^2-1}{x+1}$ D. $2x-1$
- 8) What evaluates $\int_0^1 \sqrt{x^2-2x+1} dx$
- A. 1 B. $\frac{1}{2}$ C. $-\frac{1}{2}$ D. -1
- 9) Which of the following is an evaluated value of $\int_0^e \frac{|x|}{x} dx$
- A. Undefined B. e C. $\pm e$ D. 1

- 10) What is the value of dy of the function $f(x) = x^2$, when $x = 2$ and $dx = 0.01$?
- A. 4 B. 0.4 C. 0.04 D. 0.02
- 11) What is the perpendicular distance between the line $x + y = 1$ and a point $\left(\frac{8}{3}, \frac{-5}{3}\right)$
- A. 1 B. 0 C. $\frac{1}{\sqrt{2}}$ D. $\frac{1}{2}$
- 12) At what angle lines $3y = 2x + 5$ and $3x + 2y = 8$ cut each other?
- A. $\frac{\pi}{2}$ B. 0° C. $\frac{\pi}{6}$ D. $\frac{\pi}{4}$
- 13) What is the slope of a line perpendicular to $3x - 4y + k = 0$
- A. -1 B. $\frac{4}{3}$ C. $-\frac{4}{3}$ D. $-\frac{3}{4}$
- 14) $(0, 0)$ is **NOT** a solution of which of the following inequalities?
- A. $x - y < 1$ B. $2x + y < 1$ C. $-2x + y + 1 > 0$ D. $-2x + y < -1$
- 15) What is the length of the Latus rectum of a parabola $8y^2 = -32x$
- A. 16 B. 4 C. -4 D. 8
- 16) Which of the following represents equations of asymptotes of hyperbola $\frac{x^2}{7^2} - \frac{y^2}{4^2} = 1$?
- A. $x = \pm \frac{7}{4}y$ B. $x = \pm \frac{4}{7}y$ C. $y = \pm \frac{4}{7}x$ D. $y = \pm \frac{7}{4}x$
- 17) What is the eccentricity of a point circle $x^2 + y^2 = 0$?
- A. $\frac{1}{\sqrt{2}}$ B. 1 C. $\sqrt{2}$ D. 0
- 18) What is the length of major axis of an ellipse $\frac{(x-1)^2}{2^2} + \frac{(y+1)^2}{3^2} = 1$
- A. 18 B. 4 C. 6 D. 8
- 19) What is the volume of a parallelepiped, if its conterminous edges are $[2, -4, 5], [2, -3, 6]$ and $[0, -1, -1]$?
- A. 15 B. 24 C. 16 D. 0
- 20) For what value of p , $[2, p, 5]$ is perpendicular to $[3, 1, p]$?
- A. $\frac{2}{3}$ B. -1 C. 1 D. $\sqrt{5}$



MATHEMATICS HSSC-II

39

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 $\lim_{\theta \rightarrow 0} \frac{\tan \theta - \sin \theta}{\sin^3 \theta}$
- (ii) Discuss the continuity of $f(x)$ at $x=3$, when $f(x) = \begin{cases} x-1 & \text{if } x < 3 \\ 2x+1 & \text{if } x \geq 3 \end{cases}$
- (iii) Find $\frac{dy}{dx}$ if $x\sqrt{1+y} + y\sqrt{1+x} = 0$
- (iv) Differentiate $\sin^3 x$ w.r.t $\cos^2 x$
- (v) Show that $2^{x+h} = 2^x \left\{ 1 + (\ln 2)h + \frac{(\ln 2)^2}{2} h^2 + \frac{(\ln 2)^3}{3} h^3 + \dots \right\}$
- (vi) Evaluate $\int \frac{dx}{(1+x^2)^{\frac{3}{2}}}$
- (vii) Evaluate $\int \frac{e^x(1+\sin x)}{1+\cos x} dx$
- (viii) Find the points trisecting the join of $A(-1,4)$ and $B(6,2)$.
- (ix) Find a joint equation of the straight lines through the origin and perpendicular to the lines represented by $x^2 + xy - 6y^2 = 0$
- (x) Find equations of the tangents drawn from $(0,5)$ to $x^2 + y^2 = 16$.
- (xi) A parabolic arch has a $100m$ base and height $25m$. Find the height of the arch at a point $30m$ from the centre of the base.
- (xii) Find foci, vertices, and directrices of the ellipse $9x^2 + y^2 = 18$
- (xiii) Find area of the parallelogram whose vertices are $A(1,2,-1)$, $B(4,2,-3)$, $C(6,-5,2)$ and $D(9,-5,0)$
- (xiv) Prove that the points whose position vectors are $A(-6\mathbf{i} + 3\mathbf{j} + 2\mathbf{k})$, $B(3\mathbf{i} - 2\mathbf{j} + 4\mathbf{k})$, $C(5\mathbf{i} + 7\mathbf{j} + 3\mathbf{k})$ and $D(-13\mathbf{i} + 17\mathbf{j} - \mathbf{k})$ are coplanar.

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 $\lim_{\theta \rightarrow 0} \frac{\sin \theta}{\theta} = 1$
- Q. 4 If $x = a(\theta + \sin \theta)$, $y = a(1 + \cos \theta)$, then show that $y^2 \frac{d^2 y}{dx^2} + a = 0$
- Q. 5 Evaluate $\int e^x \sin 2x \cos x dx$
- Q. 6 The vertices of a triangle are $A(-2,3)$, $B(-4,1)$ and $C(3,5)$. Find the coordinates of the orthocentre of the triangle.
- Q. 7 Maximize the function defined as $f(x,y) = 2x + 3y$ subject to the constraints $2x + y \leq 8$; $x + 2y \leq 14$; $x \geq 0$; $y \geq 0$
- Q. 8 Find the equation of a circle passing through $A(5,1)$ and tangent to the line $2x - y - 10 = 0$ at $B(3,-4)$
- Q. 9 Show that midpoint of hypotenuse of a right triangle is equidistant from its vertices.

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PHILOSOPHY

PHILOSOPHY



MATHEMATICS HSSC-II

SECTION – A (Marks 20)

40

Time allowed: 25 Minutes

Version Number 4 | 1 | 1 | 6

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 vectors is perpendicular to $[2, -1, 1]$
A. $[-1, 6, 8]$ B. $[-3, 6, 0]$ C. $[-1, -6, 8]$ D. $[1, -6, 8]$
- 2) $\lim_{x \rightarrow 99} (100 - x)^{\tan \frac{\pi}{2}}$ is equal to:
A. 0 B. ∞ C. 99 D. 1
- 3) Which of the following represents domain of a real function $f(x) = \sqrt{1-x} \cdot \ln x$
A. $(-\infty, 0]$ B. $[0, 1)$ C. $(0, 1]$ D. $(0, +\infty)$
- 4) What is the maximum value of $|7 \cos x - 5|$ for $x \in \mathbb{R}$?
A. π B. 7 C. $\frac{\pi}{2}$ D. 2
- 5) If $f(x) = \sin x \cdot g(x)$ with $g\left(\frac{\pi}{2}\right) = e$ and $g'\left(\frac{\pi}{2}\right) = \ln e$ then $f'\left(\frac{\pi}{2}\right) = ?$
A. $e+1$ B. 0 C. 1 D. e
- 6) For $f(x) = \sin^{-1}\left(\frac{x}{2}\right)$ which of the following is $f'(x)$
A. $\frac{2}{\sqrt{x^2-4}}$ B. $\frac{1}{\sqrt{4+x^2}}$ C. $\frac{2}{\sqrt{4+x^2}}$ D. $\frac{1}{\sqrt{x^2-4}}$
- 7) If $f'(x) = -f(x)$ then which of the following represents $f(x)$
A. $\frac{1}{2}e^{-2x+2}$ B. e^{1-x} C. e^{-1+x} D. e^{-x^2}
- 8) Evaluate $\int_0^{\frac{\pi}{4}} e^{\tan x} \cdot \sec^2 x dx$
A. $e-1$ B. e C. $e+1$ D. 0
- 9) The result of $\int_{-\infty}^0 \frac{e^x}{e^x+3} dx$ is:
A. Undefined B. $\ln \frac{4}{3}$ C. $\ln \frac{3}{4}$ D. 0
- 10) For what value of K , $\int_{-1}^0 (3x^2 + 2x + K) dx = 5$
A. 5 B. -5 C. -3 D. 0

- 11) Which of the following represents equation of a line passing through $(-8,5)$ and slope undefined?
 A. $x+8=0$ B. $y+5=0$ C. $x-8=0$ D. $y-5=0$
- 12) Which of the following lines passes through points $(-2,1)$ and $(6,-4)$
 A. $5x+8y-18=0$ B. $5x+8y-2=0$
 C. $5x+8y+2=0$ D. $5x-8y+18=0$
- 13) For what value of p , $3x+6y+8=0$ is perpendicular to $px+3y+7=0$
 A. 6 B. $\frac{1}{6}$ C. $-\frac{1}{6}$ D. -6
- 14) $(-1,-1)$ is a solution of which of the following inequalities?
 A. $-4x+3y < 0$ B. $-x-2y < 0$ C. $2x+y < -1$ D. $2x-y > 10$
- 15) What is the length of the tangent drawn from $(-1,2)$ to the circle $x^2+y^2+4x+2y=0$?
 A. $\sqrt{5}$ B. 5 C. $\sqrt{13}$ D. $\sqrt{11}$
- 16) What is the length of the Latus rectum of an ellipse $\frac{x^2}{20^2} + \frac{y^2}{10^2} = 1$
 A. 100 B. 0.50 C. 5 D. 10
- 17) Which of the following is an equation of a parabola with focus $(0,5)$ and vertex $(0,0)$
 A. $y^2 = -20x$ B. $x^2 = -20y$ C. $x^2 = 20y$ D. $x = 20y^2$
- 18) What is the eccentricity of a conic $x^2 - y^2 = 9$
 A. $\frac{2\sqrt{2}}{3}$ B. $\sqrt{2}$ C. $\frac{\sqrt{2}}{3}$ D. 0
- 19) For what value of q , vector $[1,-3,4]$ is parallel to vector $[q,9,-12]$
 A. $\sqrt{-199}$ B. $-\frac{1}{3}$ C. -3 D. 75
- 20) What is the projection of $\underline{i} - \underline{k}$ along $\underline{j} + \underline{k}$
 A. $-\frac{1}{2}$ B. $\frac{1}{\sqrt{2}}$ C. -1 D. $-\frac{1}{\sqrt{2}}$



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 $\lim_{x \rightarrow 0} \frac{e^{\frac{1}{x}} - 1}{\frac{1}{e^x + 1}}$, $x > 0$
- (ii) If $f(x) = \begin{cases} x+2 & , x \leq -1 \\ c+2 & , x > -1 \end{cases}$, find "c" so that $\lim_{x \rightarrow -1} f(x)$ exists.
- (iii) Prove that $y \frac{dy}{dx} + x = 0$ if $x = \frac{1-t^2}{1+t^2}$, $y = \frac{2t}{1+t^2}$
- (iv) If $y = a \cos(\ln x) + b \sin(\ln x)$, prove that $x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} + y = 0$
- (v) Find $f'(x)$ if $f(x) = \frac{e^{ax} - e^{-ax}}{e^{ax} + e^{-ax}}$
- (vi) Evaluate $\int \frac{\sqrt{2}}{\sin x + \cos x} dx$
- (vii) Find the area between the curve $y = x(x-1)(x+1)$ and the x-axis.
- (viii) The three points $A(7, -1)$, $B(-2, 2)$ and $C(1, 4)$ are the consecutive vertices of a parallelogram. Find the fourth vertex.
- (ix) Find the lines represented by $x^2 + 2xy \sec \alpha + y^2 = 0$. Also find measure of the angle between them.
- (x) Show that the lines $3x - 2y = 0$ and $2x + 3y - 13 = 0$ are tangents to the circle $x^2 + y^2 + 6x - 4y = 0$.
- (xi) Find the focus, vertex and directrix of a parabola $(x-1)^2 = 8(y+2)$
- (xii) An astroid has elliptic orbit with the sun at one focus. Its distance from the sun ranges from 17 million miles to 183 million miles. Write an equation of the orbit of the astroid.
- (xiii) Find the area of a triangle with vertices $A(1, -1, 1)$, $B(2, 1, -1)$ and $C(-1, 1, 2)$.
- (xiv) Find volume of the tetrahedron with the vertices $(2, 1, 8)$, $(3, 2, 9)$, $(2, 1, 4)$ and $(3, 3, 10)$

SECTION - C (Marks 40)

Note: Attempt any FIVE questions. All questions carry equal marks.

(5 x 8 = 40)

- Q. 3** Prove that $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a} = na^{n-1}$, where n is an integer and $a > 0$
- Q. 4** Find the extreme values of a function defined as $f(x) = x^4 - 4x^2$
- Q. 5** Show that $\int e^{ax} \sin bx dx = \frac{1}{\sqrt{a^2 + b^2}} e^{ax} \sin \left(bx - \tan^{-1} \frac{b}{a} \right) + C$
- Q. 6** The vertices of a triangle are $A(-2, 3)$, $B(-4, 1)$ and $C(3, 5)$. Find the centre of circumcircle of the triangle.
- Q. 7** Minimize $z = 3x + y$; subject to the constraints: $3x + 5y \geq 15$; $x + 6y \geq 9$; $x \geq 0$; $y \geq 0$
- Q. 8** Find the centre, foci, eccentricity, vertices and equations of directrices of a hyperbola $9x^2 - y^2 - 36x - 6y + 18 = 0$
- Q. 9** Prove that angle in a semi-circle is a right angle.

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PHYSICS HSSC-II

SECTION - A (Marks 17)

22

Time allowed: 25 Minutes

Version Number	4	0	8	3
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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 value of Rydberg constant is:
A. $1.0974 \times 10^{-7} m^{-1}$ B. $2.01974 \times 10^{-7} m^{-1}$
C. $10.0974 m^{-1}$ D. $1.0974 \times 10^7 m^{-1}$
- 2) Radioactivity was discovered by:
A. Henri Becquerel B. Einstein C. Maxwell D. Max Plank
- 3) The relative permittivity for rubber is:
A. 2.94 B. 2.1 C. 2.284 D. 3.40
- 4) Electric potential energy per unit charge is:
A. Electric flux B. Electric potential
C. Electric field D. Electric intensity
- 5) In an electrolyte the charge carriers are:
A. Positive ions and electrons B. Electrons
C. Positive and negative ions D. Protons
- 6) The unit of conductivity is:
A. $mho m^{-1}$ B. $Ohm m^{-1}$ C. Siemen D. mho
- 7) A galvanometer can be made more sensitive if C/BAN is made:
A. Large B. Infinite C. Zero D. Small
- 8) In CRO the number of electrons are controlled by:
A. Grid B. Anode C. Filament D. Cathode
- 9) Lenz's law deals with the:
A. Magnitude of current B. Direction of induced current
C. Magnitude of emf D. Direction of emf
- 10) The self-induced emf is sometimes called:
A. Back emf B. Constant emf C. Motional emf D. Variable emf
- 11) Peak to peak value of voltage is:
A. $\frac{V_0}{\sqrt{2}}$ B. $\frac{V_0}{2}$ C. $\sqrt{2}V_0$ D. $2V_0$
- 12) The frequencies of AM transmission range between:
A. 450KHz to 1600KHz B. 88MHz to 108MHz
C. 450KHz to 1400KHz D. 500KHz to 1500KHz
- 13) A substance which undergoes plastic deformation is called:
A. Brittle B. Ceramic C. Ductile D. Plastic
- 14) The curie temperature for iron is about:
A. $750^\circ C$ B. $1000^\circ C$ C. $400^\circ C$ D. $570^\circ C$
- 15) The current gain of a transistor is given as:
A. $\frac{I_B}{I_E}$ B. $\frac{I_C}{I_B}$ C. $\frac{I_E}{I_C}$ D. $\frac{I_C}{I_E}$
- 16) The quantity $\sqrt{1 - \frac{v^2}{c^2}}$ is always:
A. Less than one B. Greater than one C. Zero D. Equal to one
- 17) The dimensions of factor $\frac{h}{m_0 c}$ is same as that of:
A. Mass B. Momentum C. Length D. Time



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PHYSICS HSSC-II

23

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) (Chapter 12 – 16)

Q. 2 Answer any SEVEN parts. All questions carry equal marks. (7 x 3 = 21)

- (i) In the expression $F = K \frac{q_1 q_2}{r^2}$, briefly discuss K and the factors on which it depends.
- (ii) What are electric lines of force? Why two electric lines of force never cross each other?
- (iii) What is source of current? Discuss briefly.
- (iv) Do bends in a wire affect electrical resistance? Discuss.
- (v) Define one Tesla and show that $1 \text{Wb m}^{-2} = 1 \text{ Tesla}$.
- (vi) Why do the picture on TV screen become distorted when a magnet is brought near the screen?
- (vii) Does the induced emf always act to decrease the magnetic flux through a circuit? Discuss briefly.
- (viii) Show that \mathcal{E} and $\frac{\Delta\phi}{\Delta t}$ have the same unit.
- (ix) A sinusoidal current have rms value of 10 A . What is the peak value?
- (x) How does the doubling of frequency affect the reactance of a) an inductor b) a capacitor?

SECTION – C (Marks 21) (Chapter 17 – 21)

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

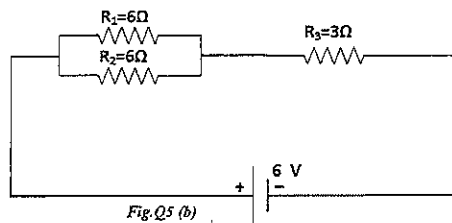
- (i) Distinguish between Crystalline, Amorphous and Polymeric solids.
- (ii) What is meant by strain energy? How can it be determined from the force extension graph?
- (iii) What is principle of virtual ground? Apply it to find the gain of an inverting amplifier.
- (iv) Why a photodiode is operated in reverse biased state? Discuss briefly.
- (v) Is it possible to create a single electron from energy? Discuss briefly.
- (vi) What advantages does an electron microscope has over an optical microscope?
- (vii) Prove that electron can exist in the atom but outside the nucleus.
- (viii) Define population inversion. Why population inversion is necessary for laser action?
- (ix) Why are heavy nuclei unstable? Discuss briefly.
- (x) What is fusion reaction? What factors make this reaction difficult to achieve?

SECTION – D (Marks 26)

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

- Q. 4**
- a. What is R.C series circuit? Discuss its behaviour with AC. Calculate the impedance and phase angle of R.C series circuit. (1+2+2+2)
 - b. How fast must a proton move in a magnetic field of $2.50 \times 10^{-3} \text{ T}$ such that magnetic force is equal to its weight? (4)
 - c. What are super conductors? Discuss briefly. (2)

- Q. 5**
- a. State and prove Gauss's law. Derive an expression for electric intensity due to an infinite sheet of charge. (1+2+3)
 - b. Find the equivalent resistance and total current drawn from the source. Also find current through each resistance for given circuit. (5)



- c. Briefly discuss back emf effect in motor. (2)

- Q. 6**
- a. What is photoelectric effect? Discuss its results and explain this effect on the basis of Quantum theory. (1+3+3)
 - b. Calculate the longest wavelength of radiation for Paschen series. (4)
 - c. What is background radiation/ State its sources. (2)





PHYSICS HSSC-II

SECTION – A (Marks 17)

24

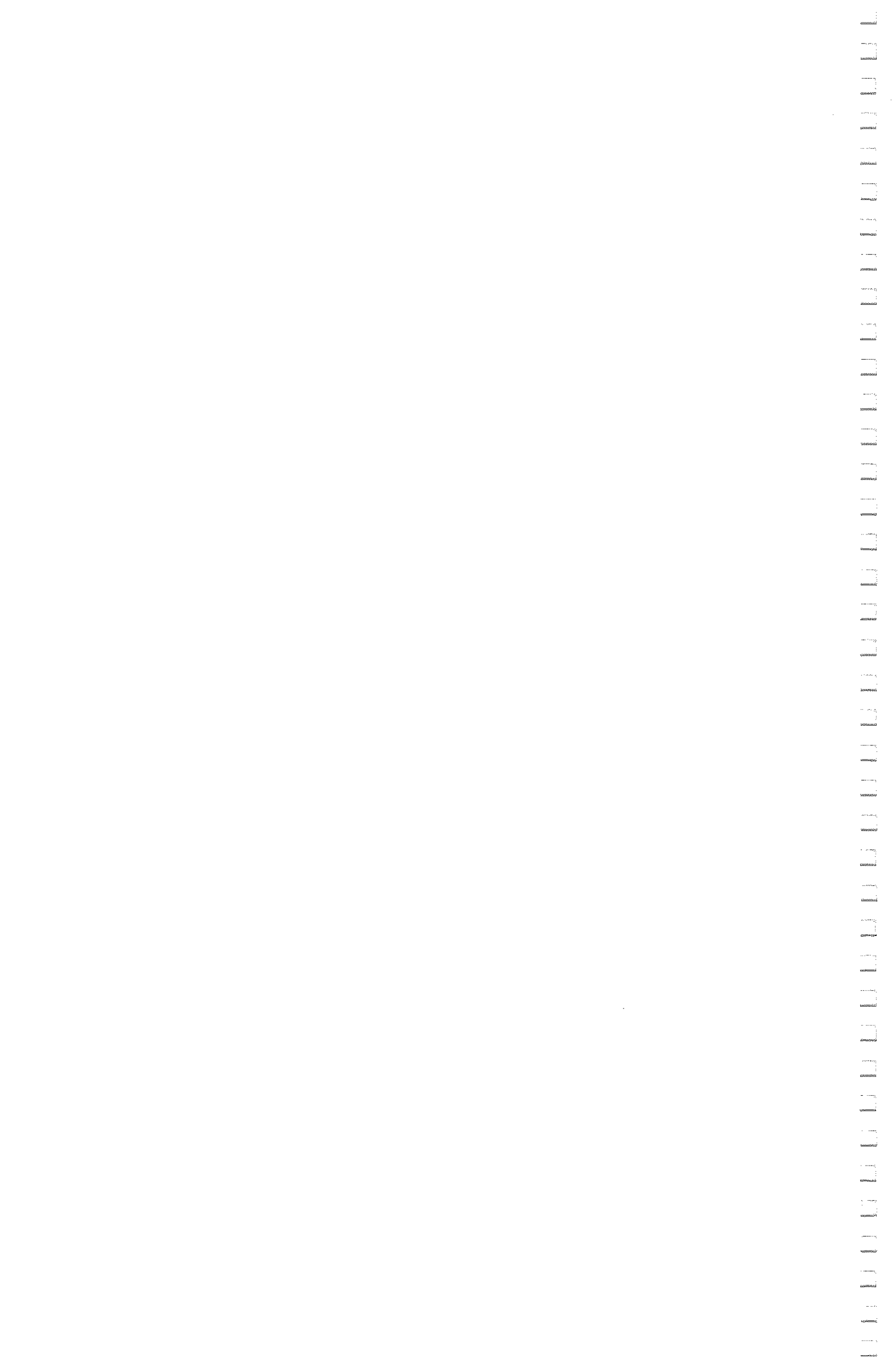
Time allowed: 25 Minutes

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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 SI unit of equivalent dose is:
A. Curie B. Gray C. Rad D. Sievert
- 2) The relativity permittivity for Benzene is:
A. 2.284 B. 2.1 C. 2.94 D. 7.5
- 3) One Joule is equal to:
A. $6.25 \times 10^{-18} eV$ B. $1.6 \times 10^{-19} eV$ C. $1.6 \times 10^{19} eV$ D. $6.25 \times 10^{18} eV$
- 4) Kirchhoff's point rule is a manifestation of law of conservation of:
A. Momentum B. Mass C. Charge D. Energy
- 5) The drift velocity of electrons in a metallic conductor is of the order of:
A. $10^{-5} ms^{-1}$ B. $10^{-2} ms^{-1}$ C. $10^{-4} ms^{-1}$ D. $10^{-3} ms^{-1}$
- 6) The unit of magnetic flux is:
A. $Nm^{-1}A$ B. NmA^{-1} C. Nm^2A^{-1} D. $Nm^{-1}A^{-1}$
- 7) The magnetic induction is also called:
A. Magnetization B. Magnetic flux
C. Magnetic Intensity D. Flux density
- 8) An induced emf in a coil is produced due to:
A. Change of momentum B. Change of electric flux
C. Change of magnetic flux D. Change of energy
- 9) The self-inductance of a coil is expressed as:
A. $\frac{-\Delta I / \Delta t}{\epsilon_L}$ B. $\frac{-\epsilon_L}{\Delta I / \Delta t}$ C. $\frac{-\epsilon_L}{\Delta t / \Delta I}$ D. $\frac{-\Delta I / \Delta t}{\epsilon_L}$
- 10) The most common source of alternating voltage is:
A. DC motor B. DC generator C. AC generator D. Transformer
- 11) The range of F.M transmission frequencies is:
A. 88KHz to 108KHz B. 540KHz to 1600KHz
C. 540MHz to 1600MHz D. 88MHz to 108MHz
- 12) The conductivity of a semiconductor in $(\Omega m)^{-1}$ is:
A. 10^{-6} to 10^{-4} B. 10^2 to 10^7 C. 10^4 to 10^7 D. 10^{-20} to 10^{-10}
- 13) The ratio of stress to strain is called:
A. Young's Modulus B. Modulus of Elasticity
C. Modulus of Rigidity D. Shear Modulus
- 14) A device which can convert various physical quantities into electric voltage is called:
A. Sensor B. Transistor C. Amplifier D. Rectifier
- 15) The Earth's orbital speed is:
A. $0.3kms^{-1}$ B. $3000kms^{-1}$ C. $300kms^{-1}$ D. $30kms^{-1}$
- 16) de. Broglie's relation is given as:
A. $\lambda = \frac{mv}{h}$ B. $h = mv\lambda$ C. $v = \frac{h}{m\lambda}$ D. $\lambda = \frac{h}{mv}$
- 17) A transmitter consists of:
A. One electrode B. Two electrodes
C. Three electrodes D. Four electrodes





PHYSICS HSSC-II

25

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) (Chapter 12 – 16)

Q. 2 Answer any SEVEN parts. All questions carry equal marks.

(7 x 3 = 21)

- (i) By using $K = \frac{1}{4\pi\epsilon_0}$, show that $\epsilon_0 = 8.85 \times 10^{-12} C^2 N^{-1} m^{-2}$
- (ii) How can you identify that which plate of a Capacitor is positively charged? Discuss briefly.
- (iii) Name the charge carriers in metals, electrolytes and gases.
- (iv) Why does the terminal potential difference of a battery decreases when the current drawn from it is increased? Explain briefly.
- (v) What is sensitive galvanometer? How can a galvanometer be made more sensitive? Discuss briefly.
- (vi) How can you use a magnetic field to separate isotopes of chemical element?
- (vii) Define efficiency of a transformer. How can one improve the efficiency of a transformer? Discuss briefly.
- (viii) Can a DC motor be turned into a DC generator? If yes, what changes are required to be done?
- (ix) What is phase of A.C? Discuss briefly.
- (x) At what frequency will an inductor of $1H$ have reactance of 500Ω ?

SECTION – C (Marks 21) (Chapter 17 – 21)

Q. 3 Answer any SEVEN parts. All questions carry equal marks.

(7 x 3 = 21)

- (i) Define 'Proportional limit' 'UTS' and 'Plasticity'.
- (ii) For Hysteresis loop define the terms saturation, retativity and coercivity.
- (iii) Briefly discuss the characteristics of op-amp.
- (iv) Why is the base current in a transistor very small? Discuss briefly.
- (v) When a solid is heated why does it first appear red? Discuss briefly.
- (vi) A particle of mass $5.0mg$ moves with speed of $8.0ms^{-1}$. Calculate its de-Broglie wavelength.
- (vii) Is energy conserved when an atom emits a photon of light? Discuss briefly.
- (viii) What are the advantages of laser over ordinary light?
- (ix) A particle which produces more ionization is less penetrating. Why?
- (x) Give a brief account of interaction of radiations with matter.

SECTION – D (Marks 26)

Note: Attempt any TWO questions. All questions carry equal marks.

(2 x 13 = 26)

- Q. 4**
 - a. State Kirchhoff's rules. Explain Kirchhoff's second rule in detail. (2+4)
 - b. Find the radius of an orbit of an electron moving at the rate of $2.0 \times 10^7 ms^{-1}$ in a uniform magnetic field of $1.20 \times 10^{-3} T$. (4)
 - c. In an R-L circuit will the current lag or lead? Discuss by a vector diagram. (3)
- Q. 5**
 - a. What do you mean by electromagnetic induction? Describe any three methods of producing induced emf. (1+6)
 - b. Determine the electric field at the position $r = (4\hat{i} + 3\hat{j})m$ caused by a point charge $q = 5.0 \times 10^{-6} C$ placed at origin. (4)
 - c. The inputs of a gate are 1 and 0. Identify the gate if its output is: a) 0, b) 1 (2)
- Q. 6**
 - a. State postulates of Bohr's theory of Hydrogen atom. Derive an expression for a radius of quantized orbit. (2+4)
 - b. What is the maximum wavelength of two photons produced when a positron annihilates an electron? The rest mass energy of each is $0.51MeV$. (5)
 - c. Define mass defect and binding energy. (2)



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