# Test Paper - 7

## BIOLOGY 1 - SECTION A

**1** A scrubber in the exhaust of a chemical industrial plant removes:
1. Gases like sulphue dioxide
2. Particulate matter of the size 5 micrometer or above
3. Gases like ozone and methane
4. Particulate matter of the size 2.5 micrometer or less

**2** Which one of the following is a wrong statement?
1. Particulate matter of the size 2.5 $\mu m$ or less can cause inflammation and damage to the lungs
2. A lake which is rich in organic waste may result in the mortality of fishes due to lack of oxygen
3. DDT residues are rapidly passed through food chain because it is water soluble
4. Photochemical smog pollution contain ozone

**3** Formation of tropical forests needs mean annual temperature and mean annual precipitation as
1. 18-25°C and 150-400 cm
2. 5-15°C and 50- 100 cm
3. 30-50°C and 100- 150 cm
4. 5-15°C and 100- 200 cm

**4** Read the following statements carefully.
(i) Primary succession is a very slow process taking thousands of years for the climax to reach.
(ii) Energy at a higher trophic level is always more than that at a lower level.
(iii) Bacterial and fungal enzymes degrade detritus into simpler inorganic substances. This process is called fragmentation.
(iv) All succession, whether taking place in water or on land, proceeds to a similar climax community - the mesic.
Which of the two above statements are correct?
1. (i) and (ii)
2. (ii) and (iii)
3. (i) and (iv)
4. (iii) and (iv)

**5** In an area where DDT had been used extensively, the population of birds declined significantly because
1. Birds stopped laying eggs
2. Earthworms in the area got eradicated
3. Cobras were feeding exclusively on birds
4. Many of the birds laid eggs, but eggs did not hatch

**6** Match correctly the following and choose the correct option :

| | |
|---|---|
| A. Environment Protection Act | 1. 1974 |
| B. Air Prevention and Control of Pollution Act | 2. 1987 |
| C. Water Act | 3. 1986 |
| D. Amendment of Air Act to include noise | 4. 1981 |

The correct matches are

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

**7** Which of the following is wrongly matched (with respect to recent extinction)?
1. Dodo-Mauritius
2. Quagga-Africa
3. Thylacine-Australia
4. Steller's Sea Cow- Stanford

**8** Choose the incorrect statement :
1. The Montreal protocol is associated with the control of emission of ozone-depleting substances
2. Methane and carbon dioxide are greenhouse gases
3. Dobson units are used to measure the oxygen content
4. Use of incinerators is crucial to the disposal of hospital waste

**9** What parameters are used for tiger census in our country's national parks and sanctuaries?
1. Pug marks only
2. Pug marks and fecal pellets
3. Fecal pellets only
4. Actual headcounts

**10** Match the items given in Column I with those given in Column II and select the correct option given below:

| | | | |
|---|---|---|---|
| A. | Eutrophication | i. | UV-B radiation |
| B. | Sanitary landfill | ii. | Deforestation |
| C. | Snow blindness | iii. | Nutrient enrichment |
| D. | Jhum cultivation | iv. | Waste disposal |

| | A | B | C | D |
|---|---|---|---|---|
| 1. | ii | i | iii | iv |
| 2. | i | ii | iv | iii |
| 3. | iii | iv | i | ii |
| 4. | i | iii | iv | ii |

**11** Consider the following statements concerning food chains
i) Removal of 80% tigers from an area resulted in greatly increased growth of vegetation.
ii) Removal of most of the carnivores resulted in an increased population of deers.
iii) The length of food chains is generally limited to 3 – 4 trophic levels due to energy loss.
iv) The length of food chains may vary from 2 to 8 trophic levels.
Which two of the above statements are correct?
1. i and ii
2. ii and iii
3. iii and iv
4. i and iv

**12** Given below are two statements.
Statement I: Energy flow is greatly reduced at each successive trophic level from producers to herbivores and then carnivores.
Statement II: The pyramid of energy is both top right and inverted.
In light of the above statements, choose the most appropriate answer from the options given below.
1. Both statement I and statement II are true
2. Both statement I and statement II are false
3. Statement I is correct but statement II is false
4. Statement I is incorrect but statement II is true

**13** Which one of the following is the correctly matched pair of an endangered animal and a National park?
1. Lion – Corbett National Park
2. Rhinoceros – Kaziranga National Park
3. Wild ass – Dudhwa National Park
4. Great Indian Bustard – Keoladeo National Park

**14** Select the incorrect statement(s) about biodiversity
A. It increases from high to low latitudes
B. Increased biodiversity contributes to higher productivity
C. Within a region, species richness increases with increasing explored area
D. Loss of biodiversity in a region leads to decreased variability in ecosystem processes
E. Tropical environments promote niche specialization and lead to decrease in biodiversity
Choose the correct answer from the options given below:
1. A, D only
2. B, C, D Only
3. B, E only
4. D, E only

**15** Exotic species:
A. These are new species entering a geographical area.
B. They may cause the disappearance of the native species.
C. They have a huge impact on the world's highly threatened island ecosystem.
D. They are considered as the major cause of the extinction of the species.
Choose the correct answer from the options given below:
1. A and B only
2. A and C only
3. A, B and C only
4. A, C and D only

**16** During a certain period, density of a population in a particular habitat increases due to changes in
A. Mortality
B. Natality
C. Emigration
D. Immigration
E. Migration
Choose the correct answer from the options given below:
1. A and C only
2. A and E only
3. B and D only
4. C and E only

**17** Given below are two statements:

Statement I: Process in which the fitness of one species is significantly higher in the presence of another species is called as interference competition

Statement II: Two closely related species competing for the same resources cannot exist indefinitely

In light of the above statement, choose the most appropriate answer from the options given below

1. Both Statement I and Statement II are correct
2. Both Statement I and Statement II are incorrect
3. Statement I is correct but Statement II is incorrect
4. Statement I is incorrect but Statement II is correct

## BIOLOGY 1 - SECTION B

**18** Consider the following statements (A-D) about organic farming :

A. Utilizes genetically modified crops like Bt cotton
B. Uses only naturally produced inputs like compost
C. Does not use pesticides and urea
D. Produces vegetables rich in vitamins and minerals

Which of the above statements are correct?

1. (A) and (B) only
2. (B), (C) and (D)
3. (C) and (D) only
4. (B) and (C) only

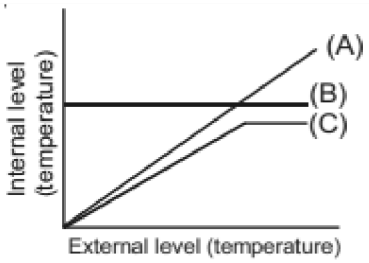
**19** Decomposition

A. is favored by warm and dry environment
B. gives rise to humus and inorganic nutrients
C. is dependent on oxygen availability
D. involves fragmentation, catabolism and leaching
E. is faster when detritus is low in nitrogen and sugars

Choose the correct answer from the options given below:

1. A. B, C & D only
2. B, C, D & E only
3. B, C & D only
4. A, C & E only

**20** Below is the diagrammatic representation of the response of organisms against temperature. Find out the correct match.




1. A-plants, B-birds
2. A-birds, B-mammals
3. C-mammals, B-plants
4. A-birds, B-plants

**21** Which one of the following is most appropriately defined -

1. Amensalism is a relationship in which one species is benefited whereas the other is unaffected
2. Predator is an organism that catches and kills other organism for food.
3. Parasite is an organism which always lives inside the body of other organism and may kill it.
4. Host is an organism which provides food to another organism.

**22** Consider the following two statements:

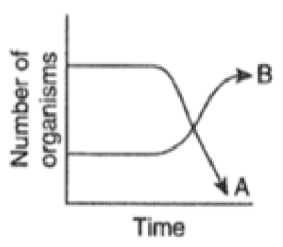
l. The annual net primary productivity of the whole biosphere is approximately 170 billion tons (dry weight) of organic matter.

ll. Majority of this is contributed by the oceans as they occupy larger area of earth.

1. Both l and ll are correct and ll explains l
2. Both l and ll are correct but ll does not explain l
3. l is correct but ll is incorrect
4. l is incorrect but ll is correct

**23** Which of the following statements are correct with respect to ecological pyramids ?
A. The base of each pyramid represents the producers or the first trophic level while the apex represents tertiary or top-level consumer
B. The pyramid of energy is always upright
C. A given species can occupy only one trophic level in the same ecosystem at the same time
D. The pyramid of number in tree ecosystem is upright
E. Saprophytes are not given any place in ecological pyramids
Choose the correct answer from the options given below:
1. A, B, C only
2. A, C, D, E only
3. B, D only
4. A, B, E only

**24**
The following graph depicts changes in two populations (A and B) of herbivores in a grassy field. A possible reason for these changes is that




1. both plant populations in this habitat decreased.
2. population B competed more successfully for food than population A.
3. population A produced more offspring than population B.
4. population A consumed the members of population B.

**25** Assertion: The triangular age pyramid is a graphic representation of a young or growing population.
Reason: An age pyramid is a graphic representation of proportion of various age group of population.
1. Both assertion and reason are true and the reason is the correct explanation of the assertion
2. Both assertion and reason are true but the reason is not the correct explanation of the assertion
3. Assertion is true but reason is false
4. Both assertion and reason are false

# BIOLOGY 2 - SECTION A

**26** In a transcription unit, what defines the template and coding strands?
1. The promoter
2. The structural gene
3. The terminator
4. The regulators

**27** In *E.coli*, the enzyme that increases the permeability of the cell to β-galactosides is encoded by:
1. lac Y
2. lac A
3. lac Z
4. lac I

**28** After transfer of *E.coli* from $^{15}N$ to $^{14}N$ medium, the DNA extracted from the medium after 40 minutes will compose of:
1. Only hybrid DNA
2. Only light DNA
3. Equal amounts of light and heavy DNA
4. Equal amounts of light and hybrid DNA

**29** The predominant site for control of gene expression in prokaryotes is:
1. Transcription initiation
2. Binding of mRNA to ribosome
3. Translation termination
4. Post translational modification

**30** In eukaryotes, RNA polymerase II transcribes:
1. heterogenous nuclear RNA
2. small nuclear RNA
3. transfer RNA
4. ribosomal RNA

**31** To form a nucleoside, a nitrogenous base is linked to a pentose sugar:
1. Through a P-Glycosidic linkage at carbon atom number 1
2. Through a P-Glycosidic linkage at carbon atom number 5
3. Through a N-Glycosidic linkage at carbon atom number 1
4. Through a N-Glycosidic linkage at carbon atom number 5

**32** Some amino acids are coded by more than one codon, hence the genetic code is:
1. not universal
2. degenerate
3. unambiguous
4. read in a contiguous manner

**33** Match the terms given in Column I with their given definition in Column II and select the correct match from the codes given:

| | **COLUMN I** | | **COLUMN II** |
|---|---|---|---|
| A | Homozygous | P | having two different alleles of a particular gene or genes |
| B | Heterozygous | Q | having two identical alleles of a particular gene or genes |
| C | Homologous | R | not having the same alleles or genes in the same order of arrangement |
| D. | Heterologous | S | having the same alleles or genes in the same order of arrangement |

Codes:

| | **A** | **B** | **C** | **D** |
|---|---|---|---|---|
| 1. | P | Q | R | S |
| 2. | S | R | Q | P |
| 3. | Q | P | S | R |
| 4. | P | Q | S | R |

**34** The transfer RNA molecule in 3D appears
1. L-shaped
2. E-shaped
3. V-shaped
4. S-shaped

**35** The initiation and termination factors required for prokaryotic transcription are respectively denoted as:
1. α and β
2. δ and θ
3. σ and ρ
4. Ψ and ϕ

**36** A person suffering from Klinefelter's syndrome:
1. has 45 autosomes
2. is likely to have short stature and webbed neck
3. can develop Gynecomastia
4. has normal fertility

**37** Match each item in Column I with one given in Column II and select the correct match from the codes given:

| | **COLUMN I [Organism]** | | **COLUMN II [Mechanism of sex determination]** |
|---|---|---|---|
| A | Honey bees | P | Genic balance |
| B | Grasshopper | Q | ZZ-ZW, female heterogamety |
| C | Birds | R | XX-XO male heterogamety |
| D | Fruit fly | S | Haplo-diploidy |

Codes:

| | A | B | C | D |
|---|---|---|---|---|
| 1. | Q | P | S | R |
| 2. | R | P | Q | S |
| 3. | P | Q | R | S |
| 4. | S | R | Q | P |

**38** Watson and Crick based their model of DNA on X-ray diffraction data produced by:
1. Hershey and Chase
2. Marie Curie and Pierre Curie
3. Franklin and Wilkins
4. Meselson and Stahl

**39** The genetic material for the first life on the earth was probably:
1. ds DNA
2. ss DNA
3. Protein
4. RNA

**40** Transcriptionally, active chromatin is termed as:
1. Heterochromatin
2. Euchromatin
3. Prechromatin
4. Prochromatin

**41** Discontinuous synthesis of DNA occurs in one strand, because:
1. DNA molecule being synthesised is very long
2. DNA dependent DNA polymerase catalyses polymerisation only in one direction (5' → 3')
3. it is a more efficient process
4. DNA ligase joins the short stretches of DNA

**42** Which of the following codons has a dual role in the genetic code?
1. AUG
2. GUG
3. CUG
4. UUG

## BIOLOGY 2 - SECTION B

**43** The template strand of DNA is 3' – TAC – 5'. The anticodon that will pair the corresponding mRNA codon will be:
1. 5' – AUG – 3'
2. 5' – UAC – 3'
3. 5' – CAU – 3'
4. 3' – TAC – 5'

**44** The lac I gene in an E. coli bacterium is mutated.What will be the effect on regulation of lactose metabolism in this cell?
1. Regulation will be normal
2. There will be constitutive expression of lac Z gene
3. Beta galactosidase and lactose permease will not be produced in the cell
4. The lac repressor will be synthesized continuously at a slow rate

**45** Frameshift mutations are caused by insertion or deletion of:
1. only one base pair
2. one or two base pairs
3. three or multiple of three base pairs
4. any number of base pairs

**46** During translation, formation of peptide bonds in bacteria is catalyzed by:
1. Polynucleotide phosphorylase
2. Protease
3. Ligase
4. Ribozyme

**47** Study the given diagram and select the correct option:

1. The karyotype is of an individual suffering from Down's syndrome
2. The number of autosomes seen is 43
3. The genetic sex of this individual must be female
4. The fertility will be maintained in this individual

**48** Identify the incorrect match between the scientists in Column I with their contributions in Column II:

| | **COLUMN I** | **COLUMN II** |
|---|---|---|
| 1. | Frederick Griffith | Discovery of bacterial transformation |
| 2. | Meselson and Stahl | Proposed semi-conservative mode of DNA replication based on complementary base pairing and antiparallel strands |
| 3. | Avery, Macleod and McCarty | Purified the transforming principle and found it to be DNA |
| 4. | Erwin Chargaff | In natural DNA the number of guanine units equals the number of cytosine units and the number of adenine units equals the number of thymine units |

**49** The mRNA codon UGG is the codon for amino acid:
1. Tryptophan
2. Phenylalanine
3. Valine
4. Glutamic acid

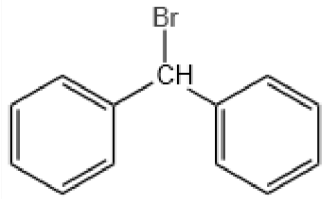
**50** Identify the incorrectly matched pair:

| | | |
|---|---|---|
| 1. | Pleiotropy | Sickle cells anaemia |
| 2. | Polygenic inheritance | Human skin colour |
| 3. | Multiple allelism | ABO blood group |
| 4. | Gene/point mutation | Down's syndrome |

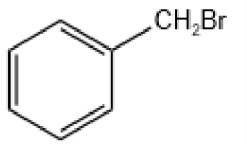
## CHEMISTRY - SECTION A

**51** Select the correct option for the increasing order of ease of $S_N1$ reaction by the following compounds, on treatment with aq. KOH :

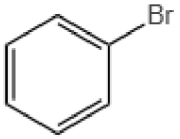
A.



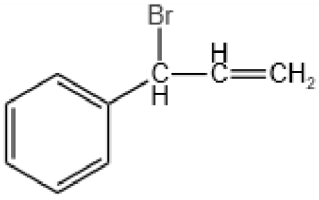

B.




C.




D.




Choose the correct answer from the options given below

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

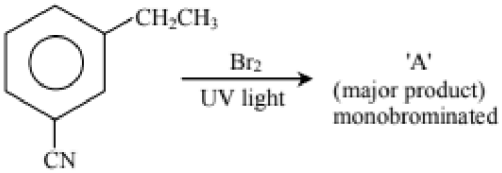
**52** Given the equation

$$CH_3 - C \equiv CH + H_2O \xrightarrow[20\%\ H_2SO_4]{1\%\ HgSO_4} A\ .$$

It can be concluded that the product 'A' is

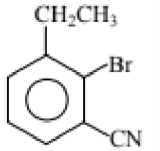
1. $CH_3 - CH_2 - CHO$
2. $CH_3 - CO - CH_3$
3. $CH_3 - CH_2 - CH_2 - OH$
4. $CH_3 - CH(OH) - CH_3$

**53** Following reaction is given.

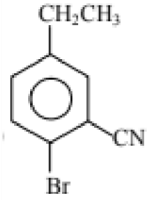



The product A is-

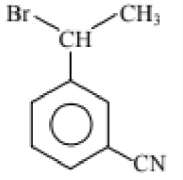
1.



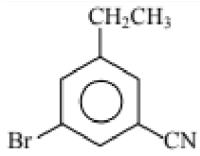

2.




3.




4.



**54** An $S_N1$ reaction at an asymmetric carbon of a compound always gives

1. An enantiomer of the substrate
2. A product with opposite optical rotation
3. A mixture of diastereomers
4. A maximum racemized product

**55** Compound X on reaction with $O_3$ followed by $Zn/H_2O$ gives formaldehyde and 2-methyl propanal as products. The compound X is :

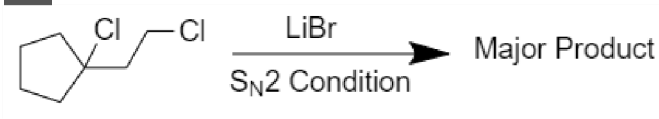
1. Pent-2-ene
2. 3-Methylbut-1-ene
3. 2-Methylbut-1-ene
4. 2-Methylbut-2-ene

**56** In the reaction, $C_6H_5\,CH_3 \xrightarrow{\text{Oxidation}} A \xrightarrow{NaOH} B \xrightarrow[\Delta]{\text{Soda lime}} C$

the product C is:

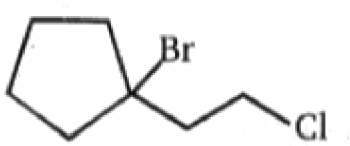
1. $C_6H_5\,OH$
2. $C_6H_6$
3. $C_6H_5\,COONa$
4. $C_6H_5\,ONa$

**57**

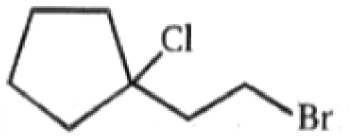



Major product is :-

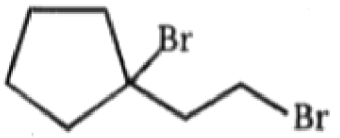
1.



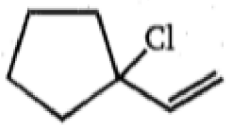

2.



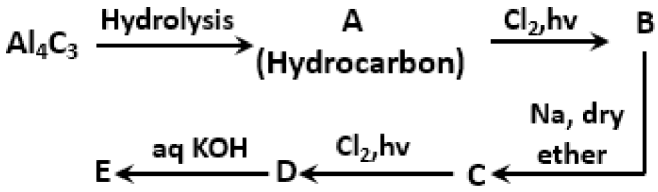

3.




4.



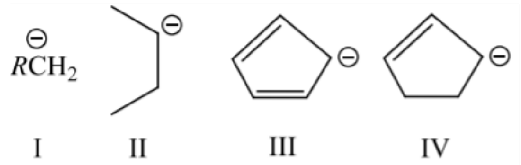

**58**




Product E is

1. Ethanol
2 Dimethyl ether
3. Methoxy ethane
4. Ethoxypropane

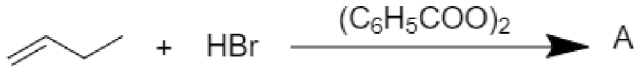
**59** The order of stability of the following carbanions is



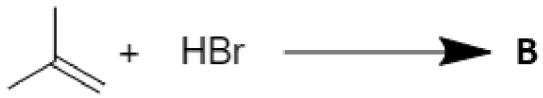

1. I>II>III>IV
2. I>III>II>IV
3. IV>III>II>I
4. III>IV>I>II

**60** The increasing order of the boiling points of the major products A, B and C of the following reactions will be :

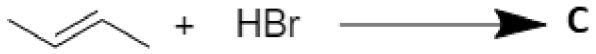
(a).




(b)




(c)




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

**61** On the reaction of haloalkane(s) with a reagent, 'A' isocyanide(s) is obtained as the major product. What is 'A'?

1. KCN
2. NaCN
3. HCN
4. AgCN

**62** Match the reactions given in Column I with the reaction types given in Column II.

| Column I | Column II |
|---|---|
| A. $CH_2 = CH_2 + H_2O \xrightarrow{H^+} CH_3\,CH_2\,OH$ | 1. Hydrogenation |
| B. $CH_2 = CH_2 + H_2 \xrightarrow{Pd} CH_3 - CH_3$ | 2. Halogenation |
| C. $CH_2 = CH_2 + Cl_2 \rightarrow Cl - CH_2 - CH_2 - Cl$ | 3. Polymerisation |
| D. $3CH \equiv CH \xrightarrow[Heat]{Cu\ tube} C_6H_6$ | 4. *Hydra*tion |
| | 5. Condensation |

**Codes**

| | A | B | C | D |
|---|---|---|---|---|
| 1. | 2 | 3 | 4 | 1 |
| 2. | 1 | 2 | 3 | 5 |
| 3. | 5 | 4 | 3 | 2 |
| 4. | 4 | 1 | 2 | 3 |

**63** 2,2 – dimethylpropane, $C(CH_3)_4$, is an isomer of pentane, $CH_3(CH_2)_3CH_3$. Pentane has a boiling point of 36 °C whilst the boiling point of 2,2 – dimethylpropane is 10°C.

Which statement below explains the difference in the boiling points for these two substances?

1. The molecules have different relative molecular masses.
2. Isomers have different chemical properties.
3. Pentane has permanent dipoles.
4. Longer chain, lesser branched molecules have stronger spontaneous/induced dipoles.

**64** Assertion(A): Alkenes and series of cycloalkanes of hydrocarbons have the same general formula.

Reason(R): Either insertion of a double bond or formation of a ring reduces the number of hydrogen atoms of the corresponding alkane by 2.

1. Both A and R are true and R is the correct explanation of A.
2. Both A and R are true but R is not the correct explanation of A.
3. A is true but R is false.
4. Both A and R are false statements.

**65** On the reaction of ethene with Baeyer's reagent, the product is:
1. Ethane
2. Ethene
3. Diethyl ether
4. Ethylene glycol

**66** Assertion(A): H—Br addition with propene in the presence of organic peroxide gives anti-Markovnikov's addition product.
Reason(R): Organic peroxide causes heterolytic cleavage of H—Br.
1. Both A and R are true and R is the correct explanation of A.
2. Both A and R are true but R is not the correct explanation of A.
3. A is a true statement but R is false.
4. Both A and R are false statements.

**67** Use the provided information in the following paper chromatogram.

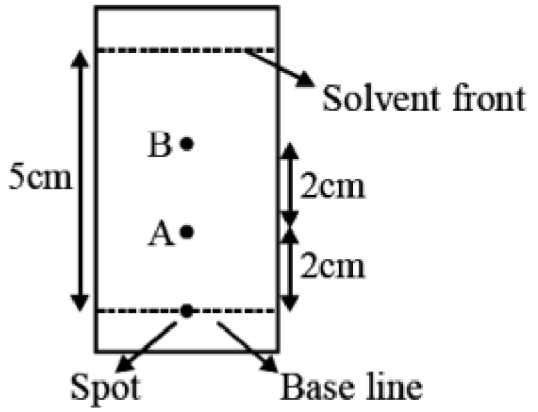
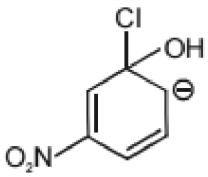


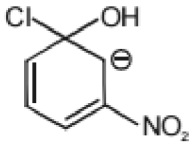

**Figure:** Paper chromatography for compounds A and B.
The $R_f$ value of A is $Y \times 10^{-1}$. The value of Y is-
1. 2
2. 3
3. 4
4. 8

## CHEMISTRY - SECTION B

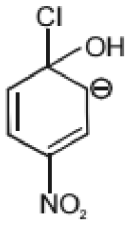
**68** Most stable carbanion intermediate among the following is :
1.




2.

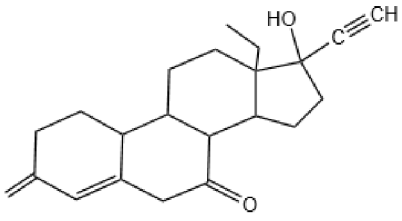



3.




4. All of these are equally stable

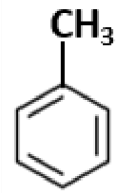
**69** Levonorgestrel is a commonly used contraceptive. The number of chiral centers present in this molecules are

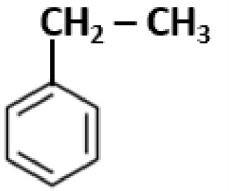


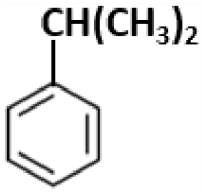

Levonorgestrel

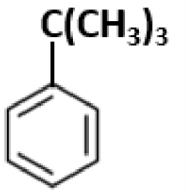
1. 4
2. 5
3. 6
4. 7

**70** Which compound is most reactive towards electrophilic substitution reaction?

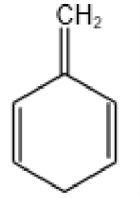
1. 


2. 

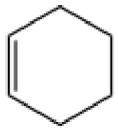

3. 

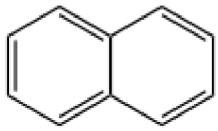

4. 


**71** Which one of the following structures is aromatic?

1. 


2. 

3. 

4. 

**72** The number of structural isomers of alkenes of $C_5H_{10}$ (excluding cyclic isomers) is-

1. 6
2. 4
3. 5
4. 7

**73** Benzene reacts with an excess of chlorine in presence of ultraviolet light to produce

1. Hexachloro benzene
2. p-chloro benzene
3. Benzene hexachloride
4. Chlorobenzene

**74**

$$H-C\equiv CH \xrightarrow[(ii)\ CH_3CH_2Br]{(i)\ NaNH_2/liq.NH_3} X \xrightarrow[(ii)\ CH_3CH_2Br]{(i)\ NaNH_2/liq.NH_3} Y$$

X and Y in the above-mentioned reaction are respectively -

1. X = 2–Butyne; Y = 3–Hexyne
2. X = 2-Butyne; Y = 2-Hexyne
3. X = 1-Butyne; Y = 2-Hexyne
4. X = 1-Butyne; Y = 3–Hexyne

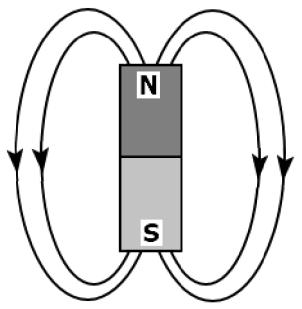
**75** Which of the following reagent is used for the following reaction ?

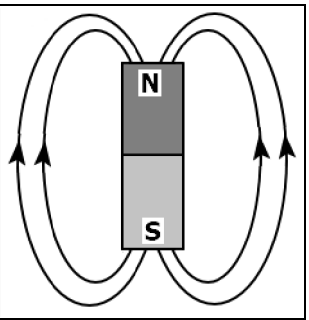
$CH_3CH_2CH_3 \xrightarrow{?} CH_3CH_2CHO$

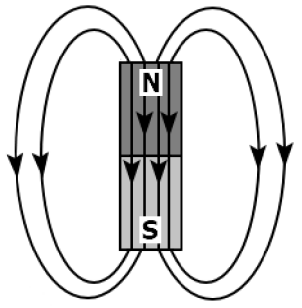
1. Manganese acetate
2. Copper at high temperature and pressure
3. Molybdenum oxide
4. Potassium permanganate

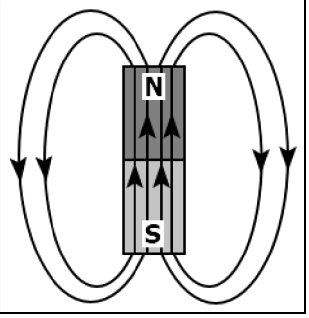
## PHYSICS - SECTION A

**76** The magnetic field lines due to a bar magnet are correctly shown in:

1. 


2. 


3. 


4. 

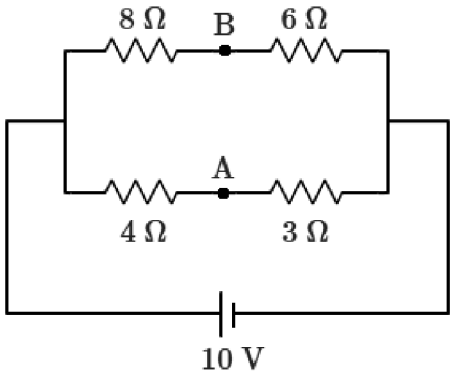

**77** At a temperature of 30°C, the susceptibility of a ferromagnetic material is found to be $x$. Its susceptibility at 333°C is:

1. $x$
2. $0.5x$
3. $2x$
4. $11.1x$

**78** The ratio of the magnitudes of the equatorial and axial fields due to a bar magnet of length 5.0 cm at a distance of 50 cm from its mid-point is:
(Given, the magnetic moment of the bar magnet is $0.40\ Am^2$.)

1. $\frac{1}{2}$
2. $2$
3. $1$
4. $\frac{3}{2}$

**79** The potential difference between points A and B is:

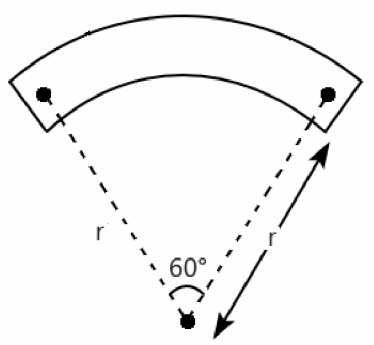



1. 207 V
2. 407 V
3. 107 V
4. 0

**80** The susceptibility of a paramagnetic material at 400 K is $2\times10^{-5}$. The susceptibility would increase to $2.5\times10^{-5}$ at a temperature of:

1. 500 K
2. 256 K
3. 320 K
4. 350 K

**81** A bar magnet of length $l$ and magnetic moment $p_m$ is bent in the form of an arc as shown in the figure below. The new magnetic dipole moment will be:




1. $p_m$
2. $\frac{3}{\pi}p_m$
3. $\frac{2}{\pi}p_m$
4. $\frac{1}{2}p_m$

**82** The dipole moment of each molecule of a paramagnetic gas is $1.5 \times 10^{-23}\ A-m^2$. The temperature of the gas is $27^{\circ}C$ and the number of molecules per unit volume in it are $2 \times 10^{26}\ m^{-3}$. The maximum possible intensity of magnetization in the gas will be:

1. $3 \times 10^{3}\ A/m$
2. $4 \times 10^{-3}\ A/m$
3. $5 \times 10^{5}\ A/m$
4. $6 \times 10^{-4}\ A/m$

**83** In a circuit, 5 percent of total current passes through a galvanometer. If the resistance of the galvanometer is *G*, then the value of the shunt is**:**

1. $19G$
2. $20G$
3. $\frac{G}{20}$
4. $\frac{G}{19}$

**84** Which one of the following gives the value of the magnetic field according to Biot-Savart's law?

1. $\frac{\mathrm{i}\Delta l\sin(\theta)}{\mathrm{r}^2}$
2. $\frac{\mu_0}{4\pi}\frac{\mathrm{i}\Delta l\sin(\theta)}{\mathrm{r}}$
3. $\frac{\mu_0}{4\pi}\frac{\mathrm{i}\Delta l\sin(\theta)}{\mathrm{r}^2}$
4. $\frac{\mu_0}{4\pi}\mathrm{i}\Delta l\sin(\theta)$

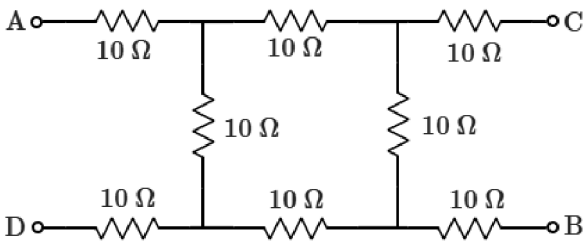
**85** The maximum kinetic energy of the positive ion of charge q and mass m in the cyclotron of radius $r_o$ in which applied magnetic field is B, is:

1. $\frac{q^2Br_0}{2m}$
2. $\frac{qB^2r_0}{2m}$
3. $\frac{q^2B^2r_0^2}{2m}$
4. $\frac{qBr_0}{2m^2}$

**86** A steady current flows in a metallic conductor of a non-uniform cross-section. The quantity/quantities constant along the length of the conductor is/are:

1. current, electric field and drift speed
2. drift speed only
3. current and drift speed
4. current only

**87** The resistance between points A and B in the circuit shown in the following figure is:



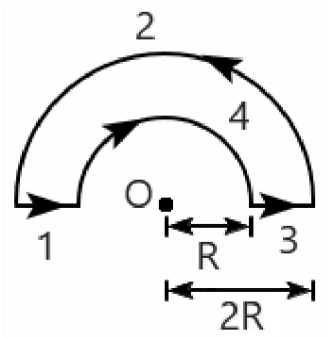

1. 10 Ω
2. 20 Ω
3. 30 Ω
4. 40 Ω

**88** Kirchhoff's second law is based on the law of conservation of:

1. charge
2. energy
3. momentum
4. sum of mass and energy

**89** **Assertion:** The magnetic field on the surface of a long current-carrying isolated wire is maximum.
**Reason:** No current-carrying wire can experience a magnetic force due to its own magnetic field.
1. Both Assertion & Reason are true and the reason is the correct explanation of the assertion.
2. Both Assertion & Reason are true but the reason is not the correct explanation of the assertion.
3. Assertion is true statement but Reason is false.
4. Both Assertion and Reason are false statements.

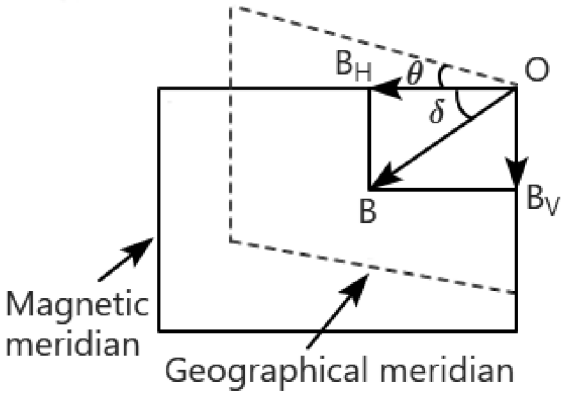
**90** The figure shows a current-carrying loop having four segments 1, 2, 3, and 4. The net magnetic field at the center O is:




1. $\vec{B} = \vec{B}_1 + \vec{B}_2 + \vec{B}_3 + \vec{B}_4$
2. $\vec{B} = \vec{B}_1 = \vec{B}_3 = \vec{0}$
3. $\vec{B} = \vec{B}_1 + \vec{B}_2 + \vec{B}_3 - \vec{B}_4$
4. $\vec{B} = \vec{B}_4 - \vec{B}_2 + \vec{B}_1 - \vec{B}_3$

**91** **Assertion:** The magnetism of magnet is due to the spin motion of electrons.
**Reason:** Dipole moment of electron is smaller than that due to orbit motion around nucleus.
1. Both assertion and reason are true and the reason is the correct explanation of the assertion.
2. Both assertion and reason are true but the reason is not the correct explanation of the assertion.
3. Assertion is true but the reason is false.
4. Both assertion and reason are false.

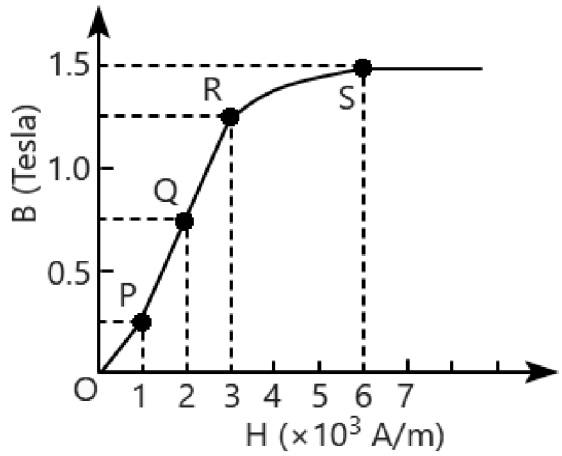
**92** The earth's magnetic field at a point on its surface is usually characterised by three quantities: (a) declination (b) inclination or dip and (c) horizontal component of the field. These are known as the elements of the earth's magnetic field. At a place, angle between geographic meridian and magnetic meridian is defined as magnetic declination, whereas angle made by the earth's magnetic field with the horizontal in magnetic meridian is known as magnetic dip.




Select the correct statement from the following.
1. The magnetic dip is zero at the centre of the earth.
2. Magnetic dip decreases as we move away from the equator towards the magnetic pole.
3. Magnetic dip increases as we move away from the equator towards the magnetic pole.
4. Magnetic dip does not vary from place to place.

# PHYSICS - SECTION B

**93** The basic magnetization curve for a ferromagnetic material is shown in the figure. The value of relative permeability is highest for the point:




1. P
2. Q
3. R
4. S

**94** $O^{++}$, $C^{+}$, $He^{++}$ and $H^{+}$ ions are projected on the photographic plate with the same velocity in a mass spectrograph. Which one will strike the farthest?

1. $O^{++}$
2. $C^{+}$
3. $He^{++}$
4. $H^{+}$

**95** The earth's magnetic field at the equator is approximately 0.4 G. The earth's dipole moment is:
(Radius of earth, $R_E = 6.4 \times 10^6$ m)

1. $1.05 \times 10^{23}$ A-m$^2$
2. $8.0 \times 10^{22}$ A-m$^2$
3. $4.5 \times 10^{23}$ A-m$^2$
4. $2.10 \times 10^{23}$ A-m$^2$

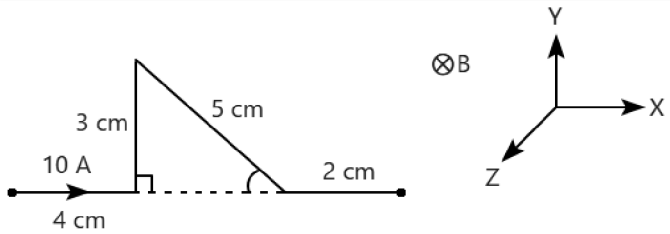
**96** When a ferromagnetic material goes through a hysteresis loop, the magnetic susceptibility:
(a) has a fixed value
(b) may be zero
(c) may be infinity
(d) may be negative
Choose the correct option:

1. (a), (b), (c)
2. (b), (c), (d)
3. (c), (d), (a)
4. (a), (d), (b)

**97** A circular loop of area 1 cm$^2$, carrying a current of 10 A, is placed in a magnetic field of 0.1 T perpendicular to the plane of the loop. The torque on the loop due to the magnetic field is:

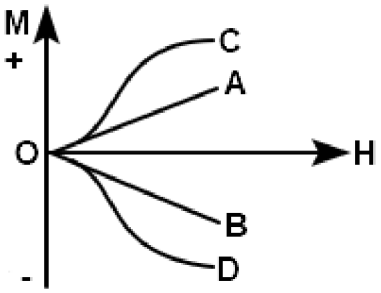
1. zero
2. $10^{-4}$ N-m
3. $10^{-2}$ N-m
4. 1 N-m

**98** A wire frame of a given shape, carrying current of 10 A is placed in a uniform magnetic field 100 T directed into the plane of the paper as shown in the figure. The net force acting on the frame is:




1. $100\hat{j}$ N
2. $100(-\hat{j})$ N
3. $67.5\hat{j}$ N
4. $67.5(-\hat{k})$ N

**99** The most suitable curve for a paramagnetic substance between magnetization M and magnetising field H is:




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

**100** A resistor of resistance R is connected to an ideal battery. If the value of R is decreased, then the power dissipated in the resistor will:
1. increase
2. decrease
3. remain unchanged
4. first increase and then decrease