

**NEET - 2019**  
**MODEL TEST**

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**General Instructions:**

1. This Model test contains multiple choice questions. 90 in Biology, 45 in Physics and 45 in Chemistry. One correct option is to be chosen from each.
  2. Test duration is **3 hours**.
  3. Each correct response carries 4 marks and -1 mark for each incorrect response.
  4. Maximum Marks : **720**.
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**BIOLOGY**

1. **All the following hormones are produced by women, only during pregnancy, except**
  - 1) Human chorionic gonadotropin
  - 2) Human placental lactogen
  - 3) Relaxin
  - 4) Oestrogen and progesterone
2. **The fixed carbon removed from circulation is present in**
  - 1) Sediments
  - 2) Fossil fuel
  - 3) Water
  - 4) Wood
3. **Unrelated feature of Diatoms is**
  - 1) Silicaceous cell wall
  - 2) Radial (or) bilateral symmetry
  - 3) Auxospores are haploid mitospores
  - 4) Non-flagellation
4. **Ascospore producing edible fungi are**
  - 1) Bread mould and Albugo
  - 2) Morels and truffles
  - 3) Mushrooms and toadstools
  - 4) *Colletotrichum* and *Trichoderma*
5. **Both independent alternation of generations are found in**
  - 1) Bryophyta
  - 2) Pteridophyta
  - 3) Gymnosperm
  - 4) Angiosperm
6. **Select incorrect statements**
  - a) Sporophyte of liverworts is independent.
  - b) *Salvinia* is heterosporous.
  - c) Life cycle of seed plants is diplontic.
  - d) *Pinus* is dioecious plant.
  - 1) a, b
  - 2) a, c
  - 3) a, d
  - 4) b, c
7. **The organisms of water blooms in polluted water bodies are nutritionally**
  - 1) Photosynthetic autotrophs
  - 2) Chemosynthetic autotrophs
  - 3) Heterotrophs

4) Saprophytes

8. Floral formula  $\oplus \overset{\uparrow}{\underset{+}{\circ}} K_{(5)} \overset{\curvearrowright}{C_{(5)}} A_5 G_{(2)}$  is that of

- 1) Soyabean
- 2) Tobacco
- 3) *Tulip*
- 4) Sunn Hemp

9. Stem tendrils are found in

- 1) Grap Vine and Pumpkin
- 2) Wild pea and Garden pea
- 3) Glory lily and Smilax
- 4) Strawberry and Grape Vine

10. Match List-I with List-II and select the correct answer using the codes given below

List-I (Characters)		List-II (Families)	
a)	Tetradynamy	i)	Fabaceae
b)	Syngenesious stamens	ii)	Brassicaceae
c)	Polyadelphly	iii)	Asteraceae
d)	Diadelphly	iv)	Rutaceae
		v)	Apiaceae

- | <u>a</u> | <u>b</u> | <u>c</u> | <u>d</u> |
|----------|----------|----------|----------|
| 1) ii    | iv       | v        | i        |
| 2) ii    | iii      | iv       | i        |
| 3) i     | iv       | v        | ii       |
| 4) i     | iii      | iv       | ii       |

11. Taxonomical keys are

- 1) Analytical in nature
- 2) Based on the contrasting characters
- 3) Preservative specimen
- 4) 1 and 2

12. The first movement of the foetus and appearance of hair on the head are usually observed during

- 1) First trimester
- 2) Twelveth week

3) Second trimester

4) Third trimester

13. Select the correct match

- 1) T.H Morgan – Transduction
- 2) Lamarck – Natural selection
- 3) Hugo de vries – Mutations
- 4) R.C punnett – Pedigree analysis

14. Which of the following pair is wrongly matched

- 1) ABO Blood grouping – Co dominance
- 2) T.H. Morgan – Linkage
- 3) XX-XY – Sex determination in human beings
- 4) Phenylketonuria – Trisomy of 12<sup>th</sup> pair of chromosomes

15. The organism which breed only once in their life time

- 1) Pacific salmon fish
- 2) Pacific salmon fish and ostrich
- 3) Many of the birds and mammals
- 4) *Clarias batrachus* and *clarias garipinus*

16. Within the interspecific interaction, the possible outcome where both the partners were lost or found to be detrimental.

- 1) Predation
- 2) Parasitism
- 3) Amensalism
- 4) Competition

17. Match the items in column A and coloumn B

Column A

- a) Catalytic converter
- b) Electrostatic precipitator
- c) Earmuff's
- d) Land fills

Column B

- i) Particulate matter
- ii) CO and Nitrogen oxides
- iii) High noise level
- iv) Solid waste

- | a    | b  | c   | d  |
|------|----|-----|----|
| 1) i | ii | iii | iv |

- 2) ii      i      iii      ii
- 3) i      ii      iv      iii
- 4) ii      i      iv      i

**18. Migration of a cancer cell to other parts of the body is known as**

- 1) Metamorphosis
- 2) Metagenesis
- 3) Metastasis
- 4) Metamerism

**19. A colour blind man marries a normal women whose father was colorblind. Then in their progeny**

- 1) Half of their sons are colour blind
- 2) None of their daughters are colour blind
- 3) All the sons are colour blind
- 4) All the daughters are colour blind

**20. Which of the following is more important for specification**

- 1) Seasonal isolation
- 2) Behavioural isolation
- 3) Reproductive isolation
- 4) Temporal isolation

**21. Passage cells are thin-walled cells found in**

- 1) Phloem, to serve as entry points
- 2) Pericycle, opposite to protoxylem
- 3) Endodermis, opposite to protophloem
- 4) Endodermis, opposite to protoxylem

**22. Conjoint and closed vascular bundles in monocot stem do not have**

- 1) Phloem parenchyma
- 2) Sieve tubes
- 3) Xylem vessels
- 4) Companion cells

**23. The youngest ring of heart wood in a woody dicot stem lies just**

- 1) Inner to youngest ring of sap wood
- 2) Inner to oldest ring of sap wood
- 3) Outer to youngest ring of sap wood
- 4) Outer to oldest ring of sap wood

**24. Both chloroplast and Mitochondria have**

- 1) Circular naked D.N.A
- 2) Internal membrane system
- 3) Protein synthesizing machinery
- 4) 1 and 3

**25. A chromosome with centromere slightly away from middle point is**

- 1) Metacentric
- 2) Submetacentric
- 3) Acrocentric
- 4) Telocentric

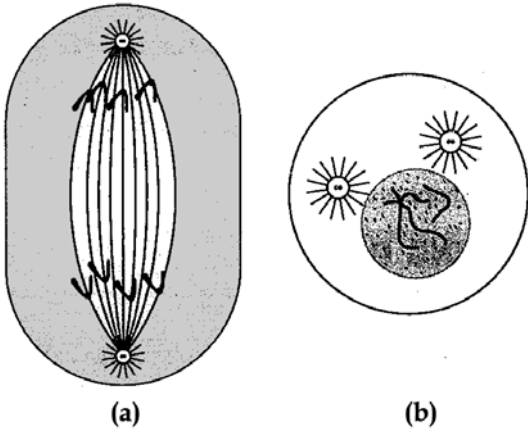
**26. All enzymes are invariably**

- 1) Polypeptides
- 2) Polynucleotides
- 3) Nitrogenous heteropolymers
- 4) Homopolymers

**27. Polymer of fructose is**

- 1) Cellulose
- 2) Starch
- 3) Glycogen
- 4) Inulin

**28. Which stages of cell division do the following figures a and b represent respectively ?**



- 1) Telophase – Metaphase
- 2) Late Anaphase – Prophase
- 3) Prophase – Anaphase
- 4) Metaphase – Telophase

**29. Transpiration is not purposeful in**

- 1) Supplying water for photosynthesis
- 2) Maintaining shape and structure of plants
- 3) Translocation of sugars from source to sink
- 4) Transporting minerals from soil to all parts of the plant

**30. Ability to rise in thin tubes and ability to resist pulling force of xylem sap are respectively due to**

- 1) Tensile strength and capillarity
- 2) Cohesion and adhesion
- 3) Capillarity and tensile strength
- 4) Adhesion and capillarity

**31. In 1974, few local women showed enormous bravery in protecting trees from the axe. This is referred as “Modern chipko” movement. This 1974 event happened in**

- 1) Jodhpur, Rajasthan
- 2) Garhwal Himalaya, Uttarakhand
- 3) Ballary, Karnataka
- 4) Khasi and jaintia, Meghalaya

**32. The air pollutant which is responsible to cause “Stone leprosy” or “rock cancer” of monuments is**

- 1) CO
- 2) CO<sub>2</sub>
- 3) SO<sub>2</sub>
- 4) O<sub>3</sub>

**33. The pyramid in which small standing crop of phytoplankton supports large standing crop of zooplankton is**

- 1) Inverted pyramid of biomass in aquatic habitat
- 2) Inverted pyramid of biomass in terrestrial habitat
- 3) Upright pyramid of number in aquatic habitat
- 4) Upright pyramid of energy in aquatic habitat

**34. Read the following statements carefully**

**I. H-zone is present at the middle of I-band**

**II. A-Band is present at the middle of sarcomere**

**III. During contraction of muscle, I-band gets reduced**

**IV. The light band contains both actin and myosin proteins**

**The correct statements among the above are**

- 1) I and II
- 2) II and III
- 3) III and IV
- 4) I and III

**35. A marine bony fish continuously**

- 1) Acquire water and get rid of salt
- 2) Get rid of both water and salt
- 3) Get rid of water and acquire salt
- 4) Acquire both water and salt

**36. A single strand of nucleic acid tagged with a radioactive molecule is called**

- 1) Vector
- 2) Plasmid
- 3) Cosmid
- 4) Probe

**37. Nerve impulse is**

- 1) Carried by afferent and efferent nerves

- 2) Is not carried by afferent and efferent nerves
- 3) Is carried away by afferent fibres and brought about by efferent fibres.
- 4) Is brought by afferent fibres and carried away by efferent fibres
- 38. Which of the following has the largest population in a food chain ?**
- 1) Producers
  - 2) Primary consumers
  - 3) Secondary consumers
  - 4) Climax consumers
- 39. World earth day falls on**
- 1) September 5<sup>th</sup>
  - 2) April 22<sup>nd</sup>
  - 3) June 1<sup>st</sup> week
  - 4) December 21
- 40. The chronic respiratory disorder in which alveolar walls are damaged which results in decreased respiratory surface area is**
- 1) Anorexia
  - 2) Emphysema
  - 3) Eczema
  - 4) SARS
- 41. The substrate for photorespiration is**
- 1) Phosphoglyceric acid
  - 2) Glycolate
  - 3) Serine
  - 4) Glycine
- 42. Sulphur containing vitamin is**
- 1) Thymine
  - 2) Methionine
  - 3) Thiamine
  - 4) Neacin
- 43. Read the following statements and select the correct statements**
- a) Cyt b6/f complex is not located on stroma lamellae
  - b) PS II does not participate in cyclic photophosphorylation
  - c) PEP Case is primary carboxylation enzyme in all plants
  - d) The photosynthetic cells in CAM plants are of one type
- 1) b and d
  - 2) a and b
  - 3) b and c
  - 4) c and d
- 44. Warburg effect is decrease in the rate of photosynthesis at**
- 1) Low carbon dioxide concentration
  - 2) High oxygen content
  - 3) High carbon dioxide concentration
  - 4) Both 1 and 2
- 45. Which is a symbiotic N<sub>2</sub>-fixer in non-leguminous plants ?**
- 1) *Rhizobium*
  - 2) *Frankia*
  - 3) *Rhodospirillum*
  - 4) *Azotobacter*
- 46. Within human eye, the space between the lens and the retina is called**
- 1) Aqueous chamber
  - 2) Vitreous chamber
  - 3) Scala media
  - 4) Helicotrema
- 47. Reduction of NAD<sup>+</sup> does not occur in the reaction**
- 1) Pyruvic acid → Acetyl CoA
  - 2) Isocitric acid → α -ketoglutaric acid
  - 3) Malic acid → Oxaloacetic acid
  - 4) Succinic acid → Fumaric acid

- 48. The common  $e^-$  carriers in E.T.S of mitochondria and chloroplasts are**
- 1) Ferridoxin
  - 2) Plastocyanin
  - 3) Ubiquinone
  - 4) Cytochromes
- 49. Green plants grow by bending towards light because of**
- 1) Need of light for photosynthesis
  - 2) Phototaxis
  - 3) Faster growth on lighted side
  - 4) Auxin accumulation more on shaded side than lighted side
- 50. Exponential growth is expressed as**
- 1)  $L_t = L_0 + rt$
  - 2)  $L_0 = Le^{rt}$
  - 3)  $W_1 = W_0 e^{rt}$
  - 4)  $W_0 = W_1 e^{rt}$
- 51. The blood vessel which carry the oxygenated blood towards the heart in human is**
- 1) Pulmonary vein
  - 2) Pulmonary artery
  - 3) Precaval vein
  - 4) Hepatic portal vein
- 52. The maximum volume of air a person can breathe in after a forced expiration**
- 1) Inspiratory capacity
  - 2) Expiratory capacity
  - 3) Total lung capacity
  - 4) Vital capacity
- 53. R.Q. would depend upon**
- 1) Nature of enzymes
  - 2) Nature of substrate
  - 3) Amount of  $CO_2$  released
  - 4) Amount of  $O_2$  utilised
- 54. A male is carrying a gene on his "X" chromosome. This character can be inherited to**
- 1) Sons
  - 2) Daughters
  - 3) Both sons and daughters
  - 4) Only grand children
- 55. Leukemia is due to**
- 1) Excessive production of WBC
  - 2) Excessive production of RBC
  - 3) Excessive production of Thrombocytes
  - 4) Excess amount of blood plasma
- 56. HCl of gastric juice**
- 1) Activates ptyalin and Inactivates pepsin
  - 2) Inactivates ptyalin and activates pepsin
  - 3) Activates both ptyalin and pepsin
  - 4) Inactivates ptyalin and pepsin
- 57. Identify the hormone which is derived from a single amino acid**
- 1) Insulin
  - 2) Melatonin
  - 3) Prostaglandin
  - 4) Estrogen
- 58. Undersecretion of adrenal cortex hormones which alter the carbohydrate metabolism causing acute weakness and fatigue leading to a disease called**
- 1) Addison's disease
  - 2) Cushing's disease
  - 3) Adrenal virilism
  - 4) Grave's disease
- 59. "Cortisol" is secreted from which endocrine gland ?**
- 1) Pancreas
  - 2) Thyroid

3) Adrenal

4) Thymus

**60. The sacred Grove 'Aravalli hills' are located in**

1) Madhya Pradesh

2) Meghlaya

3) Rajasthan

4) Uttarakhand

**61. Anti auxin property of cytokinin is**

1) Removal of apical dominance

2) Promotion of fruit fall

3) Opening of stomata

4) Delay of senescence of old organs

**62. Which of the following pairs is not correctly matched?**

**Probagule**

**Example**

1) Rhizome ---- Banana

2) Binary fission ---- Sargassum

3) Conidia ---- Penicillium

4) Offset ---- Water hyacinth

**63. Number of male gametes formed from 16 microspore mother cells is**

1) 128

2) 64

3) 32

4) 16

**64. Function of filiform apparatus is to**

1) Guide the entry of pollen tube into embryosac

2) Recognize the suitable pollen at stigma

3) Stimulate division of generative cell

4) Produce nectar

**65. Set of dominant traits chosen by Mendel**

1) Axial flower, green pod, green seed

2) Green pod, inflated pod, axial flower

3) Yellow seed, violet flower, yellow pod

4) Round seed, constricted pod, axial flower

**66. The offspring of AA bb x aa BB is crossed with, aabb. The genotypic ratio of progeny will be**

1) 9 : 3 : 3 : 1

2) 1 : 2 : 1

3) 1 : 1 : 1 : 1

4) 3 : 1

**67. Read statements, a to d.**

a) In transcription, adenine pairs with uracil

b) Regulation of lac operon by repressor is positive regulation

c) Primase is a nuclease

d) Translational unit does not include cap and tail regions of m RNA

**How many of above statement are correct?**

1) 2

2) 3

3) 4

4) 1

**68. Match codons with amino acids**

i) UUU

a) Serine

ii) GGG

b) Methionine

iii) UGU

c) Phenylalanine

iv) CCC

d) Glycine

v) AUG

e) Proine

1) i - c, ii - d, iii - a, iv - e, v - b

2) i - c, ii - a, iii - d, iv - e, v - b

3) i - c, ii - d, iii - s, iv - a, v - b

4) i – b, ii – d, iii – a, iv – e, v – c

**69. Which is not correctly matched?**

- 1) Explant – Excised plant part used for culture
- 2) G.A – Root initiation in callus
- 3) Somatic embryos – Embryos formed from vegetative cells
- 4) Anther culture – Haploid plants

**70. Hidden hunger leads to**

- 1) Reduced life span
- 2) Reduced mental abilities
- 3) Increased risk of diseases
- 4) All of the above

**71. Select the one, which is not a character offered/shown by the consumption of crack or cocaine**

- 1) It has potent stimulating action on CNS
- 2) Excess dosage causes hallucinations
- 3) Produces a sense of Euphoria
- 4) It produces great energy to the one who consumed

**72. Poikilothermic, anamniotic vertebrate with three chambered heart is**

- 1) Pterophyllus      2) Rana
- 3) Naja                4) Apteryx

**73. In cockroach the structure attached/open into the alimentary canal, but does not have any designative role in digestion is**

- 1) Ventriculus
- 2) Hepatic caecae
- 3) Gizzard
- 4) Malpighian tubules

**74. With the knowledge of types of tissues, select the odd one among the given four**

- 1) Areolar tissue      2) Blood
- 3) Neuron                4) Tendon

**75. Which of the following animal doesnot show any larval form during its development ?**

- 1) Anopheles            2) Star fish
- 3) Urochordate        4) Earthworm

**76. \_\_\_\_\_ hormone interact with intracellular receptors and mostly regulate gene expression or chromosome function by the interaction of hormone receptor complex with the genome**

- 1) Amine hormone    2) Peptide hormone
- 3) Protein hormone   4) Steroid hormone

**77. All the following show the characters of an ideal contraceptive, except**

- 1) User friendly and easily available
- 2) Effective and irreversible
- 3) No way interfere with the sexual drive or desire
- 4) No or least side effects

**78. The technique in which the semen is collected either from the husband or healthy donor is artificially introduced into the uterus of the female is**

- 1) IUI                      2) IVF
- 3) ICSI                    4) IUT

**79. The difference between spermiogenesis and spermiation is**

- 1) In spermiogenesis, spermatozoa from sertoli cells are released into the cavity of seminiferous tubule, while in spermiation spermatozoa are formed
- 2) In spermiogenesis spermatozoa are formed, while in spermiation spermatids are formed.
- 3) In spermiogenesis spermatozoa are formed, while in spermiation spermatozoa are released from sertoli



cells into the cavity of seminiferous tubules

- 4) In spermiogenesis spermatids are formed, while in spermiation spermatozoa are formed

**80. Selected the correct match of hormone and its other alternative name?**

- 1) Secretin and Gastrin
- 2) Testosterone and LTH
- 3) Oxytocin and thyroxine
- 4) Pitressin and vasopressin

**81. Which one is wrongly matched?**

- 1) Detergents – lipase
- 2) VAM Fungus - oscillatoria
- 3) Baculovirus - NPV
- 4) Clarified bottle fruit juice – pectinase

**82. Water vascular system is the characteristic of which group of the following**

- 1) Porifera
- 2) Ctenophora
- 3) Echinodermata
- 4) Chordata

**83. During amplification of gene using PCR, Taq polymerase is used**

- 1) Before denaturation
- 2) After annealing
- 3) Before annealing
- 4) After amplification

**84. Down stream processing involves**

- 1) Separation of gene product
- 2) Purification of gene product
- 3) Clinical testing of gene product
- 4) 1 and 2

**85. The bacterium Bacillus thuringiensis is widely used as**

- 1) Source of industrial enzyme
- 2) Insecticide
- 3) Indicator of water pollution
- 4) Agent for production of cheese

**86. Identify the triploblastic, meta-merically segmented, aquatic schizocoelomate among the following**

- 1) Nereis
- 2) Wuchereria
- 3) Saccoglossus
- 4) Loligo

**87. In cockroach, “anal cerci” are**

- 1) Unjointed filamentous structures present in both sexes
- 2) Unjointed filamentous structures present in only male
- 3) Jointed filamentous structures present in only male
- 4) Jointed filamentous structures present in both sexes

**88. The protochordates in which the notochord persist through their life is/are**

- 1) Hemichordates
- 2) Urochordates
- 3) Cephalochordates
- 4) 1 and 3

**89. Biogases includes**

- 1) Hydrogen sulphide, methane, sulphur dioxide
- 2) Hydrogen sulphide, phosphorus, methane
- 3) Methane, hydrogen sulphide, carbon dioxide
- 4) Methane, oxygen, hydrogen sulphide

**90. The Hookworm is**

- 1) Enterobius
- 2) Eunice
- 3) Ancylostoma
- 4) Ascaris

**PHYSICS**

91. A simple harmonic motion is represented by

$$y = 5(\sin 3\pi t + \sqrt{3} \cos 3\pi t) \text{ cm}.$$

The amplitude and time period of the motion are

- 1)  $5 \text{ cm}, \frac{2}{3} \text{ s}$       2)  $10 \text{ cm}, \frac{3}{2} \text{ s}$   
 3)  $5 \text{ cm}, \frac{3}{2} \text{ s}$       4)  $10 \text{ cm}, \frac{2}{3} \text{ s}$

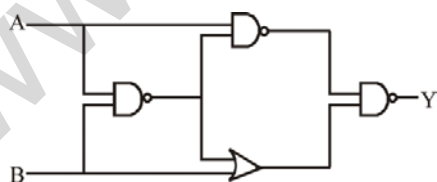
92. Barrier potential of a p-n junction diode does not depend on

- 1) Diode design  
 2) Temperature  
 3) Forward bias  
 4) Doping density

93. A travelling harmonic wave is represented by the equation  $y(x, t) = 10^{-3} \sin(50t + 2x)$ , where  $x$  and  $y$  are in meter and  $t$  is in seconds. Which of the following is a correct statement about the wave?

- 1) The wave is propagating along the negative x-axis with speed  $25 \text{ ms}^{-1}$   
 2) The wave is propagating along the positive x-axis with speed  $25 \text{ ms}^{-1}$   
 3) The wave is propagating along the positive x-axis with speed  $100 \text{ ms}^{-1}$   
 4) The wave is propagating along the negative x-axis with speed  $100 \text{ ms}^{-1}$

94. The output of the given logic circuit is



- 1)  $\overline{AB}$       2)  $A\overline{B}$   
 3)  $AB + \overline{AB}$       4)  $A\overline{B} + \overline{AB}$

95. Two electric bulbs, rated at (25 W, 220 V) and (100 W, 220 V), are connected

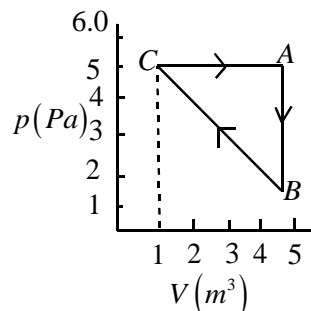
in series across a 220 V voltage source. If the 25 W and 100 W bulbs draw powers  $P_1$  and  $P_2$  respectively, then

- 1)  $P_1 = 9 \text{ W}, P_2 = 16 \text{ W}$   
 2)  $P_1 = 4 \text{ W}, P_2 = 16 \text{ W}$   
 3)  $P_1 = 16 \text{ W}, P_2 = 4 \text{ W}$   
 4)  $P_1 = 16 \text{ W}, P_2 = 9 \text{ W}$

96. A proton and an  $\alpha$ -particle (with their masses in the ratio of 1:4 and charges in the ratio of 1:2) are accelerated from rest through a potential difference  $V$ . If a uniform magnetic field ( $B$ ) is set up perpendicular to their velocities, the ratio of the radii  $r_p : r_\alpha$  of the circular paths described by them will be

- 1)  $1:\sqrt{2}$       2)  $1:2$   
 3)  $1:3$       4)  $1:\sqrt{3}$

97. For the given cyclic process CAB as shown for a gas, the work done is



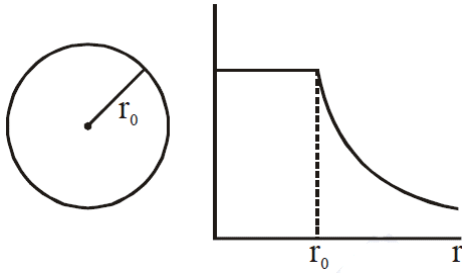
- 1) 1 J      2) 5 J  
 3) 8 J      4) 30 J

98. A particle is moving along a circular path with a constant speed of  $10 \text{ ms}^{-1}$ . What is the magnitude of the change in velocity of the particle, when it moves through an angle of  $60^\circ$  around the centre of the circle?

- 1) 0  
 2)  $10 \text{ m/s}$   
 3)  $10\sqrt{3} \text{ m/s}$

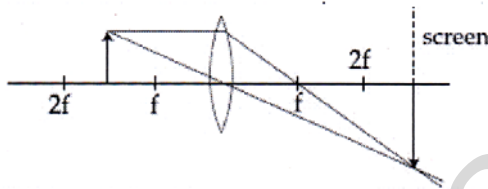
4)  $10\sqrt{2} \text{ m/s}$

99. The given graph shows variation (with distance  $r$  from centre) of



- 1) Potential of uniformly charged sphere
- 2) Potential of uniformly charged spherical shell
- 3) Electric field of uniformly charged spherical shell
- 4) Electric field of uniformly charged sphere

100. Formation of real image using a biconvex lens is shown below



If the whole set up is immersed in water without disturbing the object and the screen positions, what will one observe on the screen?

- 1) Image disappears
- 2) Magnified image
- 3) Erect real image
- 4) No change

101. A monochromatic light is incident at a certain angle on an equilateral triangular prism and suffers minimum deviation. If the refractive index of the material of the prism is  $\sqrt{3}$ , then the angle of incidence is

- 1)  $30^\circ$
- 2)  $45^\circ$
- 3)  $90^\circ$

4)  $60^\circ$

102. A paramagnetic material has  $10^{28}$  atoms/ $\text{m}^3$ . Its magnetic susceptibility at temperature 350 K is  $2.8 \times 10^{-4}$ . Its susceptibility at 300 K is

- 1)  $3.726 \times 10^{-4}$
- 2)  $3.672 \times 10^{-4}$
- 3)  $3.267 \times 10^{-4}$
- 4)  $2.672 \times 10^{-4}$

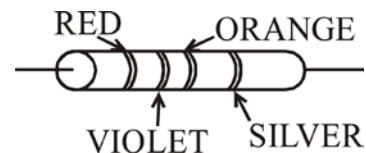
103. An alpha-particle of mass  $m$  suffers one dimensional elastic collision with a nucleus at rest of unknown mass. It is scattered directly backwards losing 64% of its initial kinetic energy. The mass of the nucleus is

- 1)  $4m$
- 2)  $3.5m$
- 3)  $2m$
- 4)  $1.5m$

104. A plane electromagnetic wave of frequency 50 MHz. Travels in free space along the positive x-direction. At a particular point in space and time, the electric field is  $\vec{E} = 6.3 \hat{j} \text{ V/m}$ . The corresponding magnetic field  $\vec{B}$ , at the point will be

- 1)  $18.9 \times 10^{-8} \hat{k} \text{ T}$
- 2)  $6.3 \times 10^{-8} \hat{k} \text{ T}$
- 3)  $2.1 \times 10^{-8} \hat{k} \text{ T}$
- 4)  $18.9 \times 10^{-8} \hat{k} \text{ T}$

105. A resistance is shown in the figure. Its value and tolerance are given respectively by



- 1)  $27 \text{ K}\Omega, 20\%$
- 2)  $27 \text{ K}\Omega, 5\%$
- 3)  $270 \text{ K}\Omega, 10\%$
- 4)  $27 \text{ K}\Omega, 10\%$

106. A 15 g mass of nitrogen gas is enclosed in a rigid vessel at a temperature 27°C. Amount of heat transferred to the gas, so that rms velocity of molecules is doubled, is about

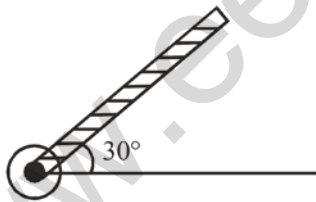
[Take R = 8.3 J/K mole]

- 1) 10 KJ                      2) 0.9 kJ  
3) 6 kJ                        4) 14 kJ

107. A particle is executing simple harmonic motion (SHM) of amplitude A, along the x-axis, about x = 0. When its potential Energy (PE) equals kinetic energy (KE), the position of the particle will be

- 1)  $\frac{A}{2}$                       2)  $\frac{A}{2\sqrt{2}}$   
3)  $\frac{A}{\sqrt{2}}$                     4) A

108. A rod of length 50cm is pivoted at one end. It is raised such that it makes an angle of 30° from the horizontal as shown and released from rest. Its angular speed when it passes through the horizontal (in rad s<sup>-1</sup>) will be (g = 10 ms<sup>-2</sup>)



- 1)  $\sqrt{30}$                       2)  $\sqrt{\frac{30}{2}}$   
3)  $\frac{\sqrt{30}}{2}$                         4)  $\frac{\sqrt{20}}{3}$

109. Expression for time in terms of G (universal gravitational constant), h (Planck constant) and c (speed of light) is proportional to

- 1)  $\sqrt{\frac{Gh}{c^3}}$                       2)  $\sqrt{\frac{hc^5}{G}}$   
3)  $\sqrt{\frac{c^3}{Gh}}$                     4)  $\sqrt{\frac{Gh}{c^5}}$

110. Two Carnot engines A and B are operated in series. The first one, A, receives heat at T<sub>1</sub> = (600K) and rejects to a reservoir at temperature T<sub>2</sub>. The second engine B receives heat rejected by the first engine and, in turn, rejects to a heat reservoir at T<sub>3</sub> = (400K). Calculate the temperature T<sub>2</sub> if the work outputs of the two engines are equal

- 1) 400 K  
2) 600 K  
3) 500 K  
4) 300 K

111. A force acts on a 2 kg objects so that its position is given as a function of time as  $x = 3t^2 + 5$ . What is the work done by this force in first 5 seconds?

- 1) 850 J                      2) 900 J  
3) 950 J                      4) 875 J

112. A power transmission line feeds input power at 2300 V to a step down transformer with its primary windings having 4000 turns. The output power is delivered at 230V by the transformer. If the current in the primary of the transformer is 5A and its efficiency is 90%, the output current would be

- 1) 25A                        2) 50 A  
3) 35 A                        4) 45 A

113. The pitch and the number of divisions, on the circular scale, for a given screw

gauge are 0.5 mm and 100 respectively. When the screw gauge is fully tightened without any object, the zero of its circular scale lies 3 divisions below the mean line.

The readings of the main scale and the circular scale, for a thin sheet, are 5.5 mm and 48 respectively, the thickness of this sheet is

- 1) 5.755 m                      2) 5.725 mm  
3) 5.740 m                      4) 5.950 mm

114. Using a nuclear counter the count rate of emitted particles from a radioactive source is measured. At  $t = 0$  it was 1600 counts per second and  $t = 8$  seconds it was 100 counts per second. The count rate observed, as counts per second, at  $t = 6$  seconds is close to

- 1) 150                              2) 360  
3) 200                              4) 400

115. A heat source at  $T = 10^3 K$  is connected to another heat reservoir at  $T = 10^2 K$  by a copper slab which is 1 m thick. Given that the thermal conductivity of copper is  $0.1 WK^{-1}m^{-1}$ , the energy flux through it in the steady state is

- 1)  $90 Wm^{-2}$                       2)  $200 Wm^{-2}$   
3)  $65 Wm^{-2}$                       4)  $120 Wm^{-2}$

116. A string of length 1 m and mass 5 g is fixed at both ends. The tension in the string is 8.0 N. The string is set into vibration using an external vibrator of frequency 100 Hz. The separation between successive nodes on the string is close to

- 1) 16.6 cm  
2) 20.0 cm

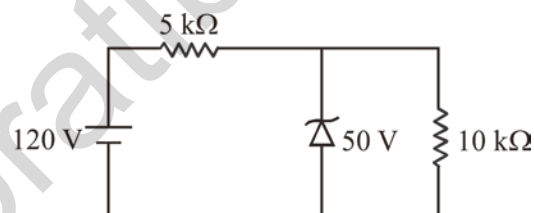
3) 10.0 cm

4) 33.3 cm

117. A train moves towards a stationary observer with speed  $34ms^{-1}$ . The train sounds a whistle and its frequency registered by the observer is  $f_1$ . If the speed of the train is reduced to 17 m/s, the frequency registered is  $f_2$ . If speed of sound is 340 m/s, then the ratio  $f_1/f_2$  is

- 1) 18/17                              2) 19/18  
3) 20/19                              4) 21/20

118. For the circuit shown below, the current through the Zener diode is



- 1) 5 mA                              2) Zero  
3) 14 mA                              4) 9 mA

119. A body dropped from top of a tower falls through 40 m during the last two seconds of its fall. The height of towers is ( $g = 10m/s^2$ )

- 1) 60 m                              2) 45 m  
3) 80 m                              4) 50 m

120. The position vector of a particle is  $\vec{r} = (a \cos \omega t)\hat{i} + (a \sin \omega t)\hat{j}$ . The velocity of the particle is

- 1) Directed towards the origin  
2) Directed away from the origin  
3) Parallel to the position vector  
4) Perpendicular to the position vector

121. Starting from rest, a body slides down a  $45^\circ$  inclined plane in twice the time it takes to slide down the same distance

in the absence of friction. The coefficient of friction between the body and the inclined plane is

- 1) 0.80                      2) 0.75  
3) 0.25                      4) 0.33

122. A particle is projected making an angle of  $45^\circ$  with horizontal having kinetic energy  $K$ . The kinetic energy at highest point will be

- 1)  $\frac{K}{\sqrt{2}}$                       2)  $\frac{K}{2}$   
3)  $2K$                       4)  $K$

123. Copper of fixed volume  $V$  is drawn into wire of length  $l$ . When this wire is subjected to a constant force  $F$ , the extension produced in the wire is  $\Delta l$ . Which of the following graphs is a straight line?

- 1)  $\Delta l$  versus  $1/l$   
2)  $\Delta l$  versus  $l^2$   
3)  $\Delta l$  versus  $1/l^2$   
4)  $\Delta l$  versus  $l$

124. The equation of state for 5g of oxygen at a pressure  $P$  and temperature  $T$ , when occupying a volume  $V$ , will be

- 1)  $PV = (5/32)RT$   
2)  $PV = 5RT$   
3)  $PV = (5/2)RT$   
4)  $PV = (5/16)RT$

125. A charge  $Q$  is situated at the corner of a cube, the electric flux passed through all the six faces of the cube is

- 1)  $\frac{Q}{6\epsilon_0}$   
2)  $\frac{Q}{8\epsilon_0}$   
3)  $\frac{Q}{\epsilon_0}$

4)  $\frac{Q}{2\epsilon_0}$

126. When a charged particle moving with velocity  $\vec{v}$  is subjected to a magnetic field of induction  $\vec{B}$ , the force on it is non-zero. This implies that

- 1) Angle between  $\vec{V}$  and  $\vec{B}$  is either zero or  $180^\circ$   
2) Angle between  $\vec{V}$  and  $\vec{B}$  is necessarily  $90^\circ$   
3) Angle between  $\vec{V}$  and  $\vec{B}$  can have any value other than  $90^\circ$   
4) Angle between  $\vec{V}$  and  $\vec{B}$  can have other than zero and  $180^\circ$

127. A galvanometer has a coil of resistance 100 ohm and gives a full scale deflection for 30 mA current. If it is to work as a voltmeter of 30 volt range, the resistance required to be added will be

- 1)  $900\Omega$                       2)  $1800\Omega$   
3)  $500\Omega$                       4)  $1000\Omega$

128. A diamagnetic material in a magnetic field moves

- 1) From stronger to the weaker parts of the field  
2) From weaker to the stronger parts of the field  
3) Perpendicular to the field  
4) In none of the above direction

129. A series L-C-R circuit is connected to a source of A.C. current. At resonance, the phase difference between the applied voltage and the current in the circuit, is

- 1)  $\pi$                       2) zero  
3)  $\pi/4$                       4)  $\pi/2$

130. In Young's double slit experiment, the slits are 2 mm apart and are illuminated by photons of two wavelengths  $\lambda_1 = 12000 \text{ \AA}$  and  $\lambda_2 = 10000 \text{ \AA}$ . At what minimum distance from the common central bright fringe on the screen 2 m from the slit will a bright fringe from one interference pattern coincide with a bright fringe from the other?

- 1) 4 mm                      2) 3 m  
3) 8 mm                      4) 6 mm

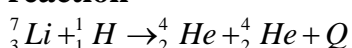
131. A telescope has an objective lens of 10 cm diameter and is situated at a distance of one kilometre from two objects. The minimum distance between these two objects, which can be resolved by the telescope, when the mean wavelength of light is  $5000 \text{ \AA}$ , is of the order of

- 1) 0.5 m                      2) 5 m  
3) 5 mm                      4) 5 cm

132. An  $\alpha$ -particle moves in a circular path of radius 0.83 cm in the presence of a magnetic field of  $0.25 \text{ Wb/m}^2$ . The de Broglie wavelength associated with the particle will be

- 1)  $1 \text{ \AA}$   
2)  $0.1 \text{ \AA}$   
3)  $10 \text{ \AA}$   
4)  $0.01 \text{ \AA}$

133. The binding energy per nucleon of  ${}^7_3\text{Li}$  and  ${}^4_2\text{He}$  nuclei are 5.60 MeV and 7.06 MeV respectively. In the nuclear reaction



The value of energy Q released is

- 1) 19.6 MeV  
2) -2.4 MeV  
3) 8.4 MeV  
4) 17.3 MeV

134. The half life of a radioactive nucleus is 50 days. The time interval  $(t_2 - t_1)$  between the time  $t_2$  when  $\frac{2}{3}$  of it has decayed and the time  $t_1$  when  $\frac{1}{3}$  of it had decayed is

- 1) 30 days                      2) 50 days  
3) 60 days                      4) 15 days

135. When 100 g of a liquid A at  $100^\circ\text{C}$  is added to 50g of a liquid B at temperature  $75^\circ\text{C}$ , the temperature of the mixture becomes  $90^\circ\text{C}$ . The temperature of the mixture, if 100 g of liquid A at  $100^\circ\text{C}$  is added to 50 g of liquid B at  $50^\circ\text{C}$ , will be

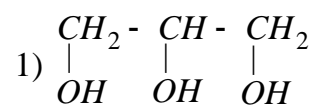
- 1)  $80^\circ\text{C}$                       2)  $60^\circ\text{C}$   
3)  $70^\circ\text{C}$                       4)  $85^\circ\text{C}$

### CHEMISTRY

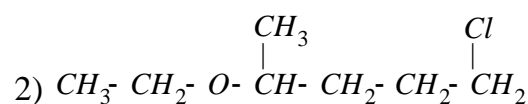
136. A first order reaction is half completed in 45 minutes. The time required for the completion of 99.9% of the reaction is

- 1) 5 hours                      2) 10 hours  
3) 20 hours                      4)  $7\frac{1}{2}$  hours

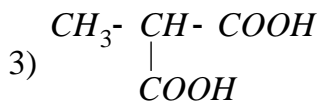
137. Correct IUPAC name of the following is



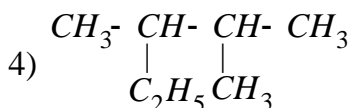
1,2,3-Trihydroxy propane



1-chloro-4 ethoxy pentane



2-carboxy propanoic acid



2-ethyl-3-methyl butane

138. The species having fractional bond order is/are

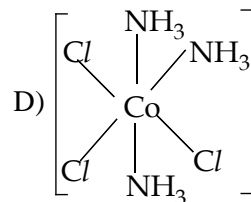
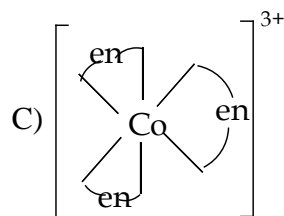
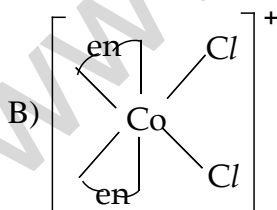
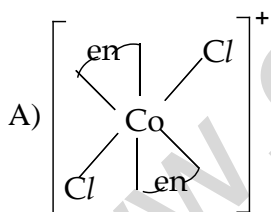
- P)  $O_2^+$                       Q)  $He_2^+$   
R)  $O_2^-$                         S)  $NO^+$

- 1) Only P  
2) P, Q and R  
3) Q, R and S  
4) P, Q, R, S

139. A metal 'M' crystallises in body centered cubic lattice with edge length  $4.29\text{Å}$ . The radius of the metal is

- 1)  $6.41\text{Å}$   
2)  $1.86\text{Å}$   
3)  $2.48\text{Å}$   
4)  $3.24\text{Å}$

140. Which of the following is optically active ?

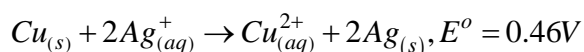


- 1) Only A                      2) Only B  
3) Both B and C            4) B, C and D

141. Molar conductivities at infinite dilution of  $\text{CH}_3\text{COONa}$ ,  $\text{HCl}$  and  $\text{NaCl}$  are 91.0, 425.9 and  $126.4 \text{ Scm}^2\text{mol}^{-1}$  respectively. The molar conductivity of  $\text{CH}_3\text{COOH}$  is

- 1)  $290.85 \text{ Scm}^2\text{mol}^{-1}$   
2)  $390.5 \text{ Scm}^2\text{mol}^{-1}$   
3)  $180.5 \text{ Scm}^2\text{mol}^{-1}$   
4)  $425.5 \text{ Scm}^2\text{mol}^{-1}$

142. The equilibrium constant of the reaction



at 298 K is

- 1)  $2.0 \times 10^{20}$               2)  $4.0 \times 10^{10}$   
3)  $4.0 \times 10^{15}$               4)  $2.0 \times 10^{10}$

143. Statement – I :  $\text{Be}(\text{OH})_2$  dissolves in excess  $\text{NaOH}$  solution

Statement – II :  $\text{Be}(\text{OH})_2$  is a basic compound

- 1) Both I and II are correct  
2) Both I and II are wrong  
3) I is correct and II is wrong  
4) I is wrong and II is correct

144. Paramagnetic complex of the following is

- 1)  $\text{Co}(\text{OX})_3$



- 2)  $\text{Co}(\text{NH}_3)_6^{3+}$   
 3)  $\text{Zn}(\text{NH}_3)_4^{2+}$   
 4)  $\text{Cr}(\text{NH}_3)_6^{3+}$

**145. Wrong statement of the following.**

- 1) Brown ring test for nitrates depends on the ability of  $\text{Fe}^{+2}$  to reduce nitrates to nitric oxide
- 2) White phosphorus dissolves in boiling NaOH solution in an inert atmosphere giving  $\text{PH}_3$
- 3) White phosphorus consists of discrete tetrahedral  $\text{P}_4$  molecules
- 4) Red phosphorus is soluble in water as well as in carbon disulphide

**146. Match the compounds given in column-I with the shape given in column-II and mark the correct option**

**Column - I**

- a)  $\text{XeF}_6$   
 b)  $\text{XeO}_3$   
 c)  $\text{XeOF}_4$   
 d)  $\text{XeF}_4$

**Column - II**

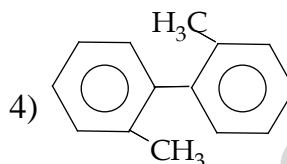
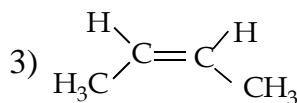
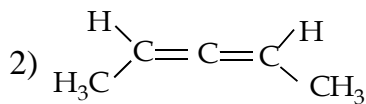
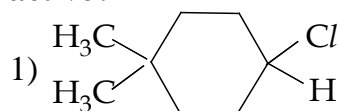
- i) Distorted octahedral  
 ii) Square planar  
 iii) Trigonal pyramidal  
 iv) Square pyramidal

	a	b	c	d
1)	i	iii	iv	ii
2)	i	ii	iv	iii
3)	iv	iii	i	ii
4)	iv	i	ii	iii

**147. Which one of the following set of monosaccharides form sucrose ?**

- 1)  $\beta$ -D-glucopyranose and  $\alpha$ -D-fructofuranose
- 2)  $\alpha$ -D-glucopyranose and  $\beta$ -D-fructopyranose
- 3)  $\alpha$ -D-galactopyranose and  $\alpha$ -D-glucopyranose
- 4)  $\alpha$ -D-glucopyranose and  $\beta$ -D-frucofuranose

**148. Which of the following is optically active?**



**149. 4.4g of  $\text{CO}_2$  and 2.24 l of  $\text{H}_2$  at STP are mixed in a container. The total number of molecules present in the container will be**

- 1)  $6.023 \times 10^{24}$
- 2)  $6.023 \times 10^{23}$
- 3)  $1.204 \times 10^{23}$
- 4)  $1.204 \times 10^{24}$

**150. Which of the following is incorrect match.**

- 1)  $\text{NO}_2$  – Brown coloured gas- paramagnetic
- 2)  $\text{N}_2\text{O}$  – coloured gas – Acidic oxide
- 3)  $\text{N}_2\text{O}_4$  – colourless – diamagnetic
- 4)  $\text{N}_2\text{O}_3$  – blue colour – Acidic oxide

**151. A monoprotic acid of 0.1 M solution has  $K_a = 1.0 \times 10^{-5}$ . The degree of dissociation of acid is**

- 1) 1.0%
- 2) 0.1 %
- 3) 99.9 %
- 4) 99%

**152. Order of basic strength of the following substances**

- I)  $\text{CH}_3 - \overset{\text{NH}}{\parallel} \text{C} - \text{NH}_2$
- II)  $\text{CH}_3 - \text{NH} - \text{CH}_3$
- III)  $\text{CH}_3 - \text{CH}_2 - \text{NH}_2$
- IV)  $\text{CH}_3 - \overset{\text{O}}{\parallel} \text{C} - \text{NH}_2$

- 1) I > II > III > IV

- 2) I > III > II > IV
- 3) IV > III > II > I
- 4) III > I > II > IV

153. There is no Sulphur-Sulphur bond in

- 1)  $S_2O_4^{2-}$
- 2)  $S_2O_5^{2-}$
- 3)  $S_2O_3^{2-}$
- 4)  $S_2O_7^{2-}$

154. 40 mL of 0.1 M ammonia solution is mixed with 20 mL of 0.1 M HCl. What is the pH of the mixture? ( $p^{kb} = 4.74$ )

- 1) 5.74
- 2) 9.26
- 3) 4.56
- 4) 7.06

155. Half life period of a first order reaction is 1386 seconds. The specific rate constant of the reaction is

- 1)  $5.0 \times 10^{-2} s^{-1}$
- 2)  $5.0 \times 10^{-3} s^{-1}$
- 3)  $0.5 \times 10^{-2} s^{-1}$
- 4)  $0.5 \times 10^{-3} s^{-1}$

156. Wilkinson's catalyst is

- 1)  $TiCl_4 + (C_2H_5)_3Al$
- 2)  $K_2PtCl_3(h^2 - C_2H_4)_2$
- 3)  $PtCl_2(NH_3)_2$
- 4)  $RhCl(PPh_3)_3$

157. n-propyl alcohol is mainly formed in

- (1)  $CH_3 - CH = CH_2 \xrightarrow[3/4]{H_2O^+} \text{①}$
- (2)  $CH_3 - CH = O \xrightarrow[3/4]{\begin{matrix} CH_3MgBr \\ H_3O^+ \end{matrix}} \text{②}$
- (3)  $CH_3 - CH = CH_2 \xrightarrow[2/4]{\begin{matrix} 1) BH_3, THF \\ 2) H_2O_2, OH^- \end{matrix}} \text{③}$
- (4)  $CH_3 - CO - CH_3 \xrightarrow[3/4]{\begin{matrix} CH_3MgBr \\ H_3O^+ \end{matrix}} \text{④}$

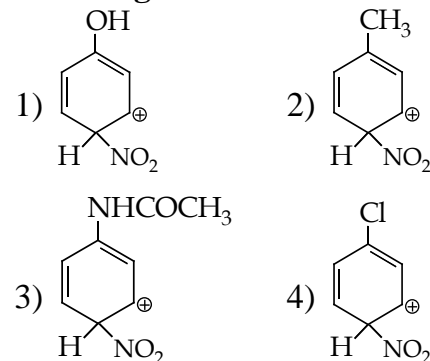
158. Antiseptics and disinfectants either kill or prevent growth of microorganism. Identify which of the following statements is not true.

- 1) Dilute solutions of boric acid and hydrogen peroxide are strong antiseptics
- 2) Disinfectants harm the living tissues
- 3) A 0.2% solution of phenol is an disinfectant
- 4) Chlorine and iodine are used as strong disinfectant

159. If the velocity of electron in first orbit of hydrogen atom is 'x'. Then the velocity of the electron in second orbit of  $He^+$  ion will be

- 1)  $\frac{x}{2}$
- 2)  $\frac{x}{4}$
- 3)  $2x$
- 4)  $x$

160. The most stable carbocation of the following is



161. Pair of species having same bond angles is

- 1)  $BF_3$  and  $PF_3$
- 2)  $SO_4^{2-}$  and  $PO_4^{3-}$
- 3)  $BeCl_2$  and  $SnCl_2$
- 4)  $NO_2^+$  and  $NO_2^-$

162. In electrophoresis the colloidal particles of  $As_2S_3$  sol

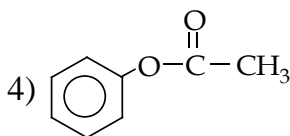
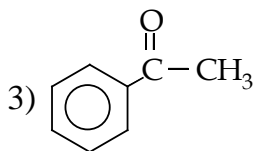
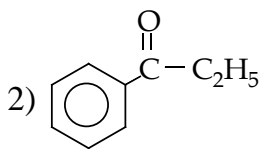
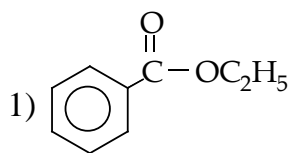
- 1) Move towards anode
- 2) Move towards cathode
- 3) Neither towards cathode nor towards anode
- 4) Both towards cathode and anode

163. Which one of the following is a chain growth polymer

- 1) Nucleic acid
- 2) Neoprene
- 3) Protein
- 4) Starch

164.  $CH_3 - CN \xrightarrow[3/4]{H_2O/H_3O^+} X \xrightarrow[3/4]{C_2H_5OH/H^+} Y$

The final product 'Y' can be



165. Hydrogen gas cannot be generated by which of the following reactions ?

- 1)  $Al + NaOH(aq)$  Ⓜ
- 2)  $Zn + HCl(dil)$  Ⓜ
- 3)  $Mg + NaOH(aq)$  Ⓜ
- 4)  $CaH_2 + H_2O$  Ⓜ

166. The heats of combustion of carbon and carbonmonoxide are  $-393.5$  and  $-283.5$   $\text{kJ}\cdot\text{mol}^{-1}$ , respectively. The heat of formation (in kJ) of carbon monoxide per mole is

- 1) 676
- 2) -676
- 3) -110
- 4) 110

167. The reagent that can distinguish benzaldehyde and propanaldehyde is

- 1)  $I_2 + NaOH$
- 2) Fehlings solution
- 3) Tollen's reagent
- 4) 2, 4 - DNP

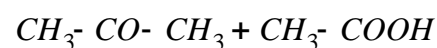
168. Which of the following ores is best concentrated by froth floatation method ?

- 1) Siderite
- 2) Galena
- 3) Malachite
- 4) Magnetite

169. Incorrect statement about dipole-dipole forces is

- 1) It is stronger than the London forces
- 2) It is stronger than ion - ion interaction
- 3) Its interaction energy  $\propto \frac{1}{r^3}$  (between stationary molecules)
- 4) Its interaction energy  $\propto \frac{1}{r^6}$  (between rotating molecules)

170.  $CH_3 - \overset{\overset{CH_3}{|}}{C} = CH - CH_3 \xrightarrow[X]{Y}$



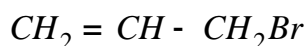
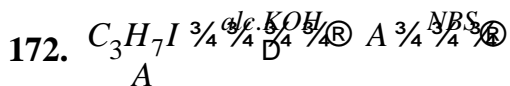
The reagent 'X' in the above reaction is

- 1)  $O_3 + H_2O / Zn$
- 2)  $MnO_4^- / OH^-$  (cold)
- 3)  $MnO_4^- / H^+$
- 4)  $HIO_4$

171. Statement-A: Tertiary butyl methyl ether is not obtained by reaction of tertiary butyl bromide and sodium methoxide.

**Statement-B: Tertiary butyl bromide undergoes elimination with sodium methoxide.**

- 1) A is true and R is false
- 2) A is false and B is true
- 3) Both A and B are false
- 4) Both A and B are true



**The compound 'A' can be**

- 1)  $CH_3-CH_2-CH_2-I$
- 2)  $CH_3-CHI-CH_3$
- 3)  $CH_2=CH-CH_2-I$
- 4) Either 1 or 2

173. A water sample has ppm level concentration of following anions

$F^- = 10; SO_4^{2-} = 100; NO_3^- = 50$

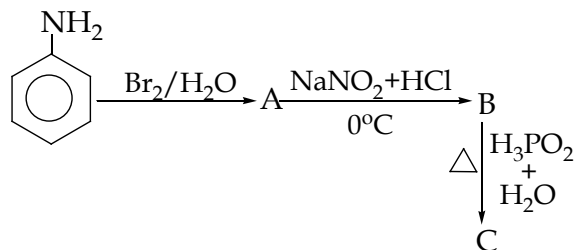
**The anion/anions that make/makes the water sample unsuitable for drinking is/are**

- 1) Only  $SO_4^{2-}$
- 2) Only  $NO_3^-$
- 3) Both  $SO_4^{2-}$  and  $NO_3^-$
- 4) Only  $F^-$

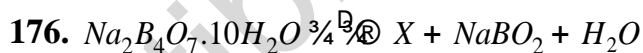
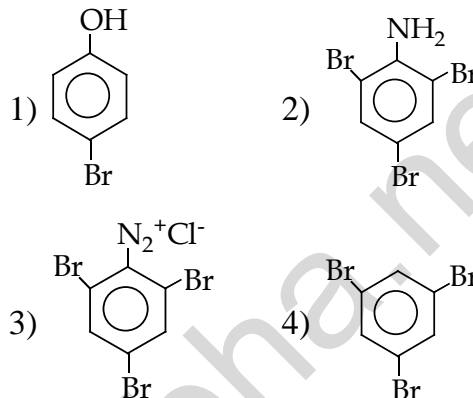
174.  $\Delta U$  is equal to

- 1) Isothermal work
- 2) Isochoric work
- 3) Isobaric work
- 4) Adiabatic work

175. Consider the following sequence of reactions



**The end product 'C' is**



**The compound 'X' is**

- 1)  $B_2O_3$
- 2)  $H_3BO_3$
- 3)  $B_2H_6$
- 4)  $BCl_3$

177. 1 gram of a carbonate ( $M_2CO_3$ ) on treatment with excess HCl produces 0.01186 mole of  $CO_2$ . The molar mass of  $M_2CO_3$  in  $g\ mol^{-1}$  is

- 1) 11.86
- 2) 1186
- 3) 84.3
- 4) 118.6

178. Correct statement of the following

- 1) Many copper (I) compounds are unstable in aqueous solution and undergo disproportionation
- 2) Cr (VI) is more stable than Mo (VI) and W (VI)
- 3) Among 3d series elements, Zn has the highest enthalpy of atomization
- 4) Interstitial compounds of transition metals are chemically more reactive

179. Which of the following is the energy of a possible excited state of hydrogen?

- 1) +13.6 eV      2) -6.8 eV  
3) -3.4 eV      4) +6.8 eV

180. An alkyl halide (X) reacts with alcoholic KOH and produces a hydrocarbon (C<sub>4</sub>H<sub>8</sub>) as major product. Ozonolysis of this hydrocarbon affords propanal and formaldehyde. Suggest

which organic compound among the following has the correct structure of the 'X'

- 1) CH<sub>3</sub>-CHBr-CH<sub>2</sub>-CH<sub>3</sub>  
2) CH<sub>3</sub>-CH<sub>2</sub>-CH<sub>2</sub>-CH<sub>2</sub>Br  
3) CH<sub>3</sub>-CHBr-CHBr-CH<sub>3</sub>  
4) Br-CH<sub>2</sub>-CH<sub>2</sub>-CH<sub>2</sub>-CH<sub>2</sub>-Br

ఈ మాదిరి ప్రశ్నాపత్రంను  
**శ్రీ చైతన్య విద్యాసంస్థల**  
అధ్యాపకులు తయారుచేసి, సరిచూసారు.

## KEY SHEET

### BIOLOGY

1) 4	2) 1	3) 3	4) 2	5) 2	6) 3	7) 1	8) 2	9) 1	10) 2
11) 4	12) 3	13) 3	14) 4	15) 1	16) 4	17) 2	18) 3	19) 1	20) 3
21) 4	22) 1	23) 2	24) 4	25) 2	26) 3	27) 4	28) 2	29) 3	30) 3
31) 2	32) 3	33) 1	34) 2	35) 1	36) 4	37) 4	38) 1	39) 2	40) 2
41) 2	42) 3	43) 1	44) 2	45) 2	46) 2	47) 4	48) 4	49) 4	50) 3
51) 1	52) 4	53) 2	54) 2	55) 1	56) 2	57) 2	58) 1	59) 3	60) 3
61) 1	62) 2	63) 1	64) 1	65) 2	66) 3	67) 1	68) 1	69) 2	70) 4
71) 4	72) 2	73) 4	74) 3	75) 4	76) 4	77) 2	78) 1	79) 3	80) 4
81) 2	82) 3	83) 2	84) 4	85) 2	86) 1	87) 4	88) 3	89) 3	90) 3

### PHYSICS

91) 4	92) 1	93) 1	94) 2	95) 3	96) 1	97) 3	98) 2	99) 2	100) 1
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101) 4	102) 3	103) 1	104) 3	105) 4	106) 1	107) 3	108) 1	109) 4	110) 3
111) 2	112) 4	113) 2	114) 3	115) 1	116) 2	117) 2	118) 4	119) 2	120) 4
121) 2	122) 2	123) 2	124) 1	125) 2	126) 4	127) 1	128) 1	129) 2	130) 4
131) 3	132) 4	133) 4	134) 2	135) 1					

### CHEMISTRY

136) 4	137) 2	138) 2	139) 2	140) 3	141) 2	142) 3	143) 3	144) 4	145) 4
146) 1	147) 4	148) 2	149) 3	150) 2	151) 1	152) 1	153) 4	154) 2	155) 4
156) 4	157) 3	158) 1	159) 4	160) 1	161) 2	162) 1	163) 2	164) 4	165) 3
166) 3	167) 2	168) 2	169) 2	170) 3	171) 4	172) 4	173) 4	174) 4	175) 4
176) 1	177) 3	178) 1	179) 3	180) 2					

### PHYSICS SOLUTIONS

91.  $y = 5[\sin(3\pi t) + \sqrt{3}\cos(3\pi t)]$   
 $= 10\sin\left(3\pi t + \frac{\pi}{3}\right)$

Amplitude = 10 cm

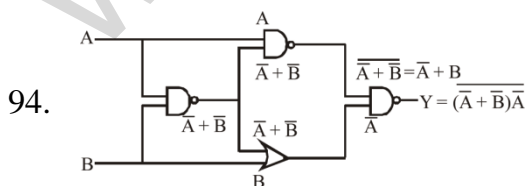
$$T = \frac{2\pi}{\omega} = \frac{2\pi}{3\pi} = \frac{2}{3} \text{ sec}$$

92. Barriers potential depends upon temperature, doping density and forward bias.

93.  $y = a \sin(\omega t + kx)$

$\Rightarrow$  wave is moving along -ve x-axis with speed

$$v = \frac{\omega}{K} \Rightarrow v = \frac{50}{2} = 25 \text{ m/sec}$$



$$Y = \overline{(\overline{A+B})\overline{A}}$$

$$= \overline{\overline{A+B}} = A(\overline{AB})$$

$$= A(A+\overline{B})$$

$$= A + A\overline{B} = A\overline{B}$$

95.  $R_1 = \frac{220^2}{25}$ ;  $R_2 = \frac{220^2}{100}$

$$i = \frac{220}{R_1 + R_2}$$

$$P_1 = i^2 R_1 \text{ and } P_2 = i^2 (R_2 = 4W)$$

$$P_1 = \frac{220^2}{\left(\frac{220^2}{25} + \frac{220^2}{100}\right)} \times \frac{220^2}{25}$$

$$= \frac{400}{25} = 16W \text{ and } P_2 = 4W$$

96.  $KE = q\Delta V$

$$r = \frac{\sqrt{2mq\Delta V}}{qB}$$

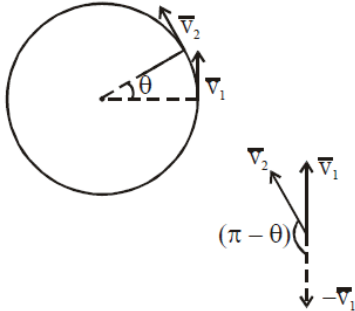
$$r\alpha \sqrt{\frac{m}{q}}$$

$$\frac{r_p}{r_\alpha} = \frac{1}{\sqrt{2}}$$

97. Since P-V indicator diagram is given, so work done by gas is area under the cyclic diagram.

$$\begin{aligned} \therefore \Delta W &= \text{Work done by gas} \\ &= \frac{1}{2} \times 2 \times 4 \times 5 \text{ J} = 10 \text{ J} \end{aligned}$$

98.



$$|\Delta \vec{v}| = \sqrt{v_1^2 + v_2^2 + 2v_1v_2 \cos(\pi - \theta)} = 2v \sin \frac{\theta}{2}$$

$$\begin{aligned} \therefore [|\vec{v}_1| &= |\vec{v}_2|] \\ &= (2 \times 10) \times \sin(30^\circ) = 10 \text{ m/s} \end{aligned}$$

99. Conceptual

100. Image disappears.

Because focal length of lens change

$$\frac{1}{f} = \left( \frac{\mu_g}{\mu_m} - 1 \right) \left( \frac{1}{R_1} - \frac{1}{R_2} \right)$$

101.  $i = e$

$$r_1 = r_2 = \frac{A}{2} = 30^\circ$$

By Snell's law

$$1 \times \sin i = \sqrt{3} \times \frac{1}{2} = \frac{\sqrt{3}}{2}$$

$$i = 60$$

102. Curie law for paramagnetic substance

$$\frac{x_1}{x_2} = \frac{T_{C_2}}{T_{C_1}}$$

$$\frac{2.8 \times 10^{-4}}{x_2} = \frac{300}{350}$$

$$x_2 = \frac{2.8 \times 350 \times 10^{-4}}{300} = 3.266 \times 10^{-4}$$

103.  $mv_0 = Mv_2 - mv_1$

$$\frac{1}{2}mv_1^2 = 0.36 \times \frac{1}{2}mv_0^2$$

$$v_1 = 0.6v_0$$

$$\frac{1}{2}MV_2^2 = 0.64 \times \frac{1}{2}mV_0^2$$

$$V_2 = \sqrt{\frac{m}{M}} \times 0.8V_0$$

$$mV_0 = \sqrt{mM} \times 0.8V_0 - m \times 0.6V_0$$

$$\Rightarrow 1.6m = 0.8\sqrt{mM}$$

$$4m^2 = mM$$

104.  $|B| = \frac{|E|}{C} = \frac{6.3}{3 \times 10^8} = 2.1 \times 10^{-8} \text{ T}$  and

$$\vec{E} \times \vec{B} = \vec{C}$$

$$\hat{j} \times \vec{B} = \hat{i}$$

$$\vec{B} = \hat{k}$$

$$\vec{B} = |B|\vec{B} = 2.1 \times 10^{-8} \hat{k} \text{ T}$$

105. Color code :

Red violet orange silver

$$R = 27 \times 10^3 \Omega \pm 10\% = 27 \text{ K}\Omega \pm 10\%$$

106.  $Q = nC_v \Delta T$  as gas in closed vessel

$$Q = \frac{15}{28} \times \frac{5 \times R}{2} \times (4T - T)$$

$$Q = 10000 \text{ J} = 10 \text{ kJ}$$

107. Potential energy ( $U$ ) =  $\frac{1}{2}kx^2$

$$\text{Kinetic energy (K)} = \frac{1}{2}kA^2 - \frac{1}{2}kx^2$$

According to the question,  $U = K$

$$\therefore \frac{1}{2}kx^2 = \frac{1}{2}kA^2 - \frac{1}{2}kx^2$$

$$x = \pm \frac{A}{\sqrt{2}}$$

108. Work done by gravity from initial to final position is,

$$W = mg \frac{l}{2} \sin 30^\circ = \frac{mgl}{4}$$

According to work energy theorem

$$W = \frac{1}{2}I\omega^2$$

109.  $F = \frac{GM^2}{R^2} \Rightarrow G = [M^{-1}L^3T^{-2}]$

$$E = hv \Rightarrow h = [ML^2T^{-1}]$$

$$C = [LT^{-1}]$$

$$t \propto G^x h^y C^z$$

$$[M^0 L^0 T^1] = [M^{-x} +^y L^{3x+2y} +^z T^{-2x-y-z}]$$

On comparing the powers of M, L, T  
 $-x + y = 0 \Rightarrow x = y$

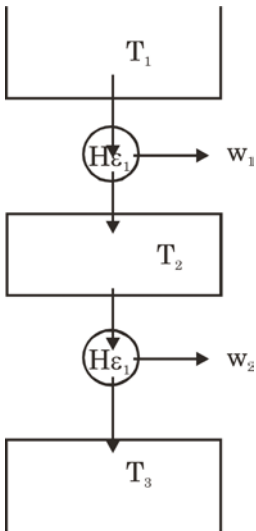
$$3x + 2y + z = 0 \Rightarrow 5x + z = 0 \quad \dots\dots (i)$$

$$-2x - y - z = 1 \Rightarrow 3x + z = -1 \quad \dots\dots (ii)$$

On solving (i) & (ii)  $x = y = \frac{1}{2}, z = -\frac{5}{2}$

$$t \propto \sqrt{\frac{Gh}{C^5}}$$

110.



$$w_1 = w_2$$

$$\Delta u_1 = \Delta u_2$$

$$T_3 - T_2 = T_2 - T_1$$

$$2T_2 = T_1 + T_3$$

Temperature,  $T_2 = 500K$

111.  $x = 3t^2 + 5$

$$v = \frac{dx}{dt}$$

$$v = 6t + 0$$

At  $t = 0$   $v = 0$

$T = 5$  sec  $v = 30$  m/s

$$W.D = \Delta KE$$

$$W.D = \frac{1}{2}mv^2 - 0 = \frac{1}{2}(2)(30)^2 = 900J$$

112.  $\eta = \frac{P_{out}}{P_{in}} = \frac{V_s I_s}{V_p I_p}$

$$\Rightarrow 0.9 = \frac{23 \times I_s}{230 \times 5}$$

$$\Rightarrow I_s = 45A$$

113.  $LC = \frac{\text{Pitch}}{\text{No. of division}}$

$$LC = 0.5 \times 10^{-2} \text{ mm}$$

$$+ve \text{ error} = 3 \times 0.5 \times 10^{-2} \text{ mm}$$

$$= 1.5 \times 10^{-2} \text{ mm} = 0.015 \text{ mm}$$

$$\text{Reading} = \text{MSR} + \text{CSR} - (+ve \text{ error})$$

$$= 5.5 \text{ mm} + (48 \times 0.5 \times 10^{-2}) - 0.015$$

$$= 5.5 + 0.24 - 0.015 = 5.725 \text{ mm}$$

114. at  $t = 0, A_0 = \frac{dN}{dt} = 1600 \text{ C/s}$

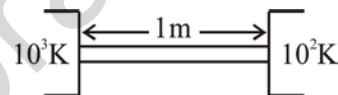
at  $t = 8\text{s}, A = 100 \text{ C/s}$

$$\frac{A}{A_0} = \frac{1}{16} \text{ in } 8 \text{ sec}$$

Therefore, half life in  $t_{1/2} = 2$  sec

$$\text{Activity at } t=6 \text{ will be } 1600 \left(\frac{1}{2}\right)^3 = 200 \text{ C/s}$$

115.



$$\left(\frac{dQ}{dt}\right) = \frac{kA\Delta T}{l}$$

$$\Rightarrow \frac{1}{A} \left(\frac{dQ}{dt}\right) = \frac{(0.1)(900)}{1} = 90 \text{ W/m}^2$$

116. Velocity of wave on string

$$V = \sqrt{\frac{T}{\mu}} = \sqrt{\frac{8}{5}} \times 1000 = 40 \text{ m/s}$$

Now, wavelength of wave  $\lambda = \frac{v}{n} = \frac{40}{100} \text{ m}$

Separation b/w successive nodes,

$$\frac{\lambda}{2} = \frac{20}{100} \text{ m}$$

117.  $f_{app} = f_0 \left[ \frac{v_2 \pm v_0}{v_2 \mp v_s} \right]$

$$f_1 = f_0 \left[ \frac{340}{340 - 34} \right]$$

$$f_2 = f_0 \left[ \frac{340}{340 - 17} \right]$$

$$\frac{f_1}{f_2} = \frac{340 - 17}{340 - 34} = \frac{323}{306} \Rightarrow \frac{f_1}{f_2} = \frac{19}{18}$$

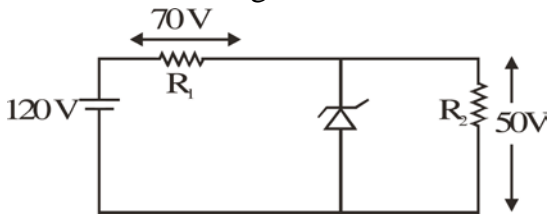


118. Assuming zener diode doesnot undergo breakdown, current in circuit

$$= \frac{120}{15000} = 8mA$$

Voltage drop across diode = 80 V > 50V.

The diode undergo breakdown.



Current is  $R_1 = \frac{70}{5000} = 14mA$

Current is  $R_2 = \frac{50}{10000} = 5mA$

Hence, current through diode = 9mA

119. Let h be height of the tower and t is the time taken by the body to reach the ground.

Here, u = 0, a = g

$$\therefore h = ut + \frac{1}{2}gt^2 \text{ or } h = 0 \times t + \frac{1}{2}gt^2$$

$$\text{or } h = \frac{1}{2}gt^2 \quad \dots\dots\dots (i)$$

Distance covered in last two seconds is

$$40 = \frac{1}{2}gt^2 - \frac{1}{2}g(t-2)^2 \text{ (Here, } u = 0)$$

$$\text{or } 40 = \frac{1}{2}gt^2 - \frac{1}{2}g(t^2 + 4 - 4t)$$

$$\text{or } 40 = (2t - 2)g \text{ or } t = 3 \text{ s}$$

Form eqn (i), we get

$$h = \frac{1}{2} \times 10 \times (3)^2 \text{ or } h = 45 \text{ m}$$

120. Position vector of the particle

$$(r) = (a \cos \omega t)\hat{i} + (a \sin \omega t)\hat{j} \text{ velocity vector}$$

$$\vec{v} = \frac{d\vec{r}}{dt} = (-a\omega \sin \omega t)\hat{i} + (a\omega \cos \omega t)\hat{j}$$

$$= \omega [(-a \sin \omega t)\hat{i} + (a \cos \omega t)\hat{j}]$$

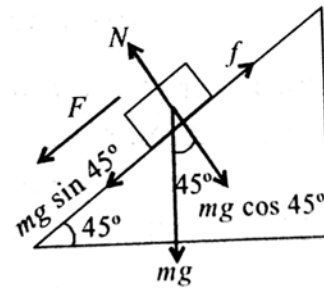
$$\vec{v} \cdot \vec{r} = \omega [(-a \sin \omega t)\hat{i} + (a \cos \omega t)\hat{j}] \cdot$$

$$[(a \cos \omega t)\hat{i} + (a \sin \omega t)\hat{j}]$$

$$= \omega [-a^2 \sin \omega t \cos \omega t + a^2 \cos \omega t \sin \omega t] = 0$$

Therefore velocity vector is perpendicular to the displacement vector.

121. The various forces acting on the body have been shown in the figure. The force on the body down the inclined plane in presence of friction  $\mu$  is



$$F = mg \sin \theta - f = mg \sin \theta - \mu N = ma$$

$$\text{or } a = g \sin \theta - \mu g \cos \theta.$$

Since block is at rest thus initial velocity u = 0

Therefore, time taken to slide down the plane

$$t_1 = \sqrt{\frac{2s}{a}} = \sqrt{\frac{2s}{g \sin \theta - \mu g \cos \theta}}$$

In absence of friction time taken will be

$$t_2 = \sqrt{\frac{2s}{g \sin \theta}}$$

$$\text{Given : } t_1 = 2t_2$$

$$122. t_1^2 = 4t_2^2 \text{ or } \frac{2s}{g(\sin \theta - \mu \cos \theta)} = \frac{2s \times 4}{g(\sin \theta)}$$

$$\text{or } \sin \theta = 4 \sin \theta - 4\mu \cos \theta \text{ or}$$

$$\mu = \frac{3}{4} \tan \theta = 0.75$$

$$123. \text{ As } V = AI \quad \dots\dots\dots (i)$$

Where A is the area of cross-section of the wire.

$$\text{Young's modulus, } Y = \frac{(F/A)}{(\Delta l/l)} = \frac{Fl}{A\Delta l}$$

$$\Delta l = \frac{Fl}{YA} = \frac{Fl^2}{YV} \quad \text{(Using (i))}$$

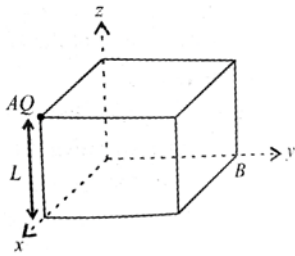
$$\Delta l \propto l^2$$

Hence, the graph between  $\Delta l$  and  $l^2$  is a straight line.

$$124. PV = nRT$$

$$PV = \frac{5}{32} RT$$

125.



As at a corner, 8 cubes can be placed symmetrically, flux linked with each cube (due to charge  $Q$  at the corner) will be  $\frac{Q}{8\epsilon_0}$ .

Now for the faces passing through the edge A, electric field  $E$  at a face will be parallel to area of face and so flux for these faces will be zero. Now as the cube has six faces and flux linked with three faces (through A) is zero, so flux linked with remaining three faces will be  $\frac{Q}{8\epsilon_0}$ .

Hence, electric flux passed through all the six faces of the cube is  $\frac{Q}{8\epsilon_0}$ .

126. Force acting on a charged particle moving with velocity  $\vec{v}$  is subjected to magnetic field  $\vec{B}$  is given by

$$\vec{F} = q(\vec{v} \times \vec{B}) \text{ or, } F = qvB \sin \theta$$

(i) When  $\theta = 0^\circ$ ,  $F = qvB \sin 0^\circ = 0$

(ii) When  $\theta = 90^\circ$ ,  $F = qvB \sin 90^\circ = qvB$

(iii) When  $\theta = 180^\circ$ ,  $F = qvB \sin 180^\circ = 0$

This implies force acting on a charged particle is non-zero, when angle between  $\vec{v}$  and  $\vec{B}$  can have any value other than zero and  $180^\circ$ .

127. Here, Resistance of galvanometer,

$$G = 100\Omega$$

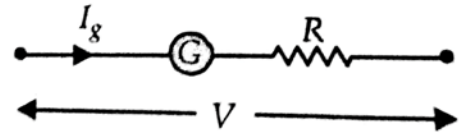
Current for full scale deflection,

$$I_g = 30mA$$

$$= 30 \times 10^{-3} A$$

Range of voltmeter,  $V = 30 V$

To convert the galvanometer into an voltmeter of a given range, a resistance  $R$  is connected in series with it as shown in the figure.



From figure,

$$V = I_g (G + R)$$

$$\text{or } R = \frac{V}{I_g} - G = \frac{30}{30 \times 10^{-3}} - 100\Omega = 900\Omega$$

128. Attractions and repulsions of substances in a magnetic field.

129. For resonance condition, the impedance will be minimum and the current be maximum. This is only possible when  $X_L = X_C$

$$\text{Therefore } \tan \theta = \frac{X_L + X_C}{R} = 0 \text{ or } \theta = 0$$

130. Let  $n_1$  bright fringe of  $\lambda_1$  coincides with  $n_2$  bright fringe of  $\lambda_2$ . Then

$$\frac{n_1 \lambda_1 D}{d} = \frac{n_2 \lambda_2 D}{d} \text{ or } n_1 \lambda_1 = n_2 \lambda_2$$

$$\frac{n_1}{n_2} = \frac{\lambda_2}{\lambda_1} = \frac{10000}{12000} = \frac{5}{6}$$

Let  $x$  be given distance

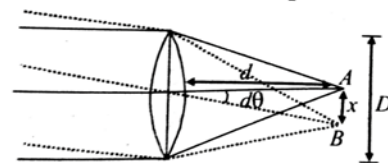
$$x = \frac{n_1 \lambda_1 D}{d}$$

Here,  $n_1 = 5, D = 2m, d = 2mm = 2 \times 10^{-3} m$

$$\lambda_1 = 12000 \text{ \AA} = 12000 \times 10^{-10} m = 12 \times 10^{-7} m$$

$$x = \frac{5 \times 12 \times 10^{-7} m \times 2m}{2 \times 10^{-3} m} = 6 \times 10^{-3} m = 6mm$$

131. Resolution of telescope



$$\Delta \theta = 1.22 \frac{\lambda}{D} = 1.22 \times \frac{5000 \times 10^{-8}}{10} (\tan \theta \approx \Delta \theta)$$

$$x = \Delta\theta \times d = \frac{1.22 \times 5000 \times 10^{-8} \times 10^5}{10} [d = 10^5 \text{ cm}]$$

□ 5 mm

132. Radius of the circular path of a charged particle in a magnetic field is given by

$$R = \frac{mv}{Bq} \text{ or } mv = RBq$$

$$\text{Here, } R = 0.83 \text{ cm} = 0.83 \times 10^{-2} \text{ m}$$

$$B = 0.25 \text{ Wbm}^2$$

$$q = 2e = 2 \times 1.6 \times 10^{-19} \text{ C}$$

$$mv = (0.83 \times 10^{-2})(0.25)(2 \times 1.6 \times 10^{-19})$$

De Broglie wavelength,

$$\lambda = \frac{h}{mv} = \frac{6.6 \times 10^{-34}}{0.83 \times 10^{-2} \times 0.25 \times 2 \times 1.6 \times 10^{-19}} = 0.01 \text{ \AA}$$

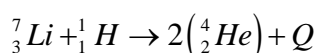
133. Binding energy of  ${}^7_3\text{Li}$  nucleus

$$= 7 \times 5.60 \text{ MeV} = 39.2 \text{ MeV}$$

Binding energy of  ${}^4_2\text{He}$  nucleus

$$= 4 \times 7.06 \text{ MeV} = 28.24 \text{ MeV}$$

The reaction is



$$t_2 - t_1 = \frac{\ln 2}{\lambda} = \frac{\ln 2}{\left(\frac{\ln 2}{T_{1/2}}\right)} \left(\because \lambda = \frac{\ln 2}{T_{1/2}}\right)$$

$$= T_{1/2} = 50 \text{ days}$$

135.  $100 \times S_A \times [100 - 90] = 50 \times S_B \times (90 - 75)$

$$2S_A = 1.5 S_B$$

$$S_A = \frac{3}{4} S_B$$

Now,

$$100 \times S_A \times [100 - \theta] = 50 \times S_B (\theta - 50)$$

$$2 \times \left(\frac{3}{4}\right) (100 - \theta) = (\theta - 50)$$

$$300 - 3\theta = 2\theta - 100$$

$$400 = 5\theta$$

$$\text{Therefore } \theta = 80$$

### CHEMISTRY SOLUTIONS

136. Time required for completion of 99.9% of first order reaction = 10 half lives  
=  $10 \times 45 \text{ min} = 450 \text{ min}$

Therefore,  $Q = 2(\text{BE of } {}^4_2\text{He}) - (\text{BE of } {}^7_3\text{Li})$

$$= 2 \times 28.24 \text{ MeV} - 39.2 \text{ MeV} = 17.28 \text{ MeV}$$

134. According to radioactive decay law

$$N = N_0 e^{-\lambda t}$$

Where  $N_0$  = Number of radioactive nuclei at time  $t = 0$

$N$  = Number of radioactive nuclei left undecayed at any time  $t$

$\lambda$  = decay constant

At time  $t_2$ ,  $\frac{2}{3}$  of the sample had decayed

Therefore,  $N = \frac{1}{3} N_0$

$$\frac{2}{3} N_0 = N_0 e^{-\lambda t_1}$$

Divide (i) by (ii), we get  $\frac{1}{2} = \frac{e^{-\lambda t_2}}{e^{-\lambda t_1}}$

$$\frac{1}{2} = e^{-\lambda(t_2 - t_1)}$$

$$\lambda(t_2 - t_1) = \ln 2$$

137. Rules of IUPAC nomenclature

138. Molecular orbital theory

$\text{NO}^+$  has triple bond.

In all others, bond order is fractional.

139. If 'a' is edge length in BCC.

$$\text{Atomic radius} = \frac{\sqrt{3}}{4} a$$

$$= 0.433 \times 4.29 = 1.86 \text{ \AA}$$

140. B and C has symmetry elements absent.

141. Molar conductivity of  $\text{CH}_3\text{COOH}$  =

Molar conductivity

[of  $\text{CH}_3\text{COONa}$  + of  $\text{HCl}$  - of  $\text{NaCl}$ ]

$$= 91.0 + 425.9 - 126.4 = 390.5$$

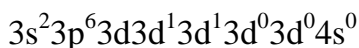
142.  $\log K = E_{\text{cell}}^0 \times \frac{n}{0.0591}$

$$= 0.46 \times \frac{2}{0.0591} = \frac{0.92}{0.0591} = 15.6$$

Equilibrium constant is in the order of  $10^{15}$ .

143.  $\text{Be}(\text{OH})_2$  is amphoteric substance.

144.  $\text{Cr}^{3+}$  has the configuration



It has 3 unpaired electrons and paramagnetic.

145. Red phosphorus is water insoluble.

146.  $\text{XeF}_4$  is planar

$\text{XeO}_3$  is trigonal pyramidal

$\text{XeF}_4$  is square pyramidal

$\text{XeF}_6$  is distorted octahedral

147.  $\alpha$ -D-glucose and  $\beta$ -D-fructose

148. Concepts of molecular symmetry

149.  $4.4 \text{ g CO}_2 = \frac{4.4}{44} = 0.1 \text{ mole}$

$$2.24 \text{ L H}_2 = \frac{2.24}{22.4} = 0.1 \text{ mole}$$

Total number of moles of gases

$$= 0.1 + 0.1 = 0.2$$

Total number of molecules

$$= 0.2 \times 6.02 \times 10^{23} \\ = 1.204 \times 10^{23}$$

150.  $\text{N}_2\text{O}$  is neutral

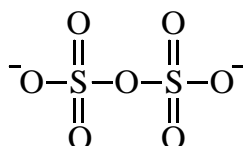
151. Percentage dissociation =  $\sqrt{\frac{K_a}{C}} \times 100$

$$= \sqrt{\frac{10^{-5}}{10^{-1}}} \times 100 = 10^{-2} \times 10^2 = 1$$

152. Amide is less basic than amine.

$2^0$  amine is more basic than  $1^0$  amine.

153. Structure of  $\text{S}_2\text{O}_7^{2-}$  is given as



Therefore, there is no direct sulphur – sulphur bond observed in the structure of the oxyanion.

154.  $[\text{salt}] = [\text{base}]$

Therefore,  $\text{pOH} = \text{pK}_b = 4.74$

$$\text{pH} = 14 - \text{pOH}$$

$$= 14 - 4.74 = 9.26$$

155. For first order reaction, rate constant K

$$K = \frac{0.693}{\text{half-life}} = \frac{0.693}{1386}$$

$$= \frac{693}{1380} \times 10^{-3} = \frac{1}{2} \times 10^{-3} = 5 \times 10^{-4} \text{ s}^{-1}$$

156. Composition of Wilkinson's catalyst.

157. Peroxide effect.

158.  $\text{H}_3\text{BO}_3$  in dilute solutions is antiseptic.

$\text{H}_2\text{O}_2$  dilute solutions is also antiseptic.

159. Velocity  $\propto \frac{Z}{n}$

Z is the atomic number

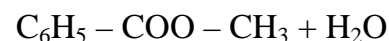
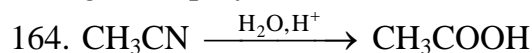
n is the principal quantum number

160. Stabilisation of positive charge on a ring.

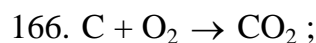
161. Both  $\text{SO}_4^{2-}$  and  $\text{PO}_4^{3-}$  are tetrahedral.

162.  $\text{As}_2\text{S}_3$  sol is an example of negative sol.

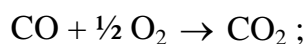
163. Synthetic rubber is example of chain growth polymer.



165. Magnesium does not react with alkali.

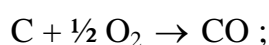


$$\Delta H = -393.5 \text{ kJ} \dots (1)$$



$$\Delta H = -283.5 \text{ kJ} \dots (2)$$

Eq. (1) – Eq. (2), gives

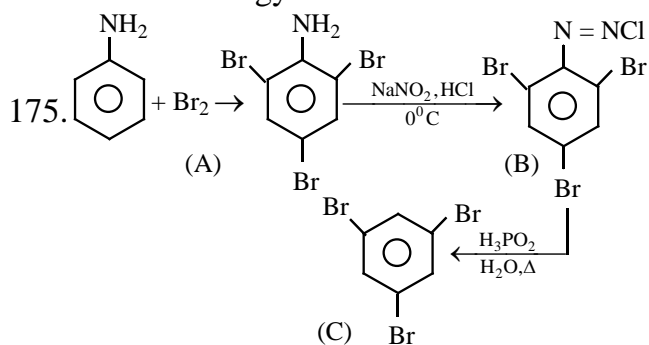


$$\Delta H = -393.5 + 283.5 = -110 \text{ kJ}$$

167. R – CHO can reduce Fehling's solution, if R- is alkyl. If R- is aryl, no reaction

168. Sulphide ores are generally concentrated by froth floatation method.

169. Dipole-dipole forces are weaker than ion-ion forces.
170. Oxidation with acidified permanganate for bond cleavage.
171. Elimination from tertiary alcohols.  
(instead of ether formation with NaOR)
172. Compound 'A' may be n-propyliodide or iso-propyliodide.
173. Excess fluoride in drinking water causes fluorosis.
174. Adiabatic work denotes change in internal energy.



176.  $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O} \xrightarrow{\Delta} 2\text{NaBO}_2 + \text{B}_2\text{O}_3 + 10\text{H}_2\text{O}$
177.  $\text{M}_2\text{CO}_3 \xrightarrow{\text{HCl}} \text{M}_2\text{O} + \text{CO}_2$
- 0.01186 mole  $\text{M}_2\text{CO}_3 = 1$  gram
- 1 mole  $\text{M}_2\text{O}_3 = \frac{1}{0.01186} = 84.3$
178.  $2\text{Cu}^+ \rightarrow \text{Cu} + \text{Cu}^{2+}$
179. -13.6 eV in ground state  
-3.4 eV in first excited state
180.  $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-CH}_2\text{Br} \xrightarrow{\text{alc. KOH}} \text{CH}_3\text{-CH}_2\text{-CH}=\text{CH}_2$

