

DR ACADEMY

DO RIGHT FOR GENUINE EDUCATION

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NEET EXAMINATION – 2020 (CODE - E5)

DATE :- 13-09-2020

TIME : 02.00 PM TO 05.00 PM

1. Flippers of Penguins and Dolphins are examples of
- 1) Adaptive radiation
 - 2) Convergent evolution
 - 3) Industrial melanism
 - 4) Natural selection

Ans. 2

2. Name the plant growth regulator which upon spraying on sugarcane crop, increases the length of stem, thus increasing the yield of sugarcane crop

- 1) Cytokinin
- 2) Gibberellin
- 3) Ethylene
- 4) Abscisic acid

Ans. 2

3. Secondary metabolites such as nicotine, strychnine and caffeine are produced by plants for their

- 1) Nutritive value
- 2) Growth response
- 3) Defence action
- 4) Effect on reproduction

Ans. 3

4. The body of the ovule is fused within the funicle at

- 1) Hilum
- 2) Micropyle
- 3) Nucellus
- 4) Chalaza

Ans. 1

5. Match the following columns and select the correct option.

Column-I	Column-II
a) Clostridium butylicum	i) Cyclosporin-A
b) Trichoderma polysporum	ii) Butyric Acid
c) Monascus purpureus	iii) Citric Acid
d) Aspergillus niger	iv) Blood cholesterol lowering agent

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

Ans. 2

6. The processes responsible for facilitating loss of water in liquid form from the tip of grass blades at night and early morning is

- 1) Transpiration
- 2) Root pressure
- 3) Imbibition
- 4) Plasmolysis

Ans. 2

7. Which of the following is not an inhibitory substance governing seed dormancy ?

- 1) Gibberellic acid
- 2) Abscisic acid
- 3) Phenolic acid
- 4) Para-ascorbic acid

Ans. 1

8. Identify the incorrect statement.
- 1) Heart wood does not conduct water but gives mechanical support
 - 2) Sapwood is involved in conduction of water and minerals from root to leaf.
 - 3) Sapwood is the innermost secondary xylem and is lighter in colour
 - 4) Due to deposition of tannins, resins, oils etc., heart wood is dark in colour.

Ans. 3

9. Choose the correct pair from the following
- 1) Ligases – Join the two DNA molecules
 - 2) Polymerases – Break the DNA into fragments
 - 3) Nucleases – Separate the two strands of DNA
 - 4) Exonucleases – Make cuts at specific positions within DNA

Ans. 1

10. By which method was a new breed 'Hisardale' of sheep formed by using Bikaneri ewes and Marino rams ?
- 1) Out crossing
 - 2) Mutational breeding
 - 3) Cross breeding
 - 4) Inbreeding

Ans. 3

11. Dissolution of the synaptonemal complex occurs during
- 1) Pachytene
 - 2) Zygotene
 - 3) Diplotene
 - 4) Leptotene

Ans. 3

12. Match the following diseases with the causative organism and select the correct option

Column-I	Column-II
a) Typhoid	i) Wuchereria
b) Pneumonia	ii) Plasmodium
c) Filariasis	iii) Salmonella
d) Malaria	iv) Hoemophilus

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

Ans. 2

13. According to Robert May, the global species diversity is about
- 1) 1.5 million
 - 2) 20 million
 - 3) 50 million
 - 4) 7 million

Ans. 4

14. In light reaction, plastoquinone facilitates the transfer of electrons from
- 1) PS-II to Cytb₆f complex
 - 2) Cytb₆f complex to PS-I
 - 3) PS-I to NADP⁺
 - 4) PS-I to ATP synthase

Ans. 1

15. Match the following columns and select the correct option

Column-I	Column-II
a) Pituitary gland	i) Grave's disease
b) Thyroid gland	ii) Diabetes mellitus
c) Adrenal gland	iii) Diabetes insipidus
d) Pancreas	iv) Addison's disease

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

Ans. 3

16. Which of the following statements are true for the phylum-Chordata ?
- a) In Urochordata notochord extends from head to tail and it is present throughout their life
 - b) In Vertebrata notochord is present during the embryonic period only
 - c) Central nervous system is dorsal and hollow
 - d) Chordata is divided into 3 subphyla : Hemichordata, Tunicats and Cephalochordata
- 1) d and c
 - 2) c and a
 - 3) a and b
 - 4) b and c

Ans. 4

17. Select the option including all sexually transmitted diseases
- 1) Gonorrhoea, Syphilis, Genital herpes
 - 2) Gonorrhoea, Malaria, Genital herpes
 - 3) AIDS, Malaria, Filaria
 - 4) Cancer, AIDS, Syphilis

Ans. 1

18. Match the following columns and select the correct option

Column-I	Column-II
a) Organ of Corti	i) Connects middle ear and pharynx
b) Cochlea	ii) Coiled part of the labyrinth
c) Eustachian tube	iii) Attached to the oval window
d) Stapes	iv) Located on the basilar membrane

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

Ans. 3

19. Cuboidal epithelium with brush border of microvilli is found in

- 1) lining of intestine
- 2) ducts of salivary glands
- 3) proximal convoluted tubule of nephron
- 4) Eustachian tube

Ans. 3

20. Identify the wrong statement with reference to transport of oxygen

- 1) Binding of oxygen with haemoglobin is mainly related to partial pressure of O_2
- 2) Partial pressure of CO_2 can interfere with O_2 binding with haemoglobin
- 3) Higher H^+ conc. in alveoli favours the formation of oxyhaemoglobin
- 4) Low pCO_2 in alveoli favours the formation of oxyhaemoglobin

Ans. 3

21. Goblet cells of alimentary canal are modified from

- 1) Squamous epithelial cells
- 2) Columnar epithelial cells
- 3) Chondrocytes
- 4) Compound epithelial cells

Ans. 2

22. Identify the wrong statement with regard to Restriction Enzymes

- 1) Each restriction enzyme functions by inspecting the length of a DNA sequence
- 2) They cut the strand of DNA at palindromic sites
- 3) They are useful in genetic engineering
- 4) Sticky ends can be joined by using DNA ligase

Ans. 4

23. Experimental verification of the chromosomal theory of inheritance was done by

- 1) Mendel
- 2) Sutton
- 3) Boveri
- 4) Morgan

Ans. 4

24. Identify the correct statement with reference to human digestive system

- 1) Ileum opens into small intestine
- 2) Serosa is the innermost layer of the alimentary canal
- 3) Ileum is a highly coiled part
- 4) Vermiform appendix arises from duodenum

Ans. 3

25. Identify the wrong statement with reference to the gene 'I' that controls ABO blood groups

- 1) The gene (I) has three alleles
- 2) A person will have only two of the three alleles
- 3) When I^A and I^B are present together, they express same type of sugar
- 4) Allele 'I' does not produce any sugar

Ans. 3

26. Match the following columns and select the correct option

Column-I	Column-II
a) Floating Ribs	i) Located between second and seventh ribs
b) Acromion	ii) Head of the Humerus
c) Scapula	iii) Clavicle
d) Glenoid cavity	iv) Do not connect with the sternum

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

Ans. 4

27. The products(s) of reaction catalysed by nitrogenase in root nodules of leguminous plants is/are
- 1) Ammonia alone
 - 2) Nitrate alone
 - 3) Ammonia and oxygen
 - 4) Ammonia and hydrogen

Ans. 4

28. Match the following columns and select the correct option

Column-I	Column-II
a) Gregarious, polyphagous pest	i) Asterias
b) Adult with radial symmetry and larva with bilateral symmetry	ii) Scorpion
c) Book lungs	iii) Ctenoplana
d) Bioluminescence	iv) Locusta

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

Ans. 2

29. Snow-blindness in Antarctic region is due to
- 1) Freezing of fluids in the eye by low temperature
 - 2) Inflammation of cornea due to high doses of UV-B radiation
 - 3) High reflection of light from snow
 - 4) Damage to retina caused by infra-red rays

Ans. 2

30. In relation to Gross primary productivity and Net primary productivity of an ecosystem, which one of the following statements is correct ?

- 1) Gross primary productivity is always less than net primary productivity
- 2) Gross primary productivity is always more than net primary productivity
- 3) Gross primary productivity and Net primary productivity are one and same
- 4) There is no relationship between Gross primary productivity and Net primary productivity

Ans. 2

31. Select the correct statement
- 1) Glucocorticoids stimulate gluconeogenesis
 - 2) Glucagon is associated with hypoerglycemia
 - 3) Insulin acts on pancreatic cells and adipocytes
 - 4) Insulin is associated with hyperglycemia

Ans. 1

32. Select the correct events that occur during inspiration
- a) Contraction of diaphragm
 - b) Contraction of external inter-costal muscles
 - c) Pulmonary volume decreases
 - d) Intra pulmonary pressure increases
- 1) a and b
 - 2) c and d
 - 3) a, b and d
 - 4) only d

Ans. 1

33. Match the following concerning essential elements and their functions in plants :

a) Iron	i) Photolysis of water
b) Zinc	ii) Pollen germination
c) Boron	iii) Required for chlorophyll biosynthesis
d) Manganese	iv) IAA biosynthesis

Select the correct option

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

Ans. 3

34. In which of the following techniques, the embryos are transferred to assist those females who cannot conceive ?
- 1) ZIFT and IUT
 - 2) GIFT and ZIFT
 - 3) ICSI and ZIFT
 - 4) GIFT and ICSI

Ans. 1

35. The infectious stage of Plasmodium that enters the human body is
- 1) Trophozoites
 - 2) Sporozoites
 - 3) Female gametocytes
 - 4) Male gametocytes

Ans. 2

36. Which of the following hormone levels will cause release of ovum (ovulation) from the graffian follicle ?
- 1) High concentration of Estrogen
 - 2) High concentration of Progesterone
 - 3) Low concentration of LG
 - 4) Low concentration of FSH

Ans. 2

37. Presence of which of the following conditions in urine are indicative of Diabetes Mellitus ?
- 1) Uremia and Ketonuria
 - 2) Uremia and Renal Calculi
 - 3) Ketonuria and Glycosuria
 - 4) Renal calculi and Hyperglycaemia

Ans. 3

38. Name the enzyme that facilitates opening of DNA helix during transcription
- 1) DNA ligase
 - 2) DNA helicase
 - 3) DNA polymerase
 - 4) RNA polymerase

Ans. 4

39. Match the trophic levels with their correct species examples in grassland ecosystem

a) Fourth trophic level	i) Crow
b) Second trophic level	ii) Vulture
c) First trophic level	iii) Rabbit
d) Third trophic level	iv) Grass

Select the correct option

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

Ans. 1

40. Match the following

a) Inhibitor of catalytic activity	i) Ricin
b) Possess peptide bonds	ii) Malonate
c) Cell wall material in fungi	iii) Chitin
d) Secondary metabolite	iv) Collagen

Select the correct option

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

Ans. 1

41. The first phase of translation is
- 1) Binding of mRNA to ribosome
 - 2) Recognition of DNA molecule
 - 3) Aminocylation of tRNA
 - 4) Recognition of an anti-codon

Ans. 3

42. Identify the substances having glycosidic bond and peptide bond, respectively in their structure :
- 1) Chitin, cholesterol
 - 2) Glycerol, trypsin
 - 3) Cellulose, lecithin
 - 4) Inulin, Insulin

Ans. 4

43. Which of the following statements about inclusion bodies is incorrect ?
- 1) They are not bound by any membrane
 - 2) These are involved in ingestion of food particles
 - 3) They lie free in the cytoplasm
 - 4) These represent reserve material in cytoplasm

Ans. 2

44. Match the following columns and select the correct option

Column-I	Column-II
a) Bt cotton	i) Gene therapy
b) Adenosine deaminase deficiency	ii) Cellular defence
c) RNAi	iii) Detection of HIV infection
d) PCR	iv) Bacillus thuringiensis

Select the correct option

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

Ans. 1

45. Identify the correct statement with regard to G₁ phase (Gap 1) of interphase
- 1) DNA synthesis or replication takes place
 - 2) Reorganisation of all cell components takes place
 - 3) Cell is metabolically active, grows but does not replicate its DNA
 - 4) Nuclear Division takes place

Ans. 3

46. Which of the following is put into Anaerobic sludge digester for further sewage treatment ?
- 1) Primary sludge
 - 2) Floating debris
 - 3) Effluents of primary treatment
 - 4) Activate sludge

Ans. 4

47. Which of the following statements is correct ?
- 1) Adenine pairs with thymine through two H-bonds
 - 2) Adenine pairs with thymine through one H-bond
 - 3) Adenine pairs with thymine through three H-bonds
 - 4) Adenine does not pair with thymine

Ans. 1

48. The sequence that controls the copy number of the linked DNA in the vector, is termed
- 1) Selectable marker
 - 2) Ori site
 - 3) Palindromic sequence
 - 4) Recognition site

Ans. 2

49. Select the correct match
- 1) Haemophilia – Y linked
 - 2) Phenylketonuria – Autosomal dominant trait
 - 3) Sickle cell anaemia – Autosomal recessive trait, chromosome-11
 - 4) Thalassemia – X linked

Ans. 3

50. Which of the following is not an attribute of a population ?
- 1) Sex ratio
 - 2) Natality
 - 3) Mortality
 - 4) Species interaction

Ans. 4

51. Strobili or cones are found in
- 1) Salvinia
 - 2) Pteris
 - 3) Marchantia
 - 4) Equisetum

Ans. 4

52. Which is the important site of formation of glycoproteins and glycolipids in eukaryotic cells ?
- 1) Endoplasmic reticulum
 - 2) Peroxisomes
 - 3) Golgi bodies
 - 4) Polysomes

Ans. 3

53. Which of the following is correct about viroids?
- 1) They have RNA with protein coat
 - 2) They have free RNA without protein coat
 - 3) They have DNA with protein coat
 - 4) They have free DNA without proteins coat

Ans. 2

54. The process of growth is maximum during
- 1) Log phase
 - 2) Lag phase
 - 3) Senescence
 - 4) Dormancy

Ans. 1

55. Which of the following regions of the globe exhibits highest species diversity ?
- 1) Western Ghats of India
 - 2) Madagascar
 - 3) Himalayas
 - 4) Amazon forests

Ans. 4

56. The number of substrate level phosphorylations in one turn of citric acid cycle is
- 1) Zero
 - 2) One
 - 3) Two
 - 4) Three

Ans. 2

57. Meiotic division of the secondary oocyte is completed
- 1) Prior to ovulation
 - 2) At the time of copulation
 - 3) After zygote formation
 - 4) At the time of fusion of a sperm with an ovum

Ans. 4

58. Which of the following pairs is of unicellular algae ?
- 1) Laminaria and Sargassum
 - 2) Gelidium and Gracilaria
 - 3) Anabaena and Volvox
 - 4) Chlorella and Spirulina

Ans. 4

59. The QRS complex in a standard ECG represents
- 1) Repolarisation of auricles
 - 2) Depolarisation of auricles
 - 3) Depolarisation of ventricles
 - 4) Repolarisation of ventricles

Ans. 3

72. Match the following columns and select the correct option.

Column-I	Column-II
a) 6-15 pairs of gills lists	i) Trygon
b) Heterocercal caudal fin	ii) Cyclostomes
c) Air Bladder	iii) Chondrichthyes
d) Poison sting	iv) Osteichthyes

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

Ans. 1

73. Floridean starch has structure similar to

- 1) Starch and cellulose
- 2) Amylopectin and glycogen
- 3) Mannitol and algin
- 4) Laminarin and cellulose

Ans. 2

74. Which of the following statements is not correct ?

- 1) In man insulin is synthesised as a proinsulin
- 2) The proinsulin has an extra peptide called C-peptide
- 3) The functional insulin has A and B chains linked together by hydrogen bonds
- 4) Genetically engineered insulin is produced in E-Coli.

Ans. 3

75. If the head of cockroach is removed, it may live for few days because

- 1) the supra-oesophageal ganglia of the cockroach are situated in ventral part of abdomen
- 2) the cockroach does not have nervous system
- 3) the head holds a small proportion of a nervous while the rest is situated along the ventral part of its body
- 4) the head holds a $1/3^{\text{rd}}$ of a nervous system while the rest is situated along the dorsal part of its body

Ans. 3

76. The enzyme enterokinase helps in conversion of

- 1) proteins into polypeptides
- 2) trypsinogen into trypsin
- 3) caseinogen into casein
- 4) pepsinogen into pepsin

Ans. 2

77. The transverse section of a plant shows following anatomical features

- a) Large number of scattered vascular bundles surrounded by bundle sheath
- b) Large conspicuous parenchymatous ground tissue
- c) Vascular bundles conjoint and closed
- d) Phloem parenchyma absent

Identify the category of plant and its part

- 1) Monocotyledonous stem
- 2) Monocotyledonous root
- 3) Dicotyledonous stem
- 4) Dicotyledonous root

Ans. 1

78. In water hyacinth and water lily, pollination takes place by

- 1) Insects or wind
- 2) Water currents only
- 3) Wind water
- 4) Insects and water

Ans. 1

79. IN gel electrophoresis, separated DNA fragments can be visualized with the help of

- 1) Acetocrmine in bright blue light
- 2) Ethidium bromide in UV radiation
- 3) Acetocarmine in UV radiation
- 4) Ethidium bromide in infrared radiation

Ans. 2

80. How many true breeding pea plant varieties did Mendel select as pairs, which were similar except in one character with contrasting traits?

- 1) 4
- 2) 2
- 3) 14
- 4) 8

Ans. 3

81. Which of the following refer to correct examples of organisms which have evolved due to changes environment brought about by anthropogenic action?

- 1) Darwin's Finches of Galapagos islands
- 2) Herbicide resistant weeds
- 3) Drug resistant eukaryotes
- 4) Man-created breeds of domesticated animals like dogs

Ans. 3

82. Match the organism with its use in biotechnology

a) <i>Bacillus thuringiensis</i>	i) Cloning vector
b) <i>Thermus aquaticus</i>	ii) Construction of first rDNA molecule
c) <i>Agrobacterium tumefaciens</i>	iii) DNA polymerase
d) <i>Salmonella typhimurium</i>	iv) Cry proteins

Select the correct option from the following

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

Ans. 2

83. From his experiments, S.L. Miller produced amino acids by mixing the following in a closed flask

- 1) CH₄, H₂, NH₃ and water vapour at 800°C
2) CH₃, H₂, NH₄ and water vapour at 800°C
3) CH₄, H₂, NH₃ and water vapour at 600°C
4) CH₃, H₂, NH₃ and water vapour at 600°C

Ans. 1

84. Embryological support for evolution was disapproved by

- 1) Karl Ernst von Baer
2) Alfred Wallace
3) Charles Darwin
4) Oparin

Ans. 1

85. If the distance between two consecutive base pairs is 0.34 nm and the total number of base pairs of DNA double helix in a typical mammalian cells 6.6×10^9 bp, then the length of the DNA is approximately

- 1) 2.0 meters 2) 2.5 meters
3) 2.2 meters 4) 2.7 meters

Ans. 3

86. Identify the wrong statement with reference to immunity

- 1) When exposed to antigen (living or dead) antibodies are produced in the host's body. It is called "Active immunity"
2) When ready-made antibodies are directly given, it is called "Passive immunity"
3) Active immunity is quick and gives full response
4) Foetus receives some antibodies from mother, it is an example for passive immunity

Ans. 3

87. The specific palindromic sequence which is recognized by EcoRI is

- 1) 5' – GAATTC – 3'
 3' – CTTAAG – 5'
2) 5' – GGAACC – 3'
 3' – CCTTGG – 5'
3) 5' – CTTAAG – 3'
 3' – GAATTC – 5'
4) 5' – GGATTC – 3'
 3' – CTAGG – 5'

Ans. 1

88. Which of the following would help in prevention diuresis?

- 1) More water reabsorption due to under secretion of ADH
2) Reabsorption of Na⁺ and water from renal tubules due to aldosterone
3) Atrial natriuretic factor causes vasoconstriction
4) Decrease in secretion of renin by JG cells

Ans. 2

89. Montreal protocol was signed in 1987 for control of

- 1) Transport of Genetically modified organisms from one country to another
2) Emission of ozone depleting substances
3) Release of Green House gases
4) Disposal of e-wastes

Ans. 2

90. The roots that originate from the base of the stem are

- 1) Fibrous roots 2) Primary roots
3) Prop roots 4) Lateral roots

Ans. 1

91. The solids which have the negative temperature coefficient of resistance are

- 1) Metals
2) Insulators only
3) Semiconductors only
4) Insulators and semiconductors

Ans. 4

Sol. Insulator and semiconductors

92. A charged particle having drift velocity of $7.5 \times 10^{-4} \text{ m s}^{-1}$ in an electric field of $3 \times 10^{-10} \text{ Vm}^{-1}$ has a mobility in $\text{m}^2 \text{ V}^{-1} \text{ s}^{-1}$ of
- 1) 2.25×10^{15}
 - 2) 2.5×10^6
 - 3) 2.5×10^{-6}
 - 4) 2.25×10^{-15}

Ans. 2

Sol. $\mu = \frac{V_d}{E} = \frac{7.5 \times 10^{-4}}{3 \times 10^{-10}} = 2.5 \times 10^6$

93. For transistor action, which of the following statements is correct?

- 1) Base, emitter and collector regions should have same doping concentrations
- 2) Base, emitter and collector regions should have same size
- 3) Both emitter junction as well as the collector junction are forward biased
- 4) The base region must be very thin and lightly doped

Ans. 4

Sol. The base region must be very thin and lightly doped

94. In a guitar, two strings A and B made of same material are slightly out of tune and produce beats of frequency 6 Hz. When tension in B is slightly decreased, the beat frequency increases to 7 Hz. If the frequency of B will be
- 1) 523 Hz
 - 2) 524 Hz
 - 3) 536 Hz
 - 4) 537 Hz

Ans. 2

Sol. $n_A - n_B = 6$

As tension is decreased, frequency of 'B' decreases and hence no. of beats increases.

i.e., $n_A > n_B$

$\therefore n_A - n_B = 6$

$n_B = n_A - 6$
 $= 530 - 6 = 524$

95. A wire of length L, area of cross section A is hanging from a fixed support. The length of the wire changes to L_1 when mass M is suspended from its free end. The expression of Young's modulus is

- 1) $\frac{MgL_1}{AL}$
- 2) $\frac{Mg(L_1 - L)}{AL}$
- 3) $\frac{MgL}{AL_1}$
- 4) $\frac{MgL}{A(L_1 - L)}$

Ans. 4

Sol. $Y = \frac{F \times L}{A \times e}$

$Y = \frac{mg \times L}{A(L_1 - L)}$

96. Light with an average flux of 20 W/cm^2 falls on a non-reflecting surface at normal incidence having surface area 20 cm^2 . The energy received by the surface during time span of 1 minute is

- 1) $10 \times 10^3 \text{ J}$
- 2) $12 \times 10^3 \text{ J}$
- 3) $24 \times 10^3 \text{ J}$
- 4) $48 \times 10^3 \text{ J}$

Ans. 3

Sol. $I = \frac{E}{At} \Rightarrow E = IA \times t$
 $= 2 \times 10^5 \times 2 \times 10^{-3} \times 60$
 $= 24 \times 10^3 \text{ J}$

97. The phase difference between displacement and acceleration of a particle in a simple harmonic motion is

- 1) $\pi \text{ rad}$
- 2) $\frac{3\pi}{2} \text{ rad}$
- 3) $\frac{\pi}{2} \text{ rad}$
- 4) Zero

Ans. 1

Sol. $a = -\omega^2 y \Rightarrow a \propto -y$
 $\therefore \pi \text{ rad}$

98. A capillary tube of radius r is immersed water and rises in it to a height h. The mass of the water in the capillary is 5g. Another capillary tube of radius 2r is immersed in water. The mass of water that will rise in this tube is

- 1) 2.5g
- 2) 5.0g
- 3) 10.0g
- 4) 20.0g

Ans. 3

Sol. Weight balances the tension

$mg = 2\pi r T \cos \theta$

$\therefore m \propto r$

$\frac{m_1}{m_2} = \frac{r_1}{r_2} \Rightarrow \frac{5}{m_2} = \frac{1}{2} \Rightarrow m_2 = 10 \text{ g}$

99. A series LCR is connected to an ac voltage source. When L is removed from the circuit, the phase difference between current and

voltage is $\frac{\pi}{3}$. If instead C is removed from the

circuit, the phase difference is again $\frac{\pi}{3}$

between current and voltage. The power factor of the circuit is

- 1) Zero
- 2) 0.5
- 3) 1.0
- 4) -1.0

Ans. 3

Sol. Circuit is under resonance

$\therefore \cos \phi = 1$

100. In Young's double slit experiment, if the separation between coherent source is halved and the distance of the screen from the coherent source is doubled, then the fringe width becomes

- 1) Double 2) Half
3) Four times 4) One-fourth

Ans. 3

Sol. $\beta = \frac{\lambda D}{d}$
 $\beta \propto \frac{D}{d}$
 $\frac{\beta}{\beta'} = \frac{D}{D'} \times \frac{d'}{d} = \frac{1}{2} \times \frac{1}{2}$
 $\beta' = 4\beta$

101. Dimensions of stress are

- 1) $[MLT^{-2}]$ 2) $[ML^2T^{-2}]$ 3) $[ML^0T^{-2}]$ 4) $[ML^{-1}T^{-2}]$

Ans. 4

Sol. $[ML^{-1}T^{-2}]$

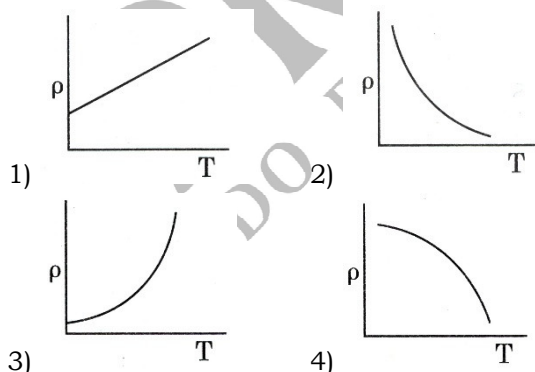
102. Find the torque about the origin when a force of $3\hat{j}N$ acts on a particle whose position vector is $2\hat{k}m$

- 1) $6\hat{i}Nm$ 2) $6\hat{j}Nm$ 3) $-6\hat{i}Nm$ 4) $6\hat{k}Nm$

Ans. 3

Sol. $\vec{\tau} = \vec{r} \times \vec{F}$
 $= 2\hat{k} \times 3\hat{j}$
 $= -6\hat{i}N - m$

103. Which of the following graph represents the variation of resistivity (ρ) with temperature (T) for copper?



Ans. 3

Sol. The variation of resistivity of copper with temperature is parabolic in nature.

104. A cylinder contains hydrogen gas at pressure of 249 kPa and temperature $27^\circ C$.

Its density is : ($R = 8.3 J mol^{-1}K^{-1}$)

- 1) $0.5 kg/m^3$ 2) $0.2 kg/m^3$
3) $0.1 kg/m^3$ 4) $0.02 kg/m^3$

Ans. 2

Sol. $\rho = \frac{P.M}{RT} = \frac{249 \times 10^3 \times 2 \times 10^{-3}}{8.3 \times 300}$
 $= 0.2 kg / m^3$

105. The ratio of contributions made by the electric field and magnetic field components to the intensity of an electromagnetic wave is: ($C =$ speed of electromagnetic waves)

- 1) $c : 1$ 2) $1 : 1$ 3) $1 : c$ 4) $1 : c^2$

Ans. 2

Sol. $\frac{I_E}{I_B} = \frac{\frac{1}{2}}{\frac{1}{2}} = \frac{1}{1}$

i.e., $1 : 1$

106. For which one of the following, Bohr model is not valid?

- 1) Hydrogen atom
2) Singly ionised helium atom (He^+)
3) Deuteron atom
4) Singly ionised neon atom (Ne^+)

Ans. 4

Sol. Singly ionised neon atom (Ne^+)
Since it has more than one electron.

107. A long solenoid of 50 cm length have 100 turns carries a current of 2.5A. The magnetic field at the centre of the solenoid is:

($\mu = 4\pi \times 10^{-7} T m A^{-1}$)

- 1) $6.28 \times 10^{-4} T$ 2) $3.14 \times 10^{-4} T$
3) $6.28 \times 10^{-5} T$ 4) $3.14 \times 10^{-5} T$

Ans. 1

Sol. $B = \mu_0 ni$
 $= \frac{\mu_0 Ni}{L}$
 $= \frac{4\pi \times 10^{-7} \times 100 \times 2.5}{50 \times 10^{-2}}$
 $= 6.28 \times 10^{-4} T$

108. The Brewster's angle i_b for an interface should be:

- 1) $0^\circ < i_b < 30^\circ$ 2) $30^\circ < i_b < 45^\circ$
3) $45^\circ < i_b < 90^\circ$ 4) $i_b = 90^\circ$

Ans. 3

Sol. $45^\circ < i_b < 90^\circ$

109. A body weighs 72 N on the surface of the earth. What is the gravitational force on it, at a height equal to half the radius of the earth?

- 1) 48 N 2) 32 N 3) 30 N 4) 24 N

Ans. 2

Sol. Given $mg=72\text{N}$

$$g_h = g \left(\frac{R}{R+h} \right)^2$$

$$= g \left(\frac{R}{R + \frac{R}{2}} \right)^2$$

$$= \frac{4}{9}g$$

$$\text{weight at } \frac{R}{2} \text{ is } W' = mg_h$$

$$= m \frac{4g}{9}$$

$$= \frac{4}{9}mg$$

$$= \frac{4}{9} \times 72 = 32\text{N}$$

110. A screw gauge has least count of 0.01 mm and there are 50 divisions in its circular scale.

The pitch of the screw gauge is:

- 1) 0.01 mm 2) 0.25 mm
3) 0.5 mm 4) 1.0 mm

Ans. 3

Sol. Pitch of the screw

$$= \text{L.C} \times \text{number of divisions on circular scale}$$

$$= 0.01 \times 50$$

$$= 0.5\text{mm}$$

111. The mean free path for a gas, with molecular diameter d and number density n can be expressed as

1) $\frac{1}{\sqrt{2} n \pi d}$ 2) $\frac{1}{\sqrt{2} n \pi d^2}$

3) $\frac{1}{\sqrt{2} n^2 \pi d^2}$ 4) $\frac{1}{\sqrt{2} n^2 \pi^2 d^2}$

Ans. 2

Sol. Mean free path $\lambda = \frac{1}{\sqrt{2} n \pi d^2}$

112. A ball is thrown vertically downward with a velocity of 20 m/s from the top of a tower. It hits the ground after some time with a velocity of 80 m/s. The height of the tower is: ($g=10 \text{ m/s}^2$)

- 1) 360 m 2) 340 m
3) 320 m 4) 300 m

Ans. 4

Sol. $v^2 - u^2 = 2gH$

$$(80)^2 - (20)^2 = 2(10)H$$

$$\therefore H = 300\text{m}$$

113. In a certain region of space with volume 0.2 m^3 , the electric potential is found to be 5 V throughout. The magnitude of electric field in this region is

- 1) Zero 2) 0.5 N/C
3) 1 N/C 4) 5 N/C

Ans. 1

Sol. \therefore potential $v = \text{constant}$

$$E = -\frac{dv}{dr} = 0$$

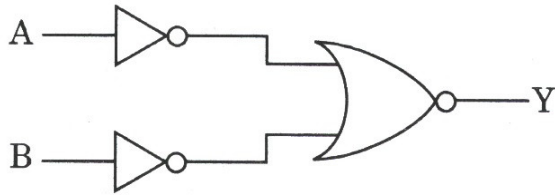
114. The average thermal energy for a mono-atomic gas is: (k_B is Boltzmann constant and T , absolute temperature)

- 1) $\frac{1}{2} k_B T$ 2) $\frac{3}{2} k_B T$
3) $\frac{5}{2} k_B T$ 4) $\frac{7}{2} k_B T$

Ans. 2

Sol. $\frac{3}{2} k_B T$

115. For the logic circuit shown, the truth table is



- 1) -A B Y
0 0 0
0 1 0
1 0 0
1 1 1
- 2) A B Y
0 0 0
0 1 1
1 0 1
1 1 1
- 3) A B Y
0 0 1
1 0 1
1 1 0
- 4) A B Y
0 0 1
0 1 0
1 0 0
1 1 0

Ans. 1

Sol. $\overline{\overline{A+B}} = \overline{\overline{A} \cdot \overline{B}}$
= $A \cdot B$
AND gate

116. The energy required to break one bond in DNA is 10^{-20} J. This value in eV is nearly

- 1) 6 2) 0.6 3) 0.06 4) 0.006

Ans. 3

Sol. $1\text{J} = \frac{1\text{eV}}{1.6 \times 10^{-19}}$
 $E = \frac{10^{-20}}{1.6 \times 10^{-19}}$
= 0.06

117. Two particles of mass 5 kg and 10 kg respectively are attached to the two ends of a rigid rod of length 1 m with negligible mass. The centre of mass of the system from the 5 kg particle is nearly at a distance of:

- 1) 33 cm 2) 50 cm 3) 67 cm 4) 80 cm

Ans. 3

Sol. $X_{\text{cm}} = \frac{m_1 x_1 + m_2 x_2}{m_1 + m_2}$

$$\begin{aligned} &= \frac{5(0) + 10(1)}{5 + 10} \\ &= 0.666\text{m} \\ &= 67\text{cm (nearly)} \end{aligned}$$

118. A spherical conductor of radius 10 cm has a charge of 3.2×10^{-7} C distributed uniformly. What is the magnitude of electric field at a point 15 cm from the centre of the sphere?

$$\left(\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ Nm}^2 / \text{C}^2 \right)$$

- 1) 1.28×10^4 N/C 2) 1.28×10^5 N/C
3) 1.28×10^6 N/C 4) 1.28×10^7 N/C

Ans. 2

Sol. $E = \frac{1}{4\pi\epsilon_0} \cdot \frac{q}{r^2}$
= $9 \times 10^9 \times \frac{3.2 \times 10^{-7}}{(15 \times 10^{-2})^2}$
= 1.28×10^5 N/C

119. Taking into account of the significant figure, what is the value of $9.99 \text{ m} - 0.0099 \text{ m}$?

- 1) 9.9801 m 2) 9.98 m
3) 9.980 m 4) 9.9 m

Ans. 2

Sol. 9.99
 $\frac{0.010}{9.980}$
Ans. 9.98

120. A $40 \mu\text{F}$ capacitor is connected to a 200 V, 50 Hz ac supply. The rms value of the current in the circuit is, nearly

- 1) 1.7A 2) 2.05A 3) 2.5A 4) 25.1A

Ans. 3

Sol. $i_{\text{rms}} = VC\omega$
= $200 \times 40 \times 10^{-6} \times 2\pi \times 50 = 2.5\text{A}$

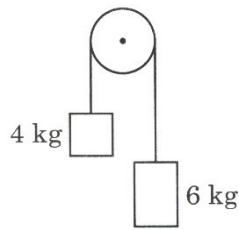
121. Two cylinders A and B of equal capacity are connected to each other via a stop cock. A contains an ideal gas at standard temperature and pressure. B is completely evacuated. The entire system is thermally insulated. The stop cock is suddenly opened. The process is

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

Ans. 2

Sol. Since the system is thermally insulated and the process is sudden process then it is adiabatic

122. Two bodies of mass 4 kg and 6 kg are tied to the ends of a massless strings. The string passes over a pulley which is frictionless (see figure). The acceleration of the system in terms of acceleration due to gravity (g) is



- 1) g 2) g/2 3) g/5 4) g/10

Ans. 3

Sol.
$$a = \frac{(m_2 - m_1)g}{m_1 + m_2}$$

$$= \frac{g}{5} \text{ms}^{-2}$$

123. An electron is accelerated from rest through a potential difference of V volt. If the de Broglie wavelength of the electron is 1.227×10^{-2} nm, the potential difference is

- 1) 10 V 2) 10^2 V 3) 10^3 V 4) 10^4 V

Ans. 4

Sol.
$$\lambda = \frac{12.27}{\sqrt{v}} \text{ \AA}$$

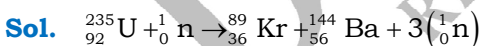
$$1.227 \times 10^{-11} = \frac{12.27}{\sqrt{v}} \times 10^{-10} \text{ m}$$

$$v = 10^4 \text{ V}$$

124. When a uranium isotope ${}_{92}^{235}\text{U}$ is bombarded with a neutron, it generates ${}_{36}^{89}\text{Kr}$, three neutrons and

- 1) ${}_{56}^{144}\text{Ba}$ 2) ${}_{40}^{91}\text{Zr}$ 3) ${}_{36}^{101}\text{Kr}$ 4) ${}_{36}^{103}\text{Kr}$

Ans. 1



125. The capacitance of a parallel plate capacitor with air as medium is 6 μF . With the introduction of a dielectric medium, the capacitance becomes 30 μF . The permittivity of the medium is:

$(\epsilon_0 = 8.85 \times 10^{-12} \text{C}^2\text{N}^{-1}\text{m}^{-2})$

- 1) $0.44 \times 10^{-12} \text{C}^2\text{N}^{-1}\text{m}^{-2}$
2) $1.77 \times 10^{-12} \text{C}^2\text{N}^{-1}\text{m}^{-2}$
3) $0.44 \times 10^{-10} \text{C}^2\text{N}^{-1}\text{m}^{-2}$
4) $5.00 \text{C}^2\text{N}^{-1}\text{m}^{-2}$

Ans. 3

Sol. $C = KC_0$

$30 = k \times 6$

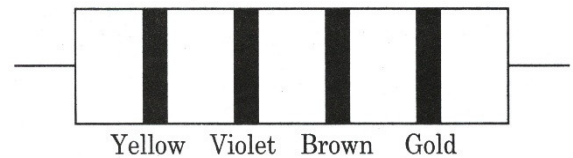
$k = 5$

$\epsilon = k\epsilon_0$

$= 5 \times 8.85 \times 10^{-12}$

$= 0.44 \times 10^{-10} \text{C}^2\text{N}^{-1}\text{m}^{-2}$

126. The color code of a resistance is given below



The values of resistance and tolerance, respectively are?

- 1) $470 \text{k}\Omega, 5\%$ 2) $47 \text{k}\Omega, 10\%$
3) $4.7 \text{k}\Omega, 5\%$ 4) $470 \Omega, 5\%$

Ans. 4

Sol. Yellow $\rightarrow 4$

Violet $\rightarrow 7$

Brown $\rightarrow 1$

Gold $\rightarrow 5\%$

$47 \times 10^1 \pm 5\%$

$470 \Omega, 5\%$

127. A resistance wire connected in the left gap of a metre bridge balances a 10Ω resistance in the right gap at a point which divides the bridge wire in the ratio 3:2. If the length of the resistance wire is 1.5 m, then the length of 1Ω of the resistance wire is

- 1) $1.0 \times 10^{-2} \text{m}$ 2) $1.0 \times 10^{-1} \text{m}$
3) $1.5 \times 10^{-1} \text{m}$ 4) $1.5 \times 10^{-2} \text{m}$

Ans. 2

Sol.
$$\frac{P}{Q} = \frac{l}{100-l}$$

$$\frac{P}{10} = \frac{3}{2}$$

$P = 15 \Omega$

Resistance per unit length = $\frac{P}{L} = \frac{15}{1.5} = 10 \Omega \text{m}^{-1}$

\therefore length of 1Ω resistance is $\frac{1}{10} = 1 \times 10^{-1} \text{m}$

128. Light of frequency 1.5 times the threshold frequency is incident on a photosensitive material. What will be the photoelectric current if the frequency is halved and intensity is doubled?
 1) Doubled 2) Four times
 3) One-fourth 4) Zero

Ans. 4

Sol. $\because v < v_0$, No photo electric effect takes place.
 So photoelectric current is zero

129. The energy equivalent of 0.5 g of a substance is
 1) 4.5×10^{16} J 2) 4.5×10^{13} J
 3) 1.5×10^{13} J 4) 0.5×10^{13} J

Ans. 2

Sol. $E = MC^2$
 $= 0.5 \times 10^{-3} \times (3 \times 10^8)^2$
 $= 4.5 \times 10^{13}$ J

130. A short electric dipole has a dipole moment of 16×10^{-9} Cm. The electric potential due to the dipole at a point at a distance of 0.6 m from the centre of the dipole, situated on a line making an angle of 60° with the dipole axis is:

$$\left(\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ Nm}^2 / \text{C}^2 \right)$$

- 1) 50 V 2) 200 V 3) 400 V 4) Zero

Ans. 2

Sol. Potential $v = \frac{1}{4\pi\epsilon_0} \frac{P \cos \theta}{(r^2)}$
 $= 9 \times 10^9 \times 16 \times 10^{-9} \times \frac{1}{2} \times \frac{1}{0.36} = 200$ V

131. A ray is incident at an angle of incidence i on one surface of a small angle prism (with angle of prism A) and emerges normally from the opposite surface. If the refractive index of the material of the prism is μ , then the angle of incidence is nearly equal to

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

Ans. 3

Sol. $r_1 + r_2 = A$
 $r_1 + 0 = A$
 $\therefore r_1 = A$
 for small angled prism
 $\mu = \frac{\sin i}{\sin r} = \frac{i}{A}$
 $i = \mu A$

132. The quantities of heat required to raise the temperature of two solid copper spheres of radii r_1 and r_2 ($r_1 = 1.5 r_2$) through 1 K are in the ratio
 1) $\frac{27}{8}$ 2) $\frac{9}{4}$ 3) $\frac{3}{2}$ 4) $\frac{5}{3}$

Ans. 1

Sol. Heat $Q = ms\Delta\theta$
 $\therefore Q \propto m$
 $Q \propto V \cdot d$
 $Q \propto \frac{4}{3} \pi r^3$
 $\therefore Q \propto r^3$
 $\Rightarrow \frac{Q_1}{Q_2} = \frac{r_1^3}{r_2^3} = \frac{27}{8}$

133. An iron rod of susceptibility 599 is subjected to magnetising field of 1200 A m^{-1} . The permeability of the material of the rod is:
 ($\mu_0 = 4\pi \times 10^{-7} \text{ T m A}^{-1}$)
 1) $2.4\pi \times 10^{-4} \text{ T m A}^{-1}$ 2) $8.0 \times 10^{-5} \text{ T m A}^{-1}$
 3) $2.4\pi \times 10^{-5} \text{ T m A}^{-1}$ 4) $2.4\pi \times 10^{-7} \text{ T m A}^{-1}$

Ans. 1

Sol. $\mu = \mu_0 [1 + \chi]$
 $= 4\pi \times 10^{-7} [1 + 599]$
 $= 2.4\pi \times 10^{-4} \text{ T m A}^{-1}$

134. Assume that light of wavelength 600 nm is coming from a star. The limit of resolution of telescope whose objective has a diameter of 2 m is
 1) 3.66×10^{-7} rad 2) 1.83×10^{-7} rad
 3) 7.32×10^{-7} rad 4) 6.00×10^{-7} rad

Ans. 1

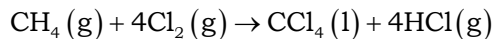
Sol. Limit of resolution $\theta = \frac{1.22\lambda}{a}$
 $= 3.66 \times 10^{-7}$ rad

135. The increase in the width of the depletion region in a p-n junction diode is due to
 1) Forward bias only
 2) Reverse bias only
 3) Both forward bias and reverse bias
 4) Increase in forward current

Ans. 2

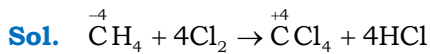
Sol. Reverse bias only

136. What is the change in oxidation number of carbon in the following reaction?



- 1) +4 to +4 2) 0 to +4
3) -4 to +4 4) 0 to -4

Ans. 3



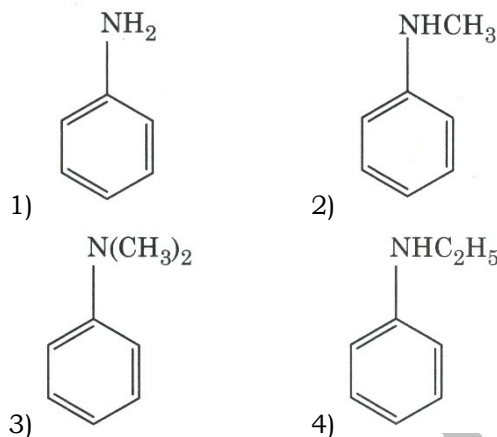
$$\overset{x}{\text{C}}\text{H}_4 \quad X + 4(+1) = 0$$

$$X = -4$$

$$\overset{x}{\text{C}}\text{Cl}_4 \quad X + 4(-1) = 0$$

$$X = +4$$

137. Which of the following amine will give the carbylamine test?



Ans. 1

Sol. Only primary amines (aliphatic and aromatic) will give carbylamine test

138. The mixture which shows positive deviation from Raoult's law is

- 1) Ethanol + Acetone
2) Benzene + Toluene
3) Acetone + Chloroform
4) Chloroethane + Bromoethane

Ans. 1

Sol. Conceptual

139. An increase in the concentration of the reactants of a reaction leads to change in

- 1) Activation energy 2) Heat of reaction
3) Threshold energy 4) Collision frequency

Ans. 4

Sol. As concentration of reactants increases, the number of reactant molecules per unit volume increases.

∴ Collision frequency (number collisions) increases.

140. Sucrose on hydrolysis gives

- 1) β-D-Glucose + α-D-Fructose
2) α-D-Glucose + β-D-Glucose
3) α-D-Glucose + β-D-Fructose
4) α-D-Fructose + β-D-Fructose

Ans. 3

Sol. Conceptual

141. A tertiary butyl carbocation is more stable than a secondary butyl carbocation because of which of the following?

- 1) -I effect of -CH₃ groups
2) +R effects of -CH₃ groups
3) -R effect of -CH₃ groups
4) Hyper conjugation

Ans. 4

Sol. Hyper conjugation

142. Identify the correct statement from the following

- 1) Wrought iron is impure iron with 4% carbon
2) Blister copper has blistered appearance due to evolution of CO₂
3) Vapour phase refining is carried out of Nickel by Van Arkel method
4) Pig iron can be moulded into a variety of shapes

Ans. 4

Sol. Conceptual

143. Identify the incorrect match.

Name	IUPAC official Name
a) Unnilunium	i) Mendelevium
b) Unniltrium	ii) Lawrencium
c) Unnilhexium	iii) Seaborgium
d) Unnununium	iv) Darmstadtium

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

Ans. 4

Sol. Unununium - Roentgenium

144. The number of Faradays (F) required to produce 20 g of calcium from molten CaCl₂ (Atomic mass of Ca=40 g mol⁻¹) is:

- 1) 1 2) 2 3) 3 4) 4

Ans. 1

Sol. 20 g of Ca = 1 GEN = 1 F

145. An element has a body centered cubic (bcc) structure with a cell edge of 288 pm. The atomic radius is

- 1) $\frac{\sqrt{3}}{4} \times 288$ pm 2) $\frac{\sqrt{4}}{4} \times 288$ pm
3) $\frac{4}{\sqrt{3}} \times 288$ pm 4) $\frac{4}{\sqrt{2}} \times 288$ pm

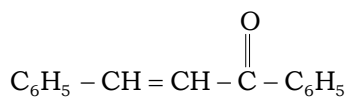
Ans. 1

Sol. $r = \frac{\sqrt{3}a}{4} = \frac{\sqrt{3} \times 288}{4}$ pm

146. Reaction between benzaldehyde and acetophenone in presence of dilute NaOH is known as

- 1) Aldol condensation
2) Cannizzaro's reaction
3) Cross Cannizzaro's reaction
4) Cross Aldol condensation

Ans. 4

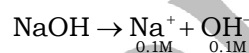
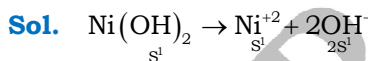


Which is a cross aldol condensation

147. Find out the solubility of $Ni(OH)_2$ in 0.1 M NaOH. Given that the ionic product of $Ni(OH)_2$ is 2×10^{-15}

- 1) $2 \times 10^{-13} M$ 2) $2 \times 10^{-8} M$
3) $1 \times 10^{-13} M$ 4) $1 \times 10^8 M$

Ans. 1



$K_{sp} = [Ni^{+2}][OH^-]^2$

$= S^1 (2S^1 + 0.1)^2$

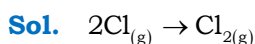
$2 \times 10^{-15} = S^1 \times 0.01$

$S^1 = 2 \times 10^{-13} M$

148. For the reaction, $2Cl(g) \rightarrow Cl_2(g)$, the correct option is

- 1) $\Delta_r H > 0$ and $\Delta_r S > 0$ 2) $\Delta_r H > 0$ and $\Delta_r S < 0$
3) $\Delta_r H < 0$ and $\Delta_r S > 0$ 4) $\Delta_r H < 0$ and $\Delta_r S < 0$

Ans. 4



Bond formation is exothermic ($\Delta H < 0$)

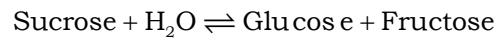
As gaseous moles decreases ($\Delta S < 0$)

149. Which of the following is a basic amino acid?
1) Seine 2) Alanine 3) Tyrosine 4) Lysine

Ans. 4

Sol. Conceptual (Lysine)

150. Hydrolysis of sucrose is given by the following reaction



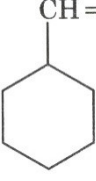
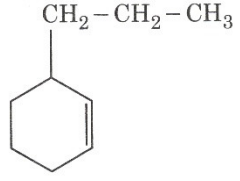
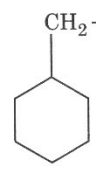
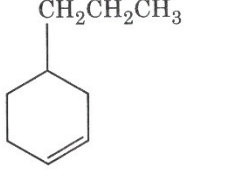
If the equilibrium constant (K_c) is 2×10^{13} at 300K, the value of $\Delta_r G^\ominus$ at the same temperature will be

- 1) $-8.314 J mol^{-1} K^{-1} \times 300K \times \ln(2 \times 10^{13})$
2) $8.314 J mol^{-1} K^{-1} \times 300K \times \ln(2 \times 10^{13})$
3) $8.314 J mol^{-1} K^{-1} \times 300K \times \ln(3 \times 10^{13})$
4) $-8.314 J mol^{-1} K^{-1} \times 300K \times \ln(4 \times 10^{13})$

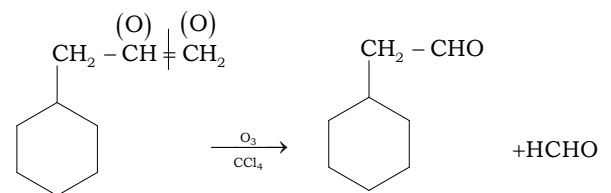
Ans. 1

Sol. $\Delta G^\ominus = -RT \ln K_c$
 $= -8.314 \times 300 \times \ln(2 \times 10^{13})$

151. An alkene on ozonolysis gives methanol as one of the product. Its structure is

- 1)  2) 
3)  4) 

Ans. 3



Sol.

152. A mixture of N_2 and Ar gases in a cylinder contains 7g of N_2 and 8g of Ar. If the total pressure of the mixture of the gases in the cylinder is 27 bar, the partial pressure of N_2 is: [Use atomic masses (in $g mol^{-1}$): N=14, Ar=40]
1) 9 bar 2) 12 bar 3) 15 bar 4) 18 bar

Ans. 3

Sol. $P_{N_2} = X_{N_2} \cdot P_{total}$

$$= \frac{n_{N_2}}{n_{N_2} + n_{Ar}} \times P_{\text{total}}$$

$$= \frac{7}{\frac{28}{7} + \frac{8}{40}} \times 27 = 15 \text{ bar}$$

153. Match the following and identify the correct option

a) CO(g)+H ₂ (g)	i) Mg(HCO ₃) ₂ +Ca(HCO ₃) ₂
b) Temporary hardness of water	ii) An electron deficient hydride
c) B ₂ H ₆	iii) Synthesis gas
d) H ₂ O ₂	iv) Non-planar structure

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

Ans. 1

Sol. Conceptual

154. The following metal ion activates many enzymes, participates in the oxidation of glucose to produce ATP and with Na, is responsible for the transmission of nerve signals

- 1) Iron 2) Copper
3) Calcium 4) Potassium

Ans. 4

Sol. Conceptual

155. Match the following:

Oxide	Nature
a) CO	i) Basic
b) BaO	ii) Neutral
c) Al ₂ O ₃	iii) Acidic
d) Cl ₂ O ₇	iv) Amphoteric

Which of the following is correct option?

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

Ans. 2

Sol. Conceptual

156. Elimination reaction of 2-Bromon-pentane to form penta-2-ene is

- a) β-Elimination reaction
b) Follows Zaitsev rule
c) Dehydrohalogenation reaction
d) Dehydration reaction
- 1) a, b, c 2) a, c, d
3) b, c, d 4) a, b, d

Ans. 1

Sol. Conceptual

157. Paper chromatography is an example of

- 1) Adsorption chromatography
2) Partition chromatography
3) Thin layer chromatography
4) Column chromatography

Ans. 2

Sol. Conceptual

158. The correct option for free expansion of an ideal gas under adiabatic condition is

- 1) q=0, ΔT=0 and w=0 2) q=0, ΔT<0 and w>0
3) q<0, ΔT=0 and w=0 4) q>0, ΔT>0 and w>0

Ans. 1

Sol. Free expansion, w=0
Adiabatic process q=0
∴ ΔU = 0 (ΔU = q + w)
∴ ΔT = 0

159. Which of the following set of molecules will have zero dipole moment?

- 1) Ammonia, beryllium difluoride, water, 1,4-dichlorobenzene
2) Boron trifluoride, hydrogen fluoride, carbon dioxide, 1,3-dichlorobenzene
3) Nitrogen trifluoride, beryllium difluoride, water, 1,3-dichlorobenzene
4) Boron trifluoride, beryllium difluoride, carbon dioxide, 1,4-dichlorobenzene

Ans. 4

Sol. Dipole moment of symmetrical molecules is zero

160. The number of protons, neutrons and electrons in ¹⁷⁵₇₁Lu, respectively, are

- 1) 71, 104 and 71 2) 104, 71 and 71
3) 71, 71 and 104 4) 175, 104 and 71

Ans. 1

Sol. P = Z = 71
e⁻ = Z = 71
n = (A-Z) = 175 - 71 = 104

161. On electrolysis of disulphuric acid using Platinum (Pt) electrode, the product obtained at anode will be

- 1) Hydrogen gas 2) Oxygen gas
3) H₂S gas 4) SO₂ gas

Ans. 2

Sol. Anode
2H₂O → O₂ + 4H⁺ + 4e⁻

162. Identify the correct statements from the following:

- a) CO₂(g) is used as refrigerant for ice-cream and frozen food
 - b) The structure of C₆₀ contains twelve six carbon rings and twenty five carbon rings
 - c) ZSM-5, a type of zeolite, is used to convert alcohols into gasoline
 - d) CO is colourless and odourless gas
- 1) a, b and c only 2) a and c only
3) b and c only 4) c and d only

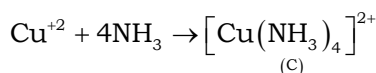
Ans. 4

Sol. Conceptual

163. Urea reacts with water to form A which will decompose to form B. B when passed through Cu⁺² (aq), deep blue colour solution C is formed. What is the formula of C from the following

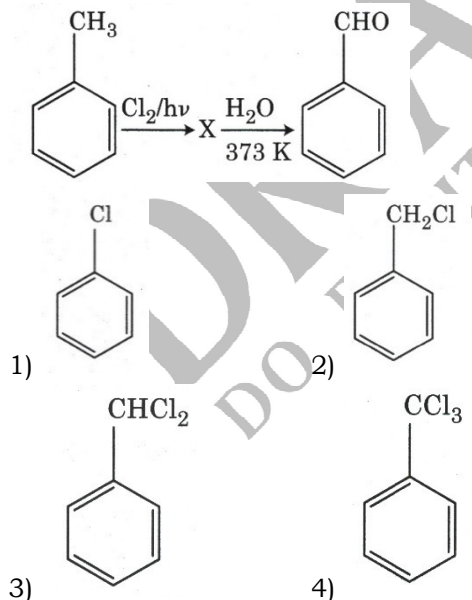
- 1) CuSO₄ 2) [Cu(NH₃)₄]²⁺
3) Cu(OH)₂ 4) CuCO₃.Cu(OH)₂

Ans. 2



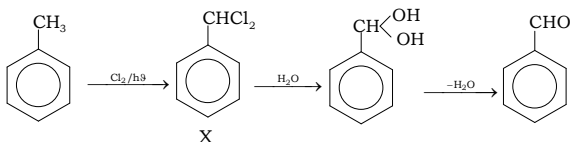
Blue coloured complex

164. Identify compound X in the following sequence of reaction

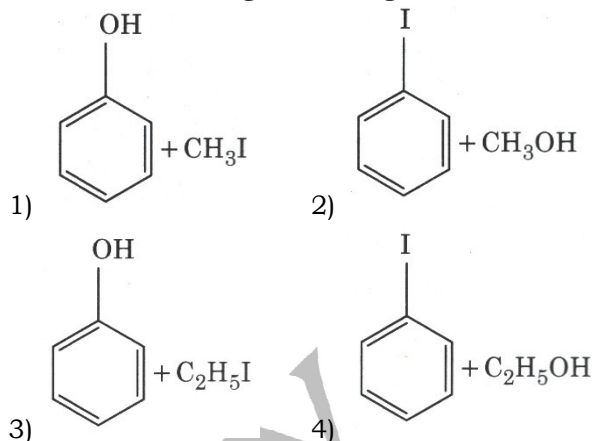


Ans. 3

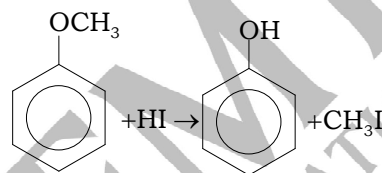
Sol.



165. Anisole on cleavage with HI gives



Ans. 1



Sol.

166. The freezing point depression constant (K_f) of benzene is 5.12 K kg mol⁻¹. The freezing point depression for the solution of molality 0.078, containing a non-electrolyte solute in benzene is (rounded off upto two decimal places)

- 1) 0.20K 2) 0.80K 3) 0.40K 4) 0.60K

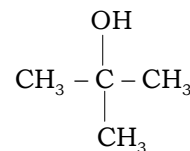
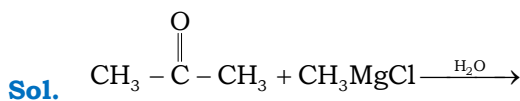
Ans. 3

Sol. $\Delta T_f = k_f \times m = 5.12 \times 0.078 = 0.4\text{K}$

167. Reaction between acetone and methylmagnesium chloride followed by hydrolysis will give

- 1) Isopropyl alcohol 2) Sec. butyl alcohol
3) Tert. Butyl alcohol 4) Isobutyl alcohol

Ans. 3

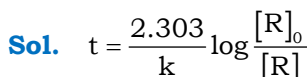


3^o-butyl alcohol

168. The rate constant for a first order reaction 4.606x10⁻³s⁻¹. The time required to reduce 2.0 g of the reactant to 0.2 g is

- 1) 100s 2) 200s 3) 500s 4) 1000s

Ans. 3



$$= \frac{2.303}{4.606 \times 10^{-3}} \log\left(\frac{2}{0.2}\right) = 500s$$

169. HCl was passed through a solution of CaCl_2 , MgCl_2 and NaCl . Which of the following compounds crystallises?

- 1) Both MgCl_2 and CaCl_2
- 2) Only NaCl
- 3) Only MgCl_2
- 4) NaCl , MgCl_2 and CaCl_2

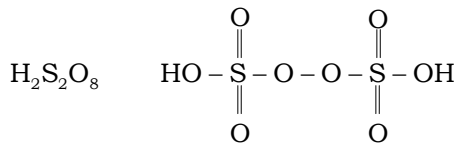
Ans. 2

Sol. Lower soluble salt can be precipitated first (NaCl has lower S value)

170. Which of the following oxoacid of sulphur has -O-O- linkage?

- 1) H_2SO_3 , sulphurous acid
- 2) H_2SO_4 , sulphuric acid
- 3) $\text{H}_2\text{S}_2\text{O}_8$, peroxodisulphuric acid
- 4) $\text{H}_2\text{S}_2\text{O}_7$, pyrosulphuric acid

Ans. 3



Sol.

171. Which of the following is a natural polymer?

- 1) cis-1, 4-polyisoprene
- 2) poly (Butadiene-styrene)
- 3) Polybutadiene
- 4) poly(Butadiene-acrylonitrile)

Ans. 1

Sol. cis-1, 4-polyisoprene (natural rubber)

172. Identify a molecule with does not exist.

- 1) He_2
- 2) Li_2
- 3) C_2
- 4) O_2

Ans. 1

Sol. He_2 Bond order = $\frac{1}{2} [N_b - N_a]$
 $= \frac{1}{2} [2 - 2] = 0$

\therefore Does not exist

173. Measuring Zeta potential is useful in determining which property of colloidal solution?

- 1) Viscosity
- 2) Solubility
- 3) Stability of the colloidal particles
- 4) Size of the colloidal particles

Ans. 3

Sol. Conceptual

174. The calculated spin only magnetic moment of Cr^{2+} ion is

- 1) 3.87 BM
- 2) 4.90 BM
- 3) 5.92 BM
- 4) 2.84 BM

Ans. 2

Sol. $\text{Cr}^{2+} [\text{Ar}] 3d^4 4s^0$

$$n=4$$

$$\mu = \sqrt{n(n+2)}$$

$$= \sqrt{4(4+2)} = \sqrt{24} = 4.90 \text{ BM}$$

175. Which of the following alkane cannot be made in good yield by Wurtz reaction

- 1) n-Hexane
- 2) 2,3-Dimethylbutane
- 3) n-Heptane
- 4) n-Butane

Ans. 3

Sol. Wurtz reaction is useful to prepare alkanes with even number of carbon atoms (symmetrical alkanes) only

176. Which of the followings has maximum number of atoms?

- 1) 1g of $\text{Ag}(s)$ [Atomic mass of $\text{Ag}=180$]
- 2) 1g of $\text{Mg}(s)$ [Atomic mass of $\text{Mg}=24$]
- 3) 1g of $\text{O}_2(g)$ [Atomic mass of $\text{O}=16$]
- 4) 1g of $\text{Li}(s)$ [Atomic mass of $\text{Li}=7$]

Ans. 4

Sol. Number of atoms = $\frac{\text{given weight}}{\text{GAW}} \times N_A$

\therefore 'Li' with least GAW, has highest number of atoms

177. Identify the incorrect statement?

- 1) $\text{Cr}^{2+}(d^4)$ is a stronger reducing agent than $\text{Fe}^{2+}(d^6)$ in water
- 2) The transition metals and their compounds are known for their catalytic activity due to their ability to adopt multiple oxidation states and to form complexes
- 3) Interstitial compounds are those that are formed when small atoms like H, C or N are trapped inside the crystal lattices of metals
- 4) The oxidation states of chromium in CrO_4^{2-} and $\text{Cr}_2\text{O}_4^{2-}$ are not the same

Ans. 4

Sol. CrO_4^{2-} $\text{Cr} \rightarrow +6$

$\text{Cr}_2\text{O}_7^{2-}$ $\text{Cr} \rightarrow +6$

178. Which of the following is the correct order of increasing field strength of ligands to form coordination compounds?
- 1) $\text{SCN}^- < \text{F}^- < \text{SCN}^- < \text{F}^- < \text{C}_2\text{O}_4^{2-} < \text{CN}^-$
 - 2) $\text{SCN}^- < \text{F}^- < \text{CN}^- < \text{C}_2\text{O}_4^{2-}$
 - 3) $\text{F}^- < \text{SCN}^- < \text{C}_2\text{O}_4^{2-} < \text{CN}^-$
 - 4) $\text{C}_2\text{O}_4^{2-} < \text{CN}^- < \text{SCN}^- < \text{F}^-$

Ans. 1

Sol. Conceptual

179. Which of the following is a cationic detergent?
- 1) Sodium lauryl sulphate
 - 2) Sodium stearate
 - 3) Cetyltrimethyl ammonium bromide
 - 4) Sodium dodecylbenzene sulphonate

Ans. 3

Sol. Conceptual

180. Which of the following is not correct about carbon monoxide?
- 1) It forms carboxyhaemoglobin
 - 2) It reduces oxygen carrying ability blood
 - 3) The carboxyhaemoglobin (haemoglobin bound to CO) is less stable than oxyhaemoglobin
 - 4) It is produced due to incomplete combustion.

Ans. 3

Sol. Carboxyhaemoglobin is '300' times more stable than oxyhaemoglobin