CAREER POINT

NEET Exam. 2020 (13th September 2020)
Code-G3 (Paper & Solution)
Biology, Physics & Chemistry

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

Ans. **[2]**
Sol. Higher H^+ conc. in alveoli favours the formation of oxyhaemoglobin

Q.2 Which of the following refer to correct example(s) of organisms which have evolved due to changes in environment brought about by anthropogenic action ?
(a) Darwin's Finches of Galapagos islands
(b) Herbicide resistant weeds
(c) Drug resistant eukaryotes
(d) Man-created breeds of domesticated animals like dogs
(1) (a) and (c)   (2) (b), (c) and (d)   (3) only (d)   (4) only (a)

Ans. **[2]**
Sol. (b), (c) and (d)

Q.3 Which of the following is not an inhibitory substance governing seed dormancy ?
(1) Abscisic acid   (2) Phenolic acid   (3) Para-ascorbic acid   (4) Gibberellic acid

Ans. **[4]**
Sol. Gibberellic acid

Q.4 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) *Haemophilus*

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

Ans. **[1]**
Sol. (a) → (iii) ; (b) → (iv); (c) → (i); (d) → (ii)

Q.5 Select the correct events that occur during inspiration.

(a) Contraction of diaphragm | (b) Contraction of external inter-coastal muscles

(c) Pulmonary volume decreases | (d) Intra pulmonary pressure increases

(1) (c) and (d)   (2) (a), (b) and (d)   (3) only (d)   (4) (a) and (b)

Ans. **[4]**

Sol. (a) and (b)

Q.6 The oxygenation activity of RuBisCo enzyme in photorespiration leads to the formation of :

(1) 1 molecule of 3-C compound

(2) 1 molecule of 6-C compound

(3) 1 molecule of 4-C compound and 1 molecule of 2-C compound

(4) 2 molecules of 3-C compound

Ans. **[1]**

Sol. 1 molecule of 3-C compound

Q.7 In light reaction, plastoquinone facilitates the transfer of electrons from :

(1) $Cytb_6f$ complex to PS-I   (2) PS-I to $NADP^+$

(3) PS-I to ATP synthase   (4) PS-II to $Cytb_6f$ complex

Ans. **[4]**

Sol. PS-II to $Cytb_6f$ complex

Q.8 In gel electrophoresis, separated DNA fragments can be visualized with the help of :

(1) Ethidium bromide in UV radiation   (2) Acetocarmine in UV radiation

(3) Ethidium bromide in infrared radiation   (4) Acetocarmine in bright blue light

Ans. **[1]**

Sol. Ethidium bromide in UV radiation

Q.9 The QRS complex in a standard ECG represents :

(1) Depolarisation of auricles   (2) Depolarisation of ventricles

(3) Repolarisation of ventricles   (4) Repolarisation of auricles

Ans. **[2]**

Sol. Depolarisation of ventricles

Q.10 The plant parts which consist of two generations-one within the other:

(a) Pollen grains inside the anther

(b) Germinated pollen grain with two male gametes

(c) Seed inside the fruit

(d) Embryo sac inside the ovule

(1) (a), (b) & (c)   (2) (c) & (d)   (3) (a) & (d)   (4) (a) only

Ans. **[3]**

Sol. (a) & (d)

Q.11 The infectious stage of Plasmodium that enters the human body is:

(1) Sporozoites   (2) Female gametocytes   (3) Male gametocytes   (4) Trophozoites

Ans. **[1]**

Sol. Sporozoites

Q.12 Identify the incorrect statement.
(1) Sapwood is involved in conduction of water and minerals from root to leaf.
(2) Sapwood is the innermost secondary xylem and is lighter in colour.
(3) Due to deposition of tannins, resins, oils etc. heart wood is dark in colour.
(4) heart wood does not conduct water but gives mechanical support.

Ans. **[2]**

Sol. Sapwood is the innermost secondary xylem and is lighter in colour.

Q.13 Flippers of Penguins and Dolphins are examples of:
(1) Convergent evolution   (2) Industrial melanism
(3) Natural selection   (4) Adaptive radiation

Ans. **[1]**

Sol. Convergent evolution

Q.14 Identify the wrong statement with reference to the gene 'I' that controls ABO blood groups.
(1) A person will have only two of the three alleles.
(2) When I^A and I^B are present together they express same type of sugar.
(3) Allele 'i' does not produce any sugar.
(4) The gene (I) has three alleles.

Ans. **[2]**

Sol. When I^A and I^B are present together they express same type of sugar.

Q.15 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, Tunicata and Cephalochordata
(1) (c) and (a)   (2) (a) and (b)   (3) (b) and (c)   (4) (d) and (c)

Ans. **[3]**

Sol. (b) and (c)

Q.16 Presence of which of the following conditions in urine are indicative of Diabetes Mellitus ?
(1) Uremia and Renal Calculi   (2) Ketonuria and Glycosuria
(3) Renal calculi and Hyperglycaemia (4) Uremia and Ketonuria

Ans. **[2]**

Sol. Ketonuria and Glycosuria

Q.17 The first phase of translation is
(1) Recognition of DNA molecule   (2) Aminoacylation of tRNA
(3) Recognition of an anti-codom   (4) Binding of mRNA to ribosome

Ans. **[4]**

Sol. Binding of mRNA to ribosome

Q.18 Rayflorets have
(1) Superior ovary   (2) Hypogynous ovary   (3) Half inferiour ovary   (4) Inferior ovary

Ans. **[4]**

Sol. Inferior ovary

Q.19   The process of growth is maximum during
     (1) Lag phase   (2) Senescence   (3)Dormancy   (4) Log phase
Ans.   **[4]**
Sol.   Log phase

Q.20   The roots that originate from the base of the stem are
     (1) Primary roots   (2) Prop roots   (3) Lateral roots   (4) Fibrous roots
Ans.   **[4]**
Sol.   Fibrous roots

Q.21   In water hyacinth and water lily, pollination takes place by
     (1) water currents only   (2) wind and water   (3) insects and water   (4) insects or wind
Ans.   **[4]**
Sol.   insects or wind

Q.22   Which of the following is put into anaerobic sludge digester for further sewage treatment ?
     (1) Floating debris   (2) Effluents of primary treatment
     (3) Activated sludge   (4) Primary sludge
Ans.   **[3]**
Sol.   Activated sludge

Q.23   Bilaterally symmetrical and acoelomate animals are exemplified by
     (1) Platyhelminthes   (2) Aschelminthes   (3) Annelida   (4) Ctenophora
Ans.   **[1]**
Sol.   Platyhelminthes

Q.24   Identify the basic amino acid fro the following
     (1) Glutamic Acid   (2) Lysine   (3) Valine   (4) Tyrosine
Ans.   **[2]**
Sol.   Lysine

Q.25   In which of the following techniques, the embryos are transferred to assist those females who cannot conceive ?
     (1) GIFT and ZIFT   (2) ICSI and ZIFT   (3) GIFT and ICSI   (4) ZIFT and IUT
Ans.   **[4]**
Sol.   ZIFT and IUT

Q.26   Which of the following statements about inclusion bodies in incorrect ?
     (1) These are involved in ingestion of food particles   (2) They line free in the cytoplasm
     (3) These represent reserve material in cytoplasm   (4) They are not bound any membrane
Ans.   **[1]**
Sol.   These are involved in ingestion of food particles

Q.27   Experimental verification of the chromosomal theory of inheritance was done by -
     (1) Sutton   (2) Boveri   (3) Morgan   (4) Mendel
Ans.   **[3]**
Sol.   Morgan

Q.28 Select the option including all sexually transmitted diseases.
(1) Gonorrhoea, Malaria, Genital herpes   (2) AIDS, Malaria, Filaria
(3) Cancer, AIDS, Syphilis   (4) Gonorrhoea, Syphilis, Genital herpes
Ans. **[4]**
Sol. Gonorrhoea, Syphilis, Genital herpes

Q.29 Which of the following statements is not correct ?
(1) The proinsulin has an extra peptide called C-peptide
(2) The functional insulin has A and B chains linked together by hydrogen bonds
(3) Genetically engineered insulin is produced in *E-coli*
(4) In man insulin is synthesised as a proinsulin
Ans. **[2]**
Sol. The functional insulin has A and B chains linked together by hydrogen bonds

Q.30 Which is the important site of formation of glycoproteins and glycolipids in eukaryotic cells ?
(1) Peroxisomes   (2) Golgi bodies
(3) Polysomes   (4) Endoplasmic reticulum
Ans. **[2]**
Sol. Golgi bodies

Q.31 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*	(iii)	Citric Acid
(d)	*Aspergillus niger*	(iv)	Blood cholesterol lowering agent

(1) (a) → (ii) ; (b) → (i) ; (c) → (iv) ; (d) → (iii)   (2) (a) → (i) ; (b) → (ii) ; (c) → (iv) ; (d) → (iii)
(3) (a) → (iv) ; (b) → (iii) ; (c) → (ii) ; (d) → (i)   (4) (a) → (iii) ; (b) → (iv) ; (c) → (ii) ; (d) → (i)
Ans. **[1]**
Sol. (a) → (ii) ; (b) → (i) ; (c) → (iv) ; (d) → (iii)

Q.32 Embryological support for evolution was disapproved by :
(1) Alfred Wallace   (2) Charles Darwin
(3) Oparin   (4) Karl Ernst von Baer
Ans. **[4]**
Sol. Karl Ernst von Baer

Q.33 The sequence that controls the copy number of the linked DNA in the vector, is termed :
(1) Ori site   (2) Palindromic sequence
(3) Recognition site   (4) Selectable marker
Ans. **[1]**
Sol. Ori site

Q.34 Which of the following is correct about viroids ?
(1) They have free RNA without protein coat.   (2) They have DNA with protein coat.
(3) They have free DNA without protein coat.   (4) They have RNA with protein coat.
Ans. **[1]**
Sol. They have free RNA without protein coat.

Q.35 Montreal protocol was signed in 1987 for control of :
(1) Emission of ozone depleting substances
(2) Release of Green House gases
(3) Disposal of e-wastes
(4) Transport of Genetically modified organisms from one country to another

Ans. **[1]**

Sol. Emission of ozone depleting substances

Q.36 The number of substrate level phosphorylations in one turn of citric acid cycle is :
(1) One   (2) Two   (3) Three   (4) Zero

Ans. **[1]**

Sol. One

Q.37 Which of the following hormone levels will cause release of ovum (ovulation) from the graffian follicle?
(1) High concentration of Progesterone   (2) Low concentration of LH
(3) Low concentration of FSH   (4) High concentration of Estrongen

Ans. **[4]**

Sol. High concentration of Estrongen

Q.38 Select the correct match.
(1) Phenylketonuria – Autosomal dominant trait
(2) Sickel cell anaemia – Autosomal recessive trait, chromosome-11
(3) Thalassemia – X linked
(4) Haemophilia – Y linked

Ans. **[2]**

Sol. Sickel cell anaemia – Autosomal recessive trait, chromosome-11

Q.39 Cuboidal epithelium with brush border of microvilli is found in :
(1) ducts of salivary glands   (2) proximal convoluted tubule of nephron
(3) eustachian tube   (4) lining of intestine

Ans. **[2]**

Sol. proximal convoluted tubule of nephron

Q.40 Snow-blindness in Antarctic region is due to :
(1) Inflammation of cornea due to high dose of UV-B radiation
(2) High reflection of light from snow
(3) Damage to retina caused by infra-red rays
(4) Freezing of fluids in the eye by low temperature

Ans. **[1]**

Sol. Inflammation of cornea due to high dose of UV-B radiation

Q.41 Which of the following pairs is of unicellular algae?
(1) *Gelidium and Gracilaria*   (2) *Anabaena and Volvox*
(3) *Chlorella and Spirulina*   (4) *Laminaria and Sargassum*

Ans. **[3]**

Sol. *Chlorella and Spirulina*

Q.42 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 root   (2) Dicotyledonous stem
(3) Dicotyledonous root   (4) Monocotyledonous stem

Ans. **[4]**
Sol. Monocotyledonous stem

Q.43 How many true breeding pea plant varieties did Mendel select as pairs, which were similar except in one character with contrasting traits?
(1) 2   (2) 14   (3) 8   (4) 4

Ans. **[2]**
Sol. 14

Q.44 Floridean starch has structure similar to:
(1) Amylopectin and glycogen   (2) Mannitol and algin
(3) Laminarin and cellulose   (4) Starch and cellulose

Ans. **[1]**
Sol. Amylopectin and glycogen

Q.45 Identify the correct statement with regard to G_1 phase (Gap 1) of interphase.
(1) Reorganisation of all cell components takes place.
(2) Cell is metabolically active, grows but does not replicate its DNA.
(3) Nuclear Division takes place.
(4) DNA synthesis or replication takes place.

Ans. **[2]**
Sol. Cell is metabolically active, grows but does not replicate its DNA.

Q.46 By which method was a new breed 'Hisardale' of sheep formed by using Bikaneri ewes and Marino rams?
(1) Mutational breeding   (2) Cross breeding   (3) Inbreeding   (4) Out crossing

Ans. **[2]**
Sol. Cross breeding

Q.47 Identify the wrong statement with reference to immunity.
(1) When ready-made antibodies are directly given, it is called "Passive immunity".
(2) Active immunity is quick and gives full response.
(3) Foetus receives some antibodies from mother, it is an example for passive immunity.
(4) When exposed to antigen (living or dead) antibodies are produced in the host's body. It is called "Active immunity".

Ans. **[2]**
Sol. Active immunity is quick and gives full response.

Q.48 The specific palindromic sequence which is recognized by EcoRI is :
(1) 5'-GGAACC-3', 3'-CCTTGG-5'   (2) 5'-CTTAAG-3', 3'-GAATTC-5'
(3) 5'-GGATCC-3', 3-CCTAGG-5'   (4) 5'-GAATTC-3', 3'-CTTAAG-5'

Ans. **[4]**
Sol. 5'-GAATTC-3', 3'-CTTAAG-5'

Q.49 If the distance between two consecutive base pairs is 0.34 nm and the total number of base pairs of a DNA double helix in a typical mammalian cell is 6.6×10^9 bp, then the length of the DNA is approximately:

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

Ans. [2]

Sol. 2.2 meters

Q.50 If the head of cockroach is removed, it may live for few days because:

(1) the cockroach does not have nervous system.

(2) the head holds a small proportion of a nervous system while the rest is situated along the ventral part of its body.

(3) the head holds a $1/3^{rd}$ of a nervous system while the rest is situated along the dorsal part of its body.

(4) the supra-oesophageal ganglia of the cockroach are situated in ventral part of abdomen.

Ans. [2]

Sol. the head holds a small proportion of a nervous system while the rest is situated along the ventral part of its body.

Q.51 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 :

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

Ans. [4]

Sol. (a) → (ii) ; (b) → (iii) ; (c) → (iv) ; (d) → (i)

Q.52 The enzyme enterokinase helps in conversion of :

(1) trypsinogen into trypsin   (2) caseinogen into pepsin
(3) pepsinogen into pepsin   (4) protein into polypeptides

Ans. [1]

Sol. trypsinogen into trypsin

Q.53 Identify the correct statement with reference to human digestive system.

(1) Serosa is the innermost layer of the alimentary canal.

(2) Ileum is a highly coiled part.

(3) Vermiform appendix arises from duodenum.

(4) Ileum opens into small intestine

Ans. [2]

Sol. Ileum is a highly coiled part.

Q.54 Name the plant growth regulator which upon spraying on sugarcane crop. Increases the length of stem. Thus increasing the yield of sugarcane crop.

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

Ans. [1]

Sol. Gibberellin

Q.55 Identify the wrong statement with regard to Restriction Enzymes.
(1) They cut the strand of DNA at palindromic sites.
(2) They are useful in genetic engineering.
(3) Sticky ends can be joined by using DNA ligases.
(4) Each restriction enzyme functions by inspection the of a DNA sequence.

Ans. **[1]**

Sol. They cut the strand of DNA at palindromic sites.

Q.56 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

Choose the correct option from the following :

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

Ans. **[4]**

Sol. (a) → (ii) ; (b) → (iv) ; (c) → (iii) ; (d) → (i)

Q.57 Goblet cells of alimentary canal are modified from :
(1) Columnar epithelial cells
(2) Chondrocytes
(3) Compound epithelial cells
(4) Squamous epithelial cells

Ans. **[1]**

Sol. Columnar epithelial cells

Q.58 Match the following columns and select the correct option.

Column-I	Column-II
(a) 6-15 pairs of gill slits	(i) Trygon
(b) Heterocercal	(ii) Cyclostomes
(c) Air Bladder	(iii) Chondrichthyes
(d) Poison sting	(iv) Osteichthyes

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

Ans. **[4]**

Sol. (a) → (ii) ; (b) → (iii) ; (c) → (iv) ; (d) → (i)

Q.59 Dissolution of the synaptonemal complex occurs during :
(1) Zygotene   (2) Diplotene   (3) Leptotene   (4) Pachytene

Ans. **[2]**

Sol. Diplotene

Q.60 Name the enzyme that facilitates opening of DNA helix during transcription.
(1) DNA helicase (2) DNA polymerase
(3) RNA polymerase (4) DNA ligase
Ans. **[3]**
Sol. RNA polymerase

Q.61 Which of the following statements is correct
(1) Adenine pairs with thymine through one H-bond
(2) Adenine pairs with thymine through three H-bonds
(3) Adenine does not pair with thymine
(4) Adenine pairs with thymine through two H-bonds
Ans. **[4]**
Sol. Adenine pairs with thymine through two H-bonds

Q.62 Which of the following regions of the globe exhibits highest species diversity?
(1) Madagascar (2) Himalayas
(3) Amazon foresta (4) Western Ghats of India
Ans. **[3]**
Sol. Amazon foresta

Q.63 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

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

Ans. **[2]**
Sol. (a) → (iii) ;(b) → (i) ; (c) → (iv) ; (d) → (ii)

Q.64 The product(s) of reaction catalyzed by nitrogenase in root nodules of leguminous plants is/are :
(1) Nitrate alone (2) Ammonia and oxygen
(3) Ammonia and hydrogen (4) Ammonia alone
Ans. **[3]**
Sol. Ammonia and hydrogen

Q.65 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) Requ8ired for cholrophyll biosynthesis
(d) Manganese (iv) IAA biosynthesis
Select the correct option :

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

Ans. **[2]**
Sol. (a) → (iii) ; (b) → (iv) ; (c) → (ii) ; (d) → (i)

Q.66 Which of the following would help in prevention of diuresis ?
(1) Reabsorption of Na^+ and water form renal tubules due to aldosterone
(2) Atrial natriuretic factor causes vasoconstriction
(3) Decrease in secretion of renin by JG cells
(4) More water reabsorption due to undersecretion of ADH

Ans. **[1]**

Sol. Reabsorption of Na^+ and water form renal tubules due to aldosterone

Q.67 Meiotic division of the secondary oocyte is completed :
(1) At the time of copulation
(2) After zygote formation
(3) At the time of fusion of a sperm with an ovum
(4) Prior to ovulation

Ans. **[3]**

Sol. At the time of fusion of a sperm with an ovum

Q.68 Match the following columns and select the correct option :

Column - I	Column - II
(a) Gregarious, polyphagous pest	(i) Asterias
(b) Adult with radial	(ii) Scorpion
(c) Book lung	(iii) Ctenoplana
(d) Bioluminescence	(iv) Locusta

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

Ans. **[1]**

Sol. (a) → (iv) ; (b) → (i) ; (c) → (ii) ; (d) → (iii)

Q.69 Match the following column 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

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

Ans. **[3]**

Sol. (a) → (iv) ; (b) → (iii) ; (c) → (i) ; (d) → (ii)

Q.70 Secondary metabolites such as nicotine, strychnine and caffeine are produced by plants for their
(1) Growth response   (2) Defence action
(3) Effect on reproduction   (4) Nutritive value

Ans. **[2]**

Sol. Defence action

Q.71 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

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

Ans. **[4]**
Sol. (a) → (iv) ; (b) → (i) ; (c) → (ii) ; (d) → (iii)

Q.72 From his experiments, S.L. Miller produced amino acids by mixing the following in a closed flask :
(1) CH_3, H_2, NH_4 and water vapor at 800°C (2) CH_4, H_2, NH_3 and water vapor at 600°C
(3) CH_3, H_2, NH_3 and water vapor at 600°C (4) CH_4, H_2, NH_3 and water vapor at 800°C

Ans. **[4]**
Sol. CH_4, H_2, NH_3 and water vapor at 800°C

Q.73 Match the organism with its use in biotechnology
(a) Bacillus thuringiensis (i) Cloning vector
(b) Thermus aquaticus (ii) Construction of first DNA molecule
(c) Agrobacterium tumefaciens (iii) DNA polymerase
(d) Salmonella typhimurium (iv) Cry proteins
Select the correct option from the following :

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

Ans. **[1]**
Sol. (a) → (iv) ; (b) → (iii) ; (c) → (i) ; (d) → (ii)

Q.74 Bt cotton variety that was developed by the introduction of toxin gene of Bacillus thuringiensis (Bt) is resistant to :
(1) Fungal diseases (2) plant nematodes (3) Insect predators (4) Insect pests

Ans. **[4]**
Sol. Insect pests

Q.75 Choose the correct pair from the following :
(1) Polymerases – Break the DNA into fragments
(2) Nucleases – Separate the two strands of DNA
(3) Exonucleases – Make cuts at specific positions within DNA
(4) Ligases – Join the two DNA molecules

Ans. **[4]**
Sol. Ligases – Join the two DNA molecules

Q.76 The body of the ovule is fused within the funicle
(1) Micropyle (2) Nucellus (3) Chalaza (4) Hilum

Ans. **[4]**
Sol. Hilum

Q.77 Strobili or cones are found in :

(1) *Pteris*   (2) *Marchantia*   (3) *Equisetum*   (4) *Salvinia*

Ans. **[3]**

Sol. *Equisetum*

Q.78 Match the following columns and select the **correct** option.

	Column-I		Column-II
(a)	Eosinophils	(i)	Immune response
(b)	Basophils	(ii)	Phagocytosis
(c)	Neutrophils	(iii)	Release histaminase, destructive enzymes
(d)	Lymphocytes	(iv)	Release granules containing histamine

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

Ans. **[4]**

Sol. (a) → (iii) ; (b) → (iv) ; (c) → (ii) ; (d) → (i)

Q.79 Identify the substances having glycosidic bond and peptide bond, respectively in their structure :

(1) Glycerol, trypsin   (2) Cellulose, lecithin

(3) Inulin, insulin   (4) Chitin, cholesterol

Ans. **[3]**

Sol. Inulin, insulin

Q.80 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 more than net primary productivity.

(2) Gross primary productivity and Net primary productivity are one and same.

(3) There is no relationship between Gross primary productivity and Net primary productivity.

(4) Gross primary productivity is always less than net primary productivity.

Ans. **[1]**

Sol. Gross primary productivity is always more than net primary productivity.

Q.81 Match the following columns and select the correct option -

Column-1	Column-II
(a) Placenta	(i) Androgens
(b) Zona pellucida	(ii) Human Chorionic Gonadotropin (hCG)
(c) Bulbo-urethral glands	(iii) Layer of the ovum
(d) Leydig cells	(iv) Lubrication of the penis

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

Ans. **[3]**

Sol. (a) → (ii) ; (b) → (iii) ; (c) → (iv) ; (d) → (i)

Q.82 Which of the following is NOT an attribute of a population ?

(1) Natality   (2) Mortality   (3) Species interaction   (4) Sex ratio

Ans. **[3]**

Sol. Species interaction

Q.83 Match the following columns and select the correct option

Column-1 | 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

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

Ans. [2]

Sol. (a) → (iv) ; (b) → (ii) ; (c) → (i) ; (d) → (iii)

Q.84 Which one of the following is the most abundant protein in the animals ?
(1) Collagen   (2) Lectin   (3) Insulin   (4) Haemoglobin

Ans. [1]

Sol. Collagen

Q.85 Match the following with respect to meiosis :
(a) Zygotene | (i) Terminalization
(b) Pachytene | (ii) Chiasmata
(c) Diplotene | (iii) Crossing Over
(d) Diakinesis | (iv) Synapsis

Select the Correct option from the following :

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

Ans. [1]

Sol. (a) → (iv) ; (b) → (iii) ; (c) → (ii) ; (d) → (i)

Q.86 According to Robert May, the global species diversity is about :
(1) 20 million   (2) 50 million   (3) 7 million   (4) 1.5 million

Ans. [3]

Sol. 7 million

Q.87 The ovary is half inferior in :
(1) Mustard   (2) Sunflower   (3) Plum   (4) Brinjal

Ans. [3]

Sol. Plum

Q.88 Select the correct statement :
(1) Glucagon is associated with hypoglycemia
(2) Insulin acts on pancreatic cells and adipocyte
(3) Insulin is associated with hyperglycemia
(4) Glucocorticoids stimulate gluconeogenesis

Ans. [4]

Sol. Glucocorticoids stimulate gluconeogenesis

Q.89 The process responsible for facilitating loss of water in liquid form the tip of grass blades at night and in early morning is
(1) Root pressure   (2) Imbibition   (3) Plasmolysis   (4) Transpiration

Ans. [1]

Sol. Root pressure

Q.90 Some dividing cells exit cell cycle and enter vegetative inactive stage. This is called quiescent stage (G_0). This process occurs at the end of :
(1) G_1 phase   (2) S phase   (3) G_2 phase   (4) M phase

Ans. [1]

Sol. G_1 phase

Q.91 The plaze difference between displacement and acceleration of a particle in a simple harmonic motion is :

(1) $\dfrac{3\pi}{2}$ rad   (2) $\dfrac{\pi}{2}$ rad   (3) Zero   (4) π rad

Ans. **[4]**

Sol. Displacement (x) equation of SHM

$x = A \sin (\omega t + \phi)$ ….(1)

$\dfrac{dx}{dt} = A\omega \cos (\omega t + \phi)$

Acceleration $(a) = \dfrac{d^2 x}{dt^2}$

$a = -\omega^2 A \sin (\omega t + \phi)$

$a = \omega^2 A \sin (\omega t + \phi + \pi)$ …. (2)

from (1) & (2), phase difference between displacement and acceleration is π.

Q.92 A long solenoid of 50 cm length having 100 turns carries a current of 2.5 A. the magnetic field at the centre of the solenoid is : $(\mu_0 = 4\pi \times 10^{-7} \text{ T m A}^{-1})$

(1) 3.14×10^{-4} T   (2) 6.28×10^{-5} T   (3) 3.14×10^{-5} T   (4) 6.28×10^{-4} T
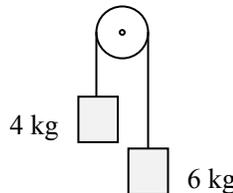
Ans. **[4]**

Sol. $B = \mu_0 \dfrac{N}{\ell} I$

$= 4\pi \times 10^{-7} \times \dfrac{100}{(0.5)} \times 2.5$

$= 6.28 \times 10^{-4}$ T

Q.93 Two bodies of mass 4 kg and 6 kg are tied to the ends of a massless string. 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
(2) g/5
(3) g/10
(4) g

Ans. **[2]**

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

$a = \dfrac{(6-4)g}{6+4} = \dfrac{2g}{10}$

$a = \dfrac{g}{5}$

Q.94 The ration of contributions made by the electric field and magnetic field components to the intensity of an electromagnetic wave is : (e = speed of electromagnetic waves)

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

Ans. **[1]**

Sol. In EMW, electric field and magnetic field have same energy density and same intensities.

Q.95 In a certain region of space with volume 0.2 m³, the electric potential is found to be 5 V throughout The magnitude of electric field in this region is :

(1) 0.5 N/C   (2) 1 N/C   (3) 5 N/C   (4) zero

Ans. **[4]**

Sol. Potential is constant throughout the volume

∴ Electric field is zero.

Q.96 The average thermal energy for a mono-atomic gas is : (K_B is Boltzmann constant and T. absolute temperature)

(1) $\dfrac{3}{2}k_BT$ (2) $\dfrac{5}{2}k_BT$ (3) $\dfrac{7}{2}k_BT$ (4) $\dfrac{1}{2}k_BT$

Ans. **[1]**

Sol. Average thermal energy = $\dfrac{3}{2}k_BT$

where 3 is translational degree of freedom

For monoatomic gas total degree of freedom f = 3 (translational degree of freedom)

Q.97 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) $6\hat{j}$ N m   (2) $-6\hat{i}$ N m   (3) $6\hat{k}$ N m   (4) $6\hat{i}$ N m

Ans. **[2]**

Sol. $\vec{F} = 3\hat{j}\,N$, $\vec{r} = 2\hat{k}$

$\vec{\tau} = \vec{r} \times \vec{F} = 2\hat{k} \times 3\hat{j} = 6(\hat{k} \times \hat{j})$

$= 6(-\hat{i})$

$\vec{\tau} = -6\hat{i}$ Nm

Q.98 The mean free path for a gas, with molecular diameter d and number density n can be expressed as :

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

Ans. **[1]**

Sol. Mean free path for a gas sample

$\lambda_m = \dfrac{1}{\sqrt{2}\,\pi d^2 n}$

where d is diameter of a gas molecule and n is molecular density

Q.99 The energy equivalent of 0.5 g of a substance is :

(1) 4.5×10^{13} J   (2) 1.5×10^{13} J   (3) 0.5×10^{13} J   (4) 4.5×10^{13} J

Ans. **[1]**

Sol. $E = mc^2$

$= 0.5 \times 10^{-3} \times 9 \times 10^{16}$

$= 4.5 \times 10^{-3}$ J

Q.100 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) 0.25 m m   (2) 0.5 m m   (3) 1.0 m m   (4) 0.01 m m

Ans. **[2]**

Sol. L.C. - $\dfrac{\text{Pitch}}{\text{Number of division on circular scale}}$

$\Rightarrow 0.01 \text{ mm} = \dfrac{\text{Pitch}}{50}$

$\Rightarrow$ Pitch $= 0.5$ mm

Q.101 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) adiabatic   (2) isochoric   (3) isobaric   (4) isothermal

Ans. **[4]**

Sol. $\Delta U = 0$. Hence $U_i = U_f \Rightarrow \Delta T = 0$

Q.102 A cylinder contains hydrogen gas at pressure of 249 kPa and temperature 27°C.

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

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

Ans. **[1]**

Sol. For an ideal gas sample

$$\frac{P}{\rho} = \frac{RT}{Mw}$$

$$\rho = \frac{PMw}{RT} = \frac{249 \times 10^3 \times 2 \times 10^{-3}}{8.314 \times 300} = 0.199$$

$$\rho = 0.2 \text{ kg/m}^3$$

Q.103 When a uranium isotope $^{235}_{92}U$ is bombarded with a neutron, it generates $^{89}_{36}Kr$, three neutrons and :

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

Ans. **[4]**

Sol. $^{235}_{92}U + ^{1}_{0}n \rightarrow ^{89}_{36}Kr + ^{144}_{56}Ba + 3^{1}_{0}n + Q$

Q.104 A charged particle having drift velocity of 7.5×10^{-4} m s^{-1} in an electric field of 3×10^{-10} Vm^{-1}, has a mobility in m^2 V^{-1} s^{-1} of :

(1) 2.5×10^6 (2) 2.5×10^{-6} (3) 2.25×10^{-15} (4) 2.25×10^{15}

Ans. **[1]**

Sol. $\mu = \dfrac{v_d}{E} = \dfrac{7.5 \times 10^{-4}}{3 \times 10^{-10}}$

$= 2.5 \times 10^6$

Q.105 Taking into account of the significant figures, what is the value of 9.99 m – 0.0099 m ?

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

Ans. **[1]**

Sol. In subtraction the number of decimal places in the result should be equal to the number of decimal places of that term in the operation which contain lesser number of decimal places.

9.99

$\dfrac{-0.0099}{9.98}$ → 3 siginificant figures

Q.106 An iron rod of susceptibility 599 is subjected to a magnetising field of 1200 A m^{-1}. The permeability of the material of the rod is : ($\mu_0 = 4\pi \times 10^{-7}$ T m A^{-1})

(1) 8.0×10^{-5} T m A^{-1} (2) $2.4\pi \times 10^{-5}$ T m A^{-1}

(3) $2.4\pi \times 10^{-7}$ T m A^{-1} (4) $2.4\pi \times 10^{-4}$ T m A^{-1}

Ans. **[4]**

Sol. $\mu_r = x_m + 1 = 599 + 1 = 600$

$\mu = \mu_0\mu_r = 4\pi \times 10^{-7} \times 600$

$= 2.4\pi \times 10^{-4} \dfrac{Tm}{A}$

Q.107 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 ?

$$\left(\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9 \, N \, m^2 / C^2\right)$$

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

Ans. **[1]**

Sol. $E = \dfrac{kQ}{r^2} = \dfrac{9 \times 10^9 \times 3.2 \times 10^{-7}}{(15 \times 10^{-2})^2}$

$E = 1.28 \times 10^5$ N/C

Q.108 A series LCR circuit is connected to an voltage source. When L is removed from the circuit, the phase difference between current and voltage is $\dfrac{\pi}{3}$. If instead C is removed from the circuit, the phase difference is again $\dfrac{\pi}{3}$ between current and voltage. The power factor of the circuit is :

(1) 0.5   (2) 1.0   (3) −1.0   (4) zero

Ans. **[2]**

Sol. When L removed $\tan\phi = \dfrac{X_C}{R}$

When L removed $\tan\phi = \dfrac{X_L}{R}$

$\dfrac{X_C}{R} = \dfrac{X_L}{R} \Rightarrow$ Resonance

$Z = R$

$\cos\phi = \dfrac{R}{Z} = \dfrac{R}{R} = 1$

Q.109 A capillary tube of radius r is immersed in water and water 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) 5.0 g   (2) 10.0 g   (3) 20.0 g   (4) 2.5 g

Ans. **[2]**

Sol. $m \propto r$

$\dfrac{m_2}{m_1} = \dfrac{r_2}{r_1}$

$\dfrac{m_2}{5} = \dfrac{2r}{r}$

$m_2 = 10$ g

Q.110 In Young's double slit experiment, if the separation between coherent sources is halved and the distance of the screen from the coherent sources is doubled, then the fringe width becomes :

(1) half   (2) four times   (3) one-fourth   (4) double

Ans. **[2]**

Sol. $\beta = \dfrac{\lambda D}{d}$

$\beta' = \dfrac{\lambda D'}{d'}$

$D' = 2D, \ d' = \dfrac{d}{2}$

$\beta' = \dfrac{\lambda \times 2D}{d/2} = \dfrac{4\lambda D}{d}$

$\beta' = 4\beta$

Fringe with becomes 4 times

Q.111 For the logic circuit shown, the truth table is :

(1)   A   B   Y
     0   0   0
     0   1   1
     1   0   1
     1   1   1

(2)   A   B   Y
     0   0   1
     0   1   1
     1   0   1
     1   1   0

(3)   A   B   Y
     0   0   1
     0   1   0
     1   0   0
     1   1   0

(4)   A   B   Y
     0   0   0
     0   1   0
     1   0   0
     1   1   1

Ans. **[4]**

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

A   B   Y
0   0   0
0   1   0
1   0   0
1   1   1

Q.112 The color code of a resistance is given below :

Yellow   Violet   Brown   Gold
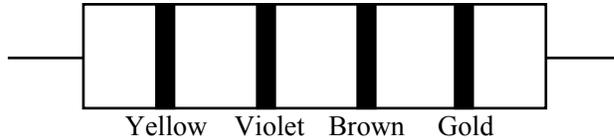
The values of resistance and tolerance, respectively, are :

(1) 4.7 kΩ, 10% (2) 4.7 kΩ, 5% (3) 470 kΩ, 5% (4) 470 kΩ, 5%

Ans. **[3]**

Sol. $R = 47 \times 10^1 \pm 5\%$

$R = 470\ \Omega, 5\%$

Q.113 The capacitance of a parallel plate capacitor with air as medium is 6μF. With the introduction of a dielectric medium, the capacitance becomes 30 μF. The permittivity of the medium is :

($\varepsilon_0 = 8.85 \times 10^{-12}$ C2 N^{-1} m^{-2})

(1) 1.77×10^{-12} C^2 N^{-1} m^{-2}

(2) 0.44×10^{-10} C^2 N^{-1} m^{-2}

(3) 5.00 C^2 N^{-1} m^{-2}

(4) 0.44×10^{-13} C^2 N^{-1} m^{-2}

Ans. **[2]**

Sol. $C_m = \in_r C_0$

$\in_r = \dfrac{30}{6} = 5$
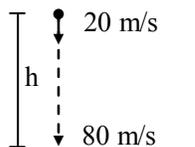
$\in\ =\ \in_0. \in_r\ = 8.85 \times 10^{-12} \times 5$

$\in\ = 0.44 \times 10^{-10}$

Q.114 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 m/s^2)

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

Ans. **[3]**

Sol.

$v^2 = u^2 + 2gh$

$80^2 = 20^2 + 2 \times 10h$

$h = 300$ m

Q.115 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) 32 N (2) 30 N (3) 24 N (4) 48 N

Ans. **[1]**

Sol. $W_s = mg_s = 72$ N

$W_h = mg_h = \dfrac{mg_s}{\left(1 + \dfrac{h}{R}\right)^2} = \dfrac{72N}{\left(1 + \dfrac{R/2}{R}\right)^2} = \dfrac{72}{9/4}$
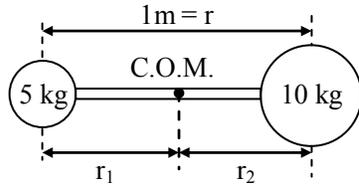
$W_h = 32$ N

Q.116 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) 50 cm (2) 67 cm (3) 80 cm (4) 33 cm

Ans. **[2]**

Sol.

$mr = constant \Rightarrow r \propto \dfrac{1}{m}$

$\dfrac{r_1}{r_2} = \dfrac{m_2}{m_1} = \dfrac{10}{5} = \dfrac{2}{1}$

$r_1 = \dfrac{2}{3}r = \dfrac{2}{3} \times 1m = 67 \text{ cm}$

Q.117 The increase in the width of the depletion region in a p-n junction diode is due to

(1) reverse bias only (2) both forward bias and reverse bias

(3) increase in forward current (4) forward bias only

Ans. **[1]**

Sol. In reverse bias external battery attract majority charge carriers. So width of the depletion region increase

Q.118 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) four times (2) one-forth (3) zero (4) doubled

Ans. **[3]**

Sol. $K_1 = 1.5 \, h\nu_0 - \phi_0 = 0.5 \, h\nu_0$

$K_2 = \dfrac{1.5}{2} \, h\nu_0 - h\nu_0 = -0.25 \, h\nu_0$

∵ Kinetic energy can never be negative

So, no emission and i = 0

OR

In second case the incident frequency is halved

Incident frequency = $\dfrac{1.5}{2}\nu_0 = 0.75 \, \nu_0$

Now the incident frequency is less than threshold frequency so no emission of electron take place therefore no current. (i = 0)

Q.119 Assume that light of wavelength 600 nm is coming from a star. The limit of resolution of telescope whose objective has a diameter of 2m is

(1) 1.83×10^{-7} rad (2) 7.32×10^{-7} rad (3) 6.00×10^{-7} rad (4) 3.66×10^{-7} rad

Ans. **[4]**

Sol. Limit of resolution $= \dfrac{1.22\lambda}{a}$

$= \dfrac{1.22 \times 6 \times 10^{-7}}{2}$

$= 3.66 \times 10^{-7}$ rad

Q.120 A resistance wire connected in the left gap of a metre bridge balances a 10 Ω 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 the resistance wire is 1.5 m, then the length of 1 Ω of the resistance wire is :

   (1) 1.0×10^{-1} m   (2) 1.5×10^{-1} m   (3) 1.5×10^{-2} m   (4) 1.0×10^{-2} m

Ans.   **[1]**

Sol.

$$\frac{R}{10} = \frac{\ell_1}{\ell_2}$$

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

R = 15Ω
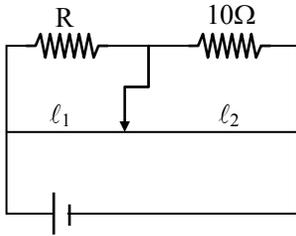
Length of 15Ω resistance wire is 1.5 m

∴ length of 1Ω resistance wire = $\dfrac{1.5}{15}$ = 0.1

$= 1.0 \times 10^{-1}$ m

Q.121 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) 12×10^3 J   (2) 24×10^3 J   (3) 48×10^3 J   (4) 10×10^3 J

Ans.   **[2]**

Sol. $I = \dfrac{E}{At}$
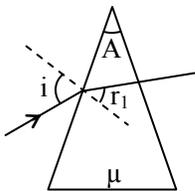
E = IAt

$= \dfrac{20}{10^{-4}} \times 20 \times 10^{-4} \times 60$

$= 24 \times 10^3$ J

Q.122 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) 2A/μ   (2) μA   (3) μA/2   (4) A/2μ

Ans.   **[2]**

Sol.

$r_2 = 0$

$r_1 = A$

Apply Snell's law

$\sin i = \mu \sin r_1$

for small angle $(r_1 = A)$

$i = \mu A$

Q.123 A 40 µF capacitor is connected to a 200 V, 50 Hz ac supply. The rms value of the current in the circuit is, nearly :

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

Ans. **[2]**

Sol. $I = \dfrac{V}{X_c} = \dfrac{V}{1/C\omega} = VC\omega$

$= 200 \times 40 \times 10^{-6} \times 2\pi \times 50$

$= 2.5$ A

Q.124 Dimensions of stress are :

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

Ans. **[3]**

Sol. stress $= \dfrac{\text{Force}}{\text{Area}}$

$= \dfrac{M^1L^1T^{-2}}{L^2}$

$= [M^1L^{-1}T^{-2}]$

Q.125 The Brewsters angle i_b for an interface should be :

(1) $30º < i_b < 45º$ (2) $45º < i_b < 90º$ (3) $i_b = 90º$ (4) $0º < i_b < 30º$

Ans. **[2]**

Sol. $\tan i_b = \dfrac{\mu_2}{\mu_1} = \dfrac{\mu_1}{1}$

$\mu_2 > 1$

$\therefore \tan i_b > 1$

$\therefore 90° > i_b > 45°$

Q.126 A wire of length L, area of cross section A is hanging form a fixed support. The length of the wire changes to L_1 When mass M is suspended form its free end. The expression for Young's modulus is :

(1) $(Mg(L_1–L))/AL$ (2) $MgL/(AL_1)$ (3) $MgL/A(L_1–L)$ (4) MgL_1/AL

Ans. **[3]**

Sol. $Y = \dfrac{FL}{A\Delta L} = \dfrac{MgL}{A(L_1 - L)}$

Q.127 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 form the center of the dipole, situated on a line making an angle of 60º with the dipole axis is : $\left(\dfrac{1}{4\pi\varepsilon_0} = 9 \times 10^9 \, \text{N m}^2 / C^2 \right)$

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

Ans. **[1]**

Sol. $V = \dfrac{kP\cos\theta}{r^2} = \dfrac{9\times10^9 \times 16\times10^{-9}}{(0.6)^2} \times \dfrac{1}{2}$

$V = 200$ V

Q.128 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 A is 530 Hz, the original frequency of B will be :

(1) 524 Hz   (2) 536 Hz   (3) 537 Hz   (4) 523 Hz

Ans. **[1]**

Sol. Guitar string i.e. is fixed from both ends

A $\vdash\!\!\!—————\!\!\!\dashv$ 530 H$_z$

B $\vdash\!\!\!—————\!\!\!\dashv$ 536H$_z$ 524H$_z$
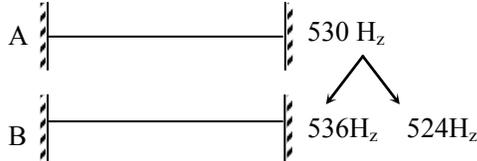
Frequency $\propto \sqrt{\text{Tension}}$

If tension in B slightly decrease then frequency of B decrease.

If B is 536 Hz, as the frequency decreases, beats with A also decreases.

If B is 524 Hz, as the frequency decreases, beats with A increases

∴ Original frequency of B will be 524 Hz.

Q.129 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) 10^2 V   (2) 10^3 V   (3) 10^4 V   (4) 10 V

Ans. **[3]**

Sol. $\lambda = 1.227 \times 10^{-2}$ nm

$= 0.1227$ Å

$\lambda = \dfrac{12.27}{\sqrt{v}}$ Å

$0.1227 = \dfrac{12.27}{\sqrt{v}}$ Å

$\sqrt{v} = 10^2 \Rightarrow v = 10^4$ volt

Q.130 The solids which have the negative temperature coefficient of resistance are :

(1) insulators only   (2) semiconductors only
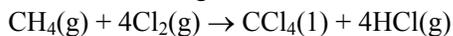
(3) insulators and semiconductors   (4) metals

Ans. **[3]**

Q.131 The energy required to break one bond in DNA is 10^{-20} J. This value in eV is nearly :

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

Ans. **[2]**

Sol. $E = \dfrac{10^{-20}}{1.6\times10^{-19}}$ eV

$= 0.625 \times 10^{-1}$

$= 0.0625$ eV

Q.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) 9/4   (2) 3/2   (3) 5/3   (4) 27/8

Ans. **[4]**

Sol. Heat supplied $\Delta Q = Ms\Delta T$

For same material 's' same.

$\Delta Q \propto M$ and $M = \dfrac{4}{3}\pi r^6 \rho$

$\Delta Q \propto r^3$

$\dfrac{\Delta Q_1}{\Delta Q_2} = \left(\dfrac{r_1}{r_2}\right)^3 = \left(\dfrac{1.5}{1}\right)^3 = \dfrac{27}{8}$

Q.133 Which of the following graph represents the variation of resistivity (r) with temperature (T) for copper ?

Ans. **[2]**

Sol. For some metal like copper, resistivity is nearly proportional to temperature although a non linear region always exists at very low temperature.

Q.134 For transistor action, which of the following statements is correct

(1) Base, emitter and collector regions should have same size.

(2) Both emitter junction as well as the collector junction are forward biased.

(3) The base region must be very thin and lightly doped.

(4) Base, emitter and collector regions should have same doping concentrations

Ans. **[3]**

Sol. Base region is very thin and lightly doped.

Q.135 For which one of the following, Bohr model is not valid?

(1) Singly ionized helium atom (He^+)

(2) Deuteron atom

(3) Singly ionized neon atom (Ne^+)

(4) Hydrogen atom

Ans. **[3]**

Sol. Bohr model is applicable for only single electron species.

Q.136 What is the change in oxidation number of carbon in the following reaction ?
$CH_4(g) + 4Cl_2(g) \rightarrow CCl_4(1) + 4HCl(g)$
(1) 0 to + 4 (2) – 4 to + 4 (3) 0 to – 4 (4) + 4 to + 4

Ans. **[2]**

Sol. $CH_{4(g)} + 4Cl_{2(g)} \rightarrow CCl_{4(\ell)} + 4HCl_{(g)}$
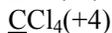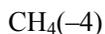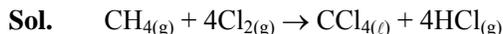
$\underline{C}H_4(-4)$
$\underline{C}Cl_4(+4)$
–4 to + 4

Q.137 On electrolysis of dil. Sulphuric acid using Platinum (Pt) electrode, the product obtained at anode will be :
(1) Oxygen gas (2) H_2S gas (3) SO_2 gas (4) Hydrogen gas

Ans. **[1]**

Sol. H_2SO_4

At Anode : $2H_2O \rightarrow O_{2(g)} + 4H^+_{(aq)} + 4e^-$ Oxygen gas will liberate at anode

Q.138 An increase in the concentration of the reactants of reaction leads to change in :
(1) Heat of reaction (2) Threshold energy
(3) Collision frequency (4) Activation energy

Ans. **[3]**

Sol. $Z_{12} \propto$ number of reactant molecules per unit volume.

Q.139 Reaction between benzaldehyde and acetophenone in presence of dilute NaOH is known as
(1) Cannizzaro's reaction (2) Cross Cannizzaro's reaction
(3) Cross Aldol condensation (4) Aldol condensation

Ans. **[3]**

Sol.

(Major)
Cross-Aldol product
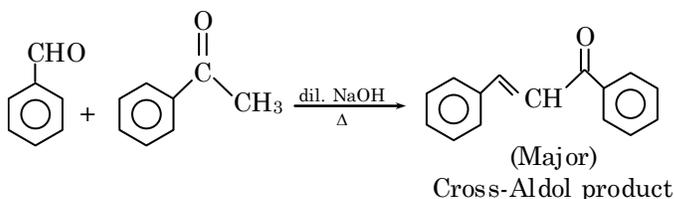
Q.140 Which of the following alkane cannot be made in good yield by Wurtz reaction ?
(1) 2,3-Dimethylbutane (2) n-Heptane
(3) n-Butane (4) n-Hexane

Ans. **[2]**

Sol. n-Heptane can not be made in good yield using Wurtz reaction since it is unsymmetrical alkane.

Q.141 Which of the following is a natural polymer ?
(1) Poly (Butadiene-styrene) (2) polybutadiene
(3) Poly (Butadiene-acrylonitrile) (4) cis-1,4-polyisoprene

Ans. **[4]**

Sol. 12th NCERT (15.2.4)

Q.142 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) 12 bar (2) 15 bar (3) 18 bar (4) 9 bar

Ans. **[2]**

Sol. N₂ Ar

	7 gram	8 gram
moles	$\dfrac{7}{28} = \dfrac{1}{4}$	$\dfrac{8}{40} = \dfrac{1}{5}$

(partial pressure)N₂ = P$_T$ × (mole fraction)N₂

$= 27 \times \dfrac{1/4}{1/4 + 1/5}$

$= 27 \times \dfrac{1/4}{9/20}$

$= 27 \times \dfrac{20}{4 \times 9}$

$= 3 \times 5$

$= 15$ bar

Q.143 Match the following and identity 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_2H_6 (iii) Synthesis gas

(d) H_2O_2 (iv) Non-planar structure

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

Ans. **[4]**

Sol. (a) CO + H₂   ...(iii) synthesis gas

(b) Temporary Hardness   ...(i) $Mg(HCO_3)_2 + Ca(HCO_3)_2$

(c) B_2H_6 ...(ii) Electron deficient (6e⁻)

(d) H_2O_2 ...(iv) Non-planar structure
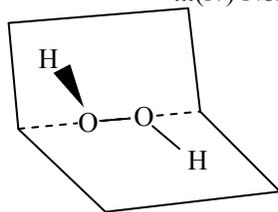
Q.144 For the reaction, $2Cl(g) \rightarrow Cl_2(g)$, the correct option is :

(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. **[3]**

Sol. $2Cl(g) \longrightarrow Cl_2(g)$

$\Delta_r S < 0$ and $\Delta_r H < 0$

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

(1) $\dfrac{\sqrt{2}}{4} \times 288$ pm   (2) $\dfrac{4}{\sqrt{3}} \times 288$ pm

(3) $\dfrac{4}{\sqrt{2}} \times 288$ pm   (4) $\dfrac{\sqrt{3}}{4} \times 288$ pm

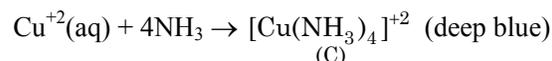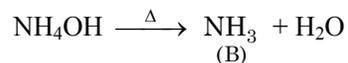**Ans.**   **[4]**

Sol. $\sqrt{3}a = 4r$ (for bcc lattice)

$r = \dfrac{\sqrt{3}}{4} \times 288$ pm

Q.146   Urea reacts with water of 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) $[Cu(NH_3)_4]^{2+}$ (2) $Cu(OH)_2$ (3) $CuCO_3.Cu(OH)_2$ (4) $CuSO_4$

Ans.   **[1]**

Sol. $NH_2CoNH_2 + H_2O \rightarrow CO_2 + \underset{(A)}{NH_4OH}$

$NH_4OH \xrightarrow{\Delta} \underset{(B)}{NH_3} + H_2O$

$Cu^{+2}(aq) + 4NH_3 \rightarrow \underset{(C)}{[Cu(NH_3)_4]^{+2}}$ (deep blue)

Q.147   Reaction between acetone and methylmagnesium chloride followed by hydrolysis will give :

(1) Sec. butyl alcohol   (2) Tert. butyl alcohol

(3) Isobutyl alcohol   (4) Isopropyl alcohol

Ans.   **[2]**

Sol.
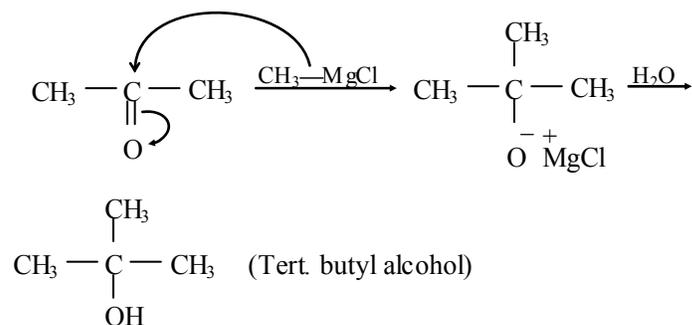
Q.148   The following metal ion activates many enzymes, participates in the oxidation of glucose to produce ATP and with Na, is responsible for the transmission of nerve signals.

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

Ans.   **[3]**

Sol.   Biological importance of sodium & potassium.

Q.149   The number of protons, neutrons and electrons in $^{175}_{71}Lu$, respectively, are :

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

Ans.   **[4]**

Sol. $^{175}_{71}Lu$

$p^+ = 71$

$n^0 = 175 - 71 = 104$

$e^- = 71$

Q.150 Which of the following set of molecules will have zero dipole moment ?
(1) Boron trifluoride, hydrogen fluoride, carbon dioxide, 1,3-dichlorobenzene
(2) Nitrogen trifluoride, beryllium difluoride, water, 1,3-dichlorobenzene
(3) Boron trifluoride, beryllium difluoride, carbon dioxide, 1,4-dichlorobenzene
(4) Ammonia, beryllium difluoride, water, 1,4-dichlorobenzene

Ans. **[3]**

Sol. BF_3, BeF_2, CO_2 and 1,4-dichloro benzene all are symmetrical structure.
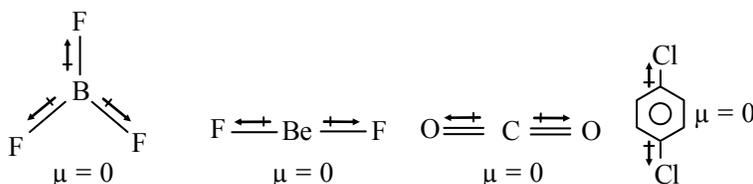
Q.151 Identify a molecule which does not exist.
(1) Li_2 (2) C_2 (3) O_2 (4) He_2

Ans. **[4]**

Sol. He_2 = Total electron = 4

$$= \sigma_{1\sigma}^2\ \sigma_{1\sigma}^{*2} \Rightarrow \text{B.O.} = \frac{1}{2}[Nb - Na] = \frac{1}{2}[2 - 2] = 0$$

Bond order = 0, so He_2 does not exist.

Q.152 Identify the incorrect match.

Name	IUPAC Official Name
(a) Unnilunium	(i) Mendelevium
(b) Unniltrium	(ii) Lawrencium
(c) Unnilhexium	(iii) Seaborgium
(d) Unununnium	(iv) Darmstadtium

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

Ans. **[3]**

Sol. Unnununium (Z = 111) it is Rontgentum (Rg) not darmstadtium.

Q.153 The rate constant for a first order reaction is 4.606×10^{-3} s^{-1}. The time required to reduce 2.0 g of the reactant to 0.2 g is :
(1) 200 s   (2) 500 s   (3) 1000 s   (4) 100 s

Ans. **[2]**

Sol. $k = 4.606 \times 10^{-3}$ s^{-1}

$$kt = 2.303 \log_{10} \frac{2}{0.2}$$

$$4.606 \times 10^{-3} \times t = 2.303 \times \log 10$$

$$t = \frac{1000}{2} = 500 \text{ s}$$

Q.154 Identity the correct statement from the following :
(1) Blister copper has bhastered appearance due to evolution of CO_2
(2) Vapour phase refining is carried out for Nickel by Van Arkel method
(3) Pig iron can be moulded into a variety of shapes
(4) Wrought iron is impure iron with 4% carbon

Ans. **[3]**

Sol. Pig iron contains impurities (C, S, Si, P etc) having malleable nature that's why can be moulded.

Q.155 Measuring Zeta potential is useful in determining which property of colloidal solution ?

(1) Solubility   (2) Stability of the colloidal particles

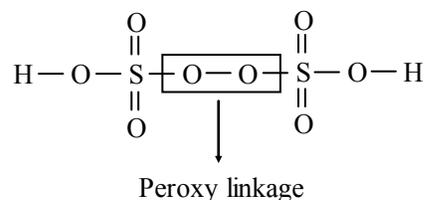(3) Size of the colloidal particles   (4) Viscosity

Ans. **[2]**

Sol. Greater the Zeta potential more will be the stability of colloidal particles.

Q.156 Which of the following oxoacid of sulphur has – O – O – linkage ?

(1) H_2SO_4, sulphuric acid   (2) $H_2S_2O_8$, peroxodisulphuric acid

(3) $H_2S_2O_7$, pyrosulphuric acid   (4) H_2SP_3, sulphurous acid

Ans. **[2]**

Sol.

Peroxy linkage

Q.157 Elimination reaction of 2-Bromo-pentane to form pent—2-ene is :

(a) β-Elimination reaction   (b) Follows Zaitsev rule

(c) Dehydrohalogenation reaction   (d) Dehydration reaction

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

Ans. **[4]**

Sol.
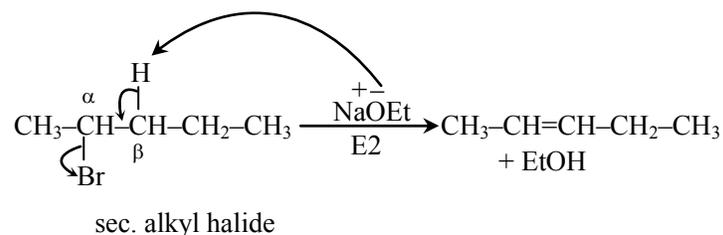
This reaction is an example of β-elimination.

Hydrogen is removed from β-carbon and halogen from α-carbon, hence dehydrohalgoenation reaction

Generally in E2 reaction Zaitsev lakene is formed as major product (more stable alkene).

Q.158 Identify the correct statements from the following :

(a) CO_2 (g) is used as refrigerant for ice-cream and frozen food.

(b) The structure of C_{60} 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 odorless gas

(1) (a) and (c) only

(2) (b) and (c) only
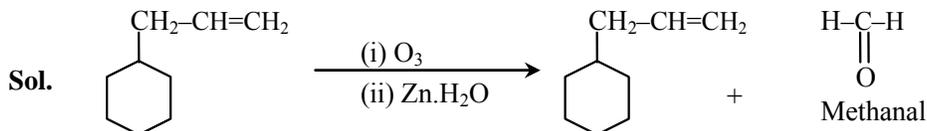
(3) (c) and (d) only

(4) (a), (b) and (c) only

Ans. **[3]**

Sol. Correct statement are (c) and (d)

(c) use of zeolite (3d-silicate)

(d) CO-neutral, colourless & odourless gas.

Q.159 An alkene on ozonolysis gives methanol as one of the product. Its structure is :

(1) Ring with $CH_2-CH_2-CH_3$ substituent

(2) Ring with $CH_2-CH=CH_2$ substituent

(3) Ring with $CH_2CH_2CH_3$ substituent

(4) Ring with $CH=CH-CH_3$ substituent

Ans. **[2]**

Sol.

Cyclohexane with $CH_2-CH=CH_2$ $\xrightarrow[\text{(ii) Zn.H}_2\text{O}]{\text{(i) O}_3}$ Cyclohexane with $CH_2-CH=CH_2$ + H–C–H (=O) Methanal

Q.160 Paper chromatography is an example of
(1) Partition chromatography   (2) Thin layer chromatography
(3) Column chromatography   (4) Adsorption chromatography

Ans. **[1]**
Sol. 11th NCERT (12.8.5) chromatography

Q.161 Match the following

Oxide	Nature
(1) CO	(i) Basic
(2) BaO	(ii) Neutral
(3) Al_2O_3	(iii) Acidic
(4) Cl_2O_7	(iv) Amphoteric

Which of the following is correct option ?

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

Ans. **[1]**
Sol. (a) CO   (ii) Neutral
      (b) BaO   (i) Basic
      (c) Al_2O_3 (iv) Amphoteric
      (d) Cl_2O_7 (iii) Acidic

Q.162 Which one of the followings has maximum number of atoms?
(1) 1 g of Mg(s) [Atomic mass of Mg = 24]
(2) 1 g of O_2(g) [Atomic mass of O = 16]
(3) 1 g of Li (s) []Atomic mass of Li = 7[
(4) 1 g of Ag(s) [Atomic mass of Ag = 108]

Ans. **[3]**
Sol. Number of atoms

$$= \frac{w}{\text{molar mass}} \times N_A \times \text{atomicitiy}$$

(1) $\frac{1}{7} \times N_A \times 1$

(2) $\dfrac{1}{108} \times N_A \times 1$
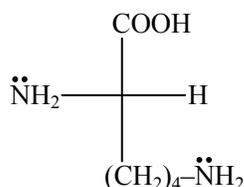
(3) $\dfrac{1}{24} \times N_A \times 1$

(4) $\dfrac{1}{32} \times N_A \times 2$

Q.163 Which of the following is a basic amino acid ?

(1) Alanine   (2) Tyrosine   (3) Lysine   (4) Serine
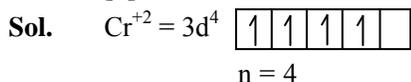
Ans. **[3]**

Sol.

$$\overset{\displaystyle COOH}{\underset{\displaystyle (CH_2)_4-\ddot{N}H_2}{\overset{|}{\underset{|}{\ddot{N}H_2 \quad\rule[0.5ex]{2em}{0.4pt}\quad H}}}}$$

Lysine

Since it contains more number of $-NH_2$ groups as compared to $-COOH$ groups hence it is basic amino acid.

Q.164 The calculated spin only magnetic moment of Cr^{2+} ion is

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

Ans. **[1]**

Sol. $Cr^{+2} = 3d^4$ $\boxed{\uparrow\,|\,\uparrow\,|\,\uparrow\,|\,\uparrow\,|\,\,}$

           n = 4

    $\mu = \sqrt{n(n+2)}$ B.M. $= \sqrt{4(6)} = \sqrt{24}$ B.M.

      = 4.90 B.M.

Q.165 Sucrose on hydrolysis gives

(1) α-D-Glucose + β-D-Glucose   (2) α –D-Glucose + β-D-Fructose

(3) α-D-Fructose + β-D-Fructose   (4) β-D-Glucose + α-D-Fructose

Ans. **[2]**

Sol. Sucrose $\xrightarrow[\text{(Hydrolysis)}]{H_2O^+}$ α-D-Glucose + β-D-Fructose
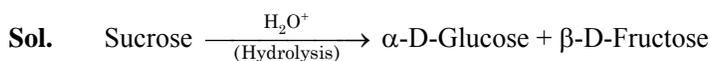
Q.166 The mixture which shows positive devation form Raoult's law is :

(1) Benzene + Toluene   (2) Acetone + Chloroform

(3) Chloroethane + Bromoethane   (4) Ethanol + Acetone

Ans. **[4]**

Sol. Hydrogen bond of ethanol gets weakened by addition of acetone.

Q.167 A tertiary butyl carbocation is more stable than a secondary butyl carbocation because of which of the following ?

(1) + R effect of – CH_3 groups   (2) – R effect of – CH_3 groups

(3) Hyperconjugation   (4) – I effect of – CH_3 groups

Ans. [3]

Sol.

CH₃—C⊕(CH₃)(CH₃) — diagram with central carbon bearing positive charge and three CH₃ groups

$$CH_3 - \overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C^{\oplus}}} \quad > \quad CH_3 - \overset{\oplus}{CH} - CH_2 - CH_3$$

$(9\alpha \text{ H})$

Tert. Butyl Carbocation   Sec. Butyl Carbocation

↓

More stable due to Hyperconjugation effect

Q.168 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) 2×10^{-8} M   (2) 1×10^{-13}M   (3) 1×10^{8}M   (4) 2×10^{-13}M

Ans. [4]

Sol. $\alpha = 1$ for NaOH

$$NaOH_{(aq)} \longrightarrow \underset{0.1\,M}{Na^{+2}}(aq) + \underset{0.1\,M}{OH^-}(aq)$$

$$Ni(OH)_2\,(s) \rightleftharpoons \underset{S'}{Ni^{+2}}(aq) + \underset{0.1+2S'}{2OH^-}(aq)$$

Ionic product = $(S')\,(0.1 + 2S')^2$

$2 \times 10^{-15} = S'(0.1)^2$

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

Q.169 Which of the following is a cationic detergent ?

(1) Sodium stearate   (2) Catyltrimethyl ammonium bromide

(3) Sodium dodecylbenzene sulphonate   (4) Sodium lauryl sulphate

Ans. [2]

Sol. $C_{19}H_{42}N^+Br^-$ (cationic detergent)

12th NCERT (16.5.2)

Synthetic detergents

Q.170 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 m containing a non – electrolyte solute in benzene is (rounded off upto two decimal places)

(1) 0.80 K   (2) 0.40 K   (3) 0.90 K   (4) 0.20 K

Ans. [2]

Sol. $\Delta T_f = K_f \times m$

$= 5.12 \times 0.078$

$\Delta T_f = 0.40$ K

Q.171 Identify the **incorrect** statement

(1) 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

(2) Interstitial compounds are those that are formed when small atom like H, C or N are trapped inside the crystal lattices of metals

(3) The oxidation states of chromium in CrO_4^{2-} and $Cr_2O_7^{2-}$ are not the same

(4) $Cr^{2+}(d^4)$ is a stronger reducing agent than $Fe^{2+}(d^6)$ in water

Ans. **[3]**

Sol. chromate $(CrO_4^{-2}) \Rightarrow$ oxidation state = +6

dichromate $(Cr_2O_7^{-2}) \Rightarrow$ oxidation state = +6

oxidation state are same.

Q.172 Which of the following is **not** correct about carbon monoxide ?

(1) It reduces oxygen carrying ability of blood

(2) The carboxyhaemoglobin (haemoglobin bound to CO) is less stable than oxyhaemoglobin

(3) It is produced due to incomplete combustion

(4) It forms carboxyhaemoglobin

Ans. **[2]**

Sol. Not correct

Carboxyhaemoglobin (haemoglobin bound to CO) is more stable than oxyhaemoglobin.

Q.173 Hydrolysis of sucros is given by the following reaction

Sucrose + H₂O $\rightleftharpoons$ Glucose + Fructose
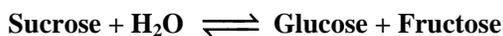
If the equilibrium constant (K_c) is 2×10^{13} at 300 K, the value of ΔrG^Θ at the same temperature will be

(1) 8.314 J mol^{-1} K^{-1} × 300 K × ln (2×10^{13})

(2) 8.314 J mol^{-1} K^{-1} × 300 K × ln (3×10^{13})

(3) −8.314 J mol^{-1} K^{-1} × 300 K × ln (4×10^{13})

(4) −8.314 J mol^{-1} K^{-1} × 300 K × ln (2×10^{13})

Ans. **[4]**

Sol. $K_C = 2 \times 10^{13}$

T = 300K

$\Delta G^\circ = -RT \ln k_{eq}$

$\Delta G^\circ = -8.314$ JK^{-1} mol^{-1} × 300 K × ln(2×10^{13})

Q.174 Which of the following is the **correct** order of increasing field strength of ligands to form coordination compounds ?

(1) $SCN^- < F^- < CN^- < C_2O_4^{2-}$

(2) $F^- < SCN^- < C_2O_4^{2-} < CN^-$

(3) $CN^- < C_2O_4^{2-} < SCN^- < F^-$

(4) $SCN^- < F^- < C_2O_4^{2-} < CN^-$

Ans. **[4]**

Sol. According to spectrochemical series.

Q.175 Identify compound X in the following sequence of reactions :

(1) CH_2Cl (2) $CHCl_2$ (3) CCl_3 (4) Cl
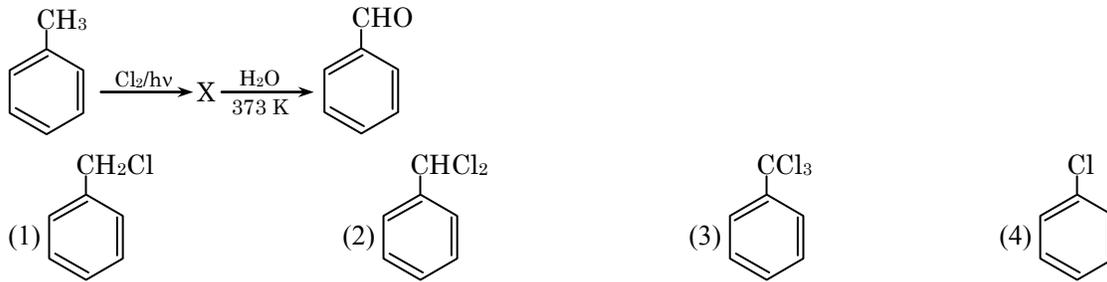
Ans. **[2]**

Sol.
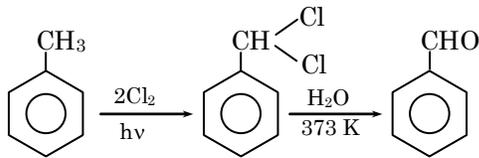
Q.176 The correct option for free expansion of an ideal gas under adiabatic condition is.

(1) $q = 0$, $\Delta T < 0$ and $w > 0$
(2) $q < 0$, $\Delta T = 0$ and $w = 0$

(3) $q > 0$, $\Delta T > 0$ and $w > 0$
(4) $q = 0$, $\Delta T = 0$ and $w = 0$

Ans. **[4]**

Sol. free expansion of ideal gas

$P_{ext} = 0$

$W_{pv} = 0$

$q = 0$ (adiabatic process)

$\Delta E = q + w$

$\Delta E = 0$

$\Delta E = {}^n C_{vm} \Delta T = 0$

$q = 0$, $\Delta T = 0$, $w = 0$

Q.177 The number of Faradays(F) required to produce 20 g of calcium from molten $CaCl_2$ (Atomic mass of Ca = 40 g mol^{-1}) is :

(1) 2

(2) 3

(3) 4

(4) 1

Ans. **[4]**

Sol. $Ca^{+2} + 2e^- \rightarrow Ca_{(s)}$
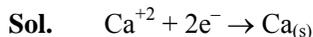
v.f. = 2

As per faraday's 1st law

Charge passed in faraday = g. eq of product

$$= \frac{20}{40} \times 2 = 1 \text{ F}$$

Q.178 HCl was passed through solution of $CaCl_2$. $MgCl_2$ and NaCl. Which of the following compound(s) crystallise(s) ?

(1) Only NaCl

(2) Only $MgCl_2$

(3) NaCl, $MgCl_2$ and $CaCl_2$

(4) Both $MgCl_2$ and $CaCl_2$

Ans. **[1]**

Sol. When HCl is passed through the mixture Cl^- ion concentration increase. Hence ionic product $[Na^+] [Cl^-]$ becomes more than solubility product.
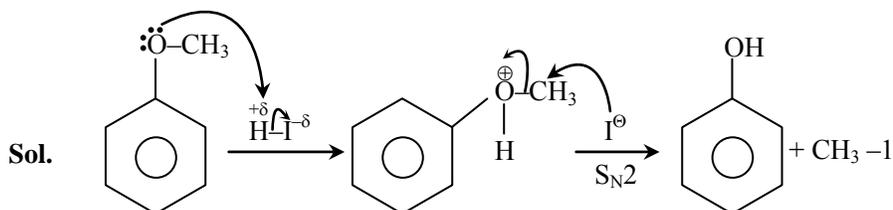
So NaCl will precipitated out

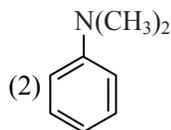Filtrate $\xrightarrow{\text{HCl gas passed}}$ pure NaCl precipitation (common ion effect)
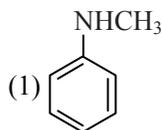
Q.179 Anisole on cleavage with HI gives:
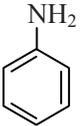

Ans. **[4]**

Sol.
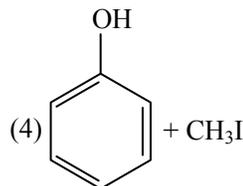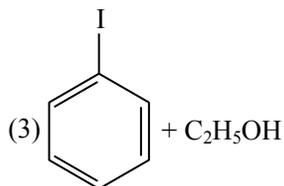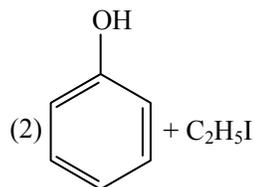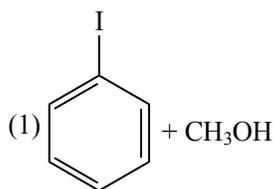
Q.180 Which of the following amine will give the carbylamine test ?
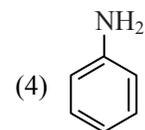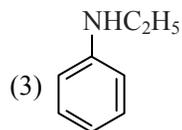
Ans. **[4]**

Sol. Since is primary amine it gives carbylamines test (isocyanide test)