NEET–II (2016) TEST PAPER WITH ANSWER & SOLUTIONS (HELD ON SUNDAY 24th JULY, 2016)

1. Which one of the following generates new genetic combinations leading to variation ?
(1) Sexual reproduction
(2) Nucellar polyembryony
(3) Vegetative reproduction
(4) Parthenogenesis

Ans. (1)

2. Match **column-I** with **column-II** and select the correct option using the codes given below :

Column-I		Column-II	
(a)	Pistils fused together	(i)	Gametogenesis
(b)	Formation of gametes	(ii)	Pistillate
(c)	Hyphae of higher Ascomycetes	(iii)	Syncarpous
(d)	Unisexual female flower	(iv)	Dikaryotic

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

Ans. (2)

3. In majority of angiosperms :
(1) reduction division occurs in the mgaspore mother cells
(2) a small central cell is present in the embryo sac
(3) egg has a filiform apparatus
(4) there are numerous antipodal cells

Ans. (1)

4. Pollination in water hyacinth and water lily is brought about by the agency of :
(1) birds (2) bats
(3) water (4) insects or wind

Ans. (4)

5. The ovule of an angiosperm is technically equivalent to :
(1) megaspore mother cell
(2) megaspore
(3) megasporangium
(4) megasporophyll

Ans. (3)

6. Taylor conducted the experiment to prove semiconservative mode of chromosome replication on :
(1) *Drosophila melanogaster*
(2) *E. coli*
(3) *Vinca rosea*
(4) *Vicia faba*

Ans. (4)

7. The mechanism that causes a gene to move from one linkage group to another is called :
(1) Translocation
(2) Crossing-over
(3) Inversion
(4) Duplication

Ans. (1)

8. The equivalent of a structural gene is :
(1) Operon
(2) Recon
(3) Muton
(4) Cistron

Ans. (4)

9. A true breeding plant is :
(1) near homozygous and produces offspring of its own kind
(2) always homozygous recessive in its genetic constitution
(3) one that is able to breed on its own
(4) produced due to cross-pollination among unrelated plants

Ans. (1)

10. Which of the following rRNAs acts as structural RNA as well as ribozyme in bacteria ?
(1) 23 S rRNA (2) 5.8 S rRNA
(3) 5 S rRNA (4) 18 S rRNA

Ans. (1)

11. Stirred-tank bioreactors have been designed for :
(1) availability of oxygen throughout the process
(2) ensuring anaerobic conditions in the culture vessel
(3) purification of product
(4) addition of preservatives to the product

Ans. (1)

12. A foreign DNA and plasmid cut by the same restriction endonuclease can be joined to form a recombinant plasmid using :
(1) Polymerase-III (2) Ligase
(3) *Eco* RI (4) *Taq* polymerase

Ans. (2)

13. Which of the following is **not** a component of downstream processing ?

(1) Preservation (2) Expression

(3) Separation (4) Purification

Ans. (2)

14. Which of the following restriction enzymes produces blunt ends ?

(1) *Xho* I (2) *Hind* III

(3) *Sal* I (4) *Eco* RV

Ans. (4)

15. Which kind of therapy was given in 1990 to a four year old girl with adenosine deaminase (ADA) deficiency ?

(1) Immunotherapy (2) Radiation therapy

(3) Gene therapy (4) Chemotherapy

Ans. (3)

16. How many hot spots of biodiversity in the world have been identified till date by Norman Myers ?

(1) 34 (2) 43 (3) 17 (4) 25

Ans. (1)

17. The primary producers of the deep-sea hydrothermal vent ecosystem are :

(1) Blue-green algae

(2) Coral reefs

(3) Green algae

(4) Chemosynthetic bacteria

Ans. (4)

18. Which of the following is correct for r-selected species ?

(1) Small number of progeny with small size

(2) Small number of progeny with large size

(3) Large number of progeny with small size

(4) Large number of progeny with large size

Ans. (3)

19. If '+' sign is assigned to beneficial interaction '–' sign to detrimental and '0' sign to neutral interaction, then the population interaction represented by '+' '–' refers to :

(1) Commensalism (2) Parasitism

(3) Mutualism (4) Amensalism

Ans. (2)

20. Which of the following is **correctly** matched ?

(1) *Parthenium hysterophorus* – Threat to biodiversity

(2) Stratification – Population

(3) Aerenchyma – *Opuntia*

(4) Age pyramid – Biome

Ans. (1)

21. Red list contains data or information on :

(1) threatened species

(2) marine vertebrates only

(3) all economically important plants

(4) plants whose products are in international trade

Ans. (1)

22. Which one of the following is **wrong** for fungi ?

(1) They are heterotrophic

(2) They are both unicellular and multicellular

(3) They are eukaryotic

(4) All fungi possess a purely cellulosic cell wall

Ans. (4)

23. Methanogens belong to :

(1) Dinoflagellates (2) Slime moulds

(3) Eubacteria (4) Archaebacteria

Ans. (4)

24. Select the **wrong** statement :

(1) Diatoms are chief producers in the oceans

(2) Diatoms are microscopic and float passively in water

(3) The walls of diatoms are easily destructible

(4) 'Diatomaceous earth' is formed by the cell walls of diatoms.

Ans. (3)

25. The lable of a herbarium shet **does not** carry information on :

(1) Local names (2) height of the plant

(3) date of collection (4) name of collector

Ans. (2)

26. Conifers are adapated to tolerate extreme environmental conditions because of :

(1) thick cuticle (2) presence of vessels

(3) broad hardy leaves (4) superficial stomata

Ans. (1)

27. Which one of the following statements is **wrong** ?

(1) Agar-agar is obtained from *Gelidium* and *Gracilaria*

(2) *Laminaria* and *Sargassum* are used as food

(3) Algae increase the level of dissolved oxygen in the immediate environment

(4) Algin is obtained from red algae, and carrageenan from brown algae.

Ans. (4)

28. The term 'polyadelphous' is related to :-

(1) Corolla (2) Calyx

(3) Gynoecium (4) Androecium

Ans. (4)

29. How many plants among *Indigofera, Sesbania, Salvia, Allium, Aloe*, mustard, groundnut, radish, gram and turnip have stamens with different lengths in their flowers ?

(1) Five (2) Six (3) Three (4) Four

Ans. (4)

30. Radial symmetry is found in the flowers of :-
(1) *Pisum* (2) *Cassia*
(3) *Brassica* (4) *Trifolium*

Ans. (3)

31. Free-central placentation is found in :-
(1) *Brassica* (2) *Citrus*
(3) *Dianthus* (4) *Argemone*

Ans. (3)

32. Cortex is the region found between :-
(1) Endodermis and pith
(2) Endodermis and vascular bundle
(3) Epidermis and stele
(4) Pericycle and endodermis

Ans. (3)

33. The balloon-shaped structures called tyloses :-
(1) Are extensions of xylem parenchyma cells into vessels
(2) Are linked to the ascent of sap through xylem vessels
(3) Originate in the lumen of vessels
(4) Characterize the sapwood

Ans. (1)

34. A non-proteinaceous enzyme is :-
(1) Ligase (2) Deoxyribonuclease
(3) Lysozyme (4) Ribozyme

Ans. (4)

35. Select the **mismatch** :-
(1) Protists-Eukaryotes
(2) Methanogens-Prokaryotes
(3) Gas vacuoles-Green bacteria
(4) Large central vacoules - Animal cells

Ans. (4)

36. Select the **wrong** statement :-
(1) Cyanobacteria lack flagellated cells.
(2) *Mycoplasma* is a wall-less microorganism
(3) Bacterial cell wall is made up of peptidoglycan.
(4) Pilli and fimbriae are mainly involved in motility of bacterial cells

Ans. (4)

37. A cell organelle containing hydrolytic enzymes is :-
(1) Ribosome (2) Mesosome
(3) Lysosome (4) Microsome

Ans. (3)

38. During cell growth, DNA synthesis takes place in:-
(1) G_2 phase (2) M phase
(3) S phase (4) G_1 phase

Ans. (3)

39. Which of the following biomolecules is common to respiration-mediated breakdown of fats, carbohydrates and proteins ?
(1) Pyruvic acid
(2) Acetyl CoA
(3) Glucose-6-phosphate
(4) Fructose 1,6-bisphosphate

Ans. (2)

40. A few drops of sap were collected by cutting across a plant stem by a suitable method. The sap was tested chemically. Which one of the following test results indicates that it is phloem sap ?
(1) Low refractive index (2) Absence of sugar
(3) Acidic (4) Alkaline

Ans. (4)

41. You are given a tissue with its potential for differentiation in an artificial culture. Which of the following pairs of hormones would you add to the medium to secure shoots as well as roots ?
(1) Auxin and abscisic acid
(2) Gibberellin and abscisic acid
(3) IAA and gibberellin
(4) Auxin and cytokinin

Ans. (4)

42. Phytochrome is a :-
(1) Lipoprotein (2) Chromoprotein
(3) Flavoprotein (4) Glycoprotein

Ans. (2)

43. Which is essential for the growth of root tip ?
(1) Ca (2) Mn (3) Zn (4) Fe

Ans. (1)

44. The process which makes major difference between C_3 and C_4 plants is :-
(1) Photorespiration (2) Respiration
(3) Glycolysis (4) Calvin cycle

Ans. (1)

45. Which one of the following statements in **not** correct?
(1) In potato, banana and ginger, the plantlets arise from the internodes present in the modified stem.
(2) Water hyacinth, growing in the standing water, drains oxygen from water that leads to the death of fishes.
(3) Offspring produced by the asexual reproduction are called clone
(4) Microscopic, motile asexual reproductive structures are called zoospores.

Ans. (1)

46. The part of nephron involved in active reabsorption of sodium is :-
(1) Bowman's capsule
(2) Descending limb of Henle's loop
(3) Distal convoluted tubule
(4) Proximal convoluted tubule

Ans. (4)

47. Which of the following is hormone releasing IUD ?
(1) Lippes loop (2) Cu7
(3) LNG-20 (4) Multiload 375

Ans. (3)

48. Which of the following is **incorrect** regarding vasectomy ?
(1) Vasa deferentia is cut and tied
(2) Irreversible sterility
(3) No sperm occurs in seminal fluid
(4) No sperm occurs in epididymis

Ans. (4)

49. Embryo with more than 16 blastomeres formed due to *in vitro* fretilization is transferred into :-
(1) Fimbriae (2) Cervix
(3) Uterus (4) Fallopian tube

Ans. (3)

50. Which of the following depicts the **correct** pathway of transport of sperms ?
(1) Rete testis → Vas deferens → Efferent ductules → Epididymis
(2) Efferent ductules → Rete testis → Vas deferens → Epididymis
(3) Rete testis → Efferent ductules → Epididymis → Vas deferens
(4) Rete testis → Epididymis → Efferent ductules → Vas deferens

Ans. (3)

51. Match **Column-I** with **Column-II** and select the correct option using the codes given below :-

	Column I		Column II
a	Mons pubis	i	Embryo formation
b	Antrum	ii	Sperm
c	Trophectoderm	iii	Female external genitalia
d	Nebenkern	iv	Graafian follicle

Codes :

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

Ans. (4)

52. Several hormones like hCG, hPL, estrogen, progesterone are produced by :-
(1) Fallopian tube (2) Pituitary
(3) Ovary (4) Placenta

Ans. (4)

53. If a colour-blind man marries a woman who is homozygous for normal colour vision, the probability of their son being colour-blind is :-
(1) 0.75 (2) 1 (3) 0 (4) 0.5

Ans. (3)

54. Genetic drift operates in :-
(1) Non-reproductive population
(2) Slow reproductive population
(3) Small isolated population
(4) Large isolated population

Ans. (3)

55. In Hardy-Weinberg equation, the frequency of heterozygous individual is represented by :-
(1) pq (2) q^2 (3) p^2 (4) 2pq

Ans. (4)

56. The chronological order of human evolution from early to the recent is :-
(1) *Ramapithecus* → *Homo habilis* → *Australopithecus* → *Homo erectus*
(2) *Australopithecus* → *Homo habilis* → *Ramapithecus* → *Homo erectus*
(3) *Australopithecus* → *Ramapithecus* → *Homo habits* → *Homo erectus*
(4) *Ramapithecus* → *Australopithecus* → *Homo habilis* → *Homo erectus*

Ans. (4)

57. Which of the following is the **correct** sequence of events in the origin of life ?
I. Formation of protobionts
II. Synthesis of organic monomers
III. Synthesis of organic polymers
IV. Formation of DNA-based genetic systems
(1) II, III, I, IV (2) II, III, IV, I
(3) I, II, III, IV (4) I, III, II, IV

Ans. (1)

58. A molecule that can act as a genetic material must fulfill the traits given below, **except** :-
(1) It should be unstable structurally and chemically
(2) It should provide the scope for slow changes that are required for evolution
(3) It should be able to express itself in the form of 'Mendelian characters'
(4) It should be able to generate its replica

Ans. (1)

59. DNA-dependent RNA polymerase catalyzes transcription on one strand of the DNA which is called the :-

(1) Alpha strand (2) Antistrand
(3) Template strand (4) Coding strand

Ans. (3)

60. Interspecific hybridization is the mating of :-

(1) Superior males and females of different breeds
(2) More closely related individuals within same breed for 4-6 generations
(3) Animals within same breed without having common ancestors
(4) Two different related species

Ans. (4)

61. Which of the following is **correct** regarding AIDS causative agent HIV ?

(1) HIV is unenveloped retrovirus.
(2) HIV does not escape but attacks the aquired immune response.
(3) HIV is enveloped virus containing one molecule of single-stranded RNA and one molecule of reverse transcriptase.
(4) HIV is enveloped virus that contains two identical molecules of single-stranded RNA and two molecules of reverse transcriptase.

Ans. (4)

62. Among the following edible fishes, which one is a marine fish having rich source of omega-3 fatty acids ?

(1) Mrigala (2) Mackerel
(3) Mystus (4) Mangur

Ans. (2)

63. Match **Column –I** with **Column–II** and select the correct option using the codes given below

Column-I		**Column-II**	
(a)	Citric acid	(i)	Trichoderma
(b)	Cyclosporin A	(ii)	Clostridium
(c)	Statins	(iii)	Aspergillus
(d)	Butyric acid	(iv)	Monascus

Codes :

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

Ans. (4)

64. Biochemical Oxygen Demand (BOD) may **not** be a good index for pollution for water bodies receiving effluents from :-

(1) Petroleum industry
(2) Sugar industry
(3) Domestic sewage
(4) Dairy industry

Ans. (1)

65. The principle of competitive exclusion was stated by :-

(1) MacArthur
(2) Verhulst and Pearl
(3) C. Darwin
(4) G.F. Gause

Ans. (4)

66. Which of the following National Parks is home to the famous musk deer or hangul?

(1) Eaglenest Wildlife Sanctuary, Arunachal Pradesh
(2) Dachigam National Park, Jammu & Kashmir
(3) Keibul Lamjao National Park, Manipur
(4) Bandhavgarh National Park, Madhya Pradesh

Ans. (2)

67. A lake which is rich in organic waste may result in:-

(1) Increased population of fish due to lots of nutrients.
(2) Mortality of fish due to lack of oxygen
(3) Increased population of aquatic organisms due to minerals
(4) Drying of the lake due to algal bloom

Ans. (2)

68. The highest DDT concentration in aquatic food chain shall occur in :-

(1) crab (2) eel
(3) phytoplankton (4) seagull

Ans. (4)

69. Which of the following sets of diseases is caused by bacteria?

(1) Tetanus and mumps
(2) Herpes and influenza
(3) Cholera and tetanus
(4) Typhoid and smallpox

Ans. (3)

70. Match **Column–I** with **Column–II** for housefly classification and select the correct option using the codes given below :

	Column-I		Column-II
a	Family	(i)	Diptera
b	Order	(ii)	Arthropoda
c	Class	(iii)	Muscidae
d	Phylum	(iv)	Insecta

Codes :

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

Ans. (3)

71. Choose the **correct** statement.

(1) All reptiles have a three–chambered heart.

(2) All pisces have gills covered by an operculum.

(3) All mammals are viviparous.

(4) All cyclostomes do not possess jaws and paired fins.

Ans. (4)

72. Study the four statements (A–D) given below and select the two correct ones out of them :

(A) Definition of biological species was given by Ernst Mayr.

(B) Photoperiod does not affect reproduction in plants.

(C) Binomial nomenclature system was given by R.H. Whittaker.

(D) In unicellular organisms, reproduction is synonymous with growth.

The two **correct statements are**

(1) A and D (2) A and B

(3) B and C (4) C and D

Ans. (1)

73. In male cockroaches, sperms are stored in which part of the reproductive system?

(1) Testes (2) Vas deferens

(3) Seminal vesicles (4) Mushroom glands

Ans. (3)

74. Smooth muscles are :-

(1) Involuntary, cylindrical, striated

(2) Voluntary, spindle–shaped, uninucleate

(3) Involuntary, fusiform, non-striated

(4) Voluntary, multinucleate, cylindrical

Ans. (3)

75. Oxidative phosphorylation is :-

(1) Addition of phosphate group to ATP.

(2) Formation of ATP by energy released from electrons removed during substrate oxidation.

(3) Formation of ATP by transfer of phosphate group from a substrate to ADP

(4) Oxidation of phosphate group in ATP

Ans. (2)

76. Which of the following is the least likely to be involved in stabilizing the three–dimensional folding of most proteins?

(1) Hydrophobic interaction

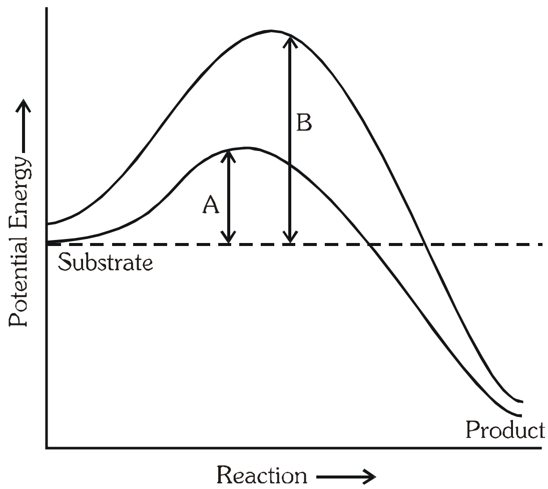
(2) Ester bonds

(3) Hydrogen bonds

(4) Electrostatic interaction

Ans. (2)

77. Which of the following describes the given graph **correctly**?



(1) Endothermic reaction with energy A in absence of enzyme and B in presence of enzyme

(2) Exothermic reaction with energy A in absence of enzyme and B in presence of enzyme

(3) Endothermic reaction with energy A in presence of enzyme and B in absence of enzyme

(4) Exothermic reaction with energy A in presence of enzyme and B in absence of enzyme.

Ans. (4)

78. When cell has stalled DNA replication fork, which checkpoint should be predominantly activated?

(1) M (2) Both G_2/M and M

(3) G_1/S (4) G_2/M

Ans. (3)

79. Match the stages of meiosis in **Column–I** to their characteristic features in **Column–II** and select the correct option using the codes given below :

	Column-I		Column-II
a	Pachytene	i	Pairing of homologous chromosomes
b	Metaphase-I	ii	Terminalization of chiasmata
c	Diakinesis	iii	Crossing over takes place
d	Zygotene	iv	Chromosomes align at equatorial plate

Codes :

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

Ans. (3)

80. Which hormones do stimulate the production of pancreatic juice and bicarbonate?
(1) Cholecystokinin and secretin
(2) Insulin and glucagon
(3) Angiotensin and epinephrine
(4) Gastrin and insulin

Ans. (1)

81. The partial pressure of oxygen in the alveoli of the lungs is :-
(1) Less than that in the blood
(2) Less than that of carbon dioxide
(3) Equal to that in the blood
(4) More than that in the blood

Ans. (4)

82. Choose the **correct** statement.
(1) Photoreceptors in the human eye are depolarized during darkness and become hyperpolarized in response to the light stimulus.
(2) Receptors do not produce graded potentials.
(3) Nociceptors respond to changes in pressure.
(4) Meissner's corpuscles are thermo receptors.

Ans. (1)

83. Graves' disease is caused due to :-
(1) Hyposecretion of adrenal gland
(2) Hypersecretion of adrenal gland
(3) Hyposecretion of thyroid gland
(4) Hypersecretion of thyroid gland

Ans. (4)

84. Name the ion responsible for unmasking of active sites for myosin for cross–bridge activity during muscle contraction.
(1) Sodium (2) Potassium
(3) Calcium (4) Magnesium

Ans. (3)

85. Name the blood cells, whose reduction in number can cause clotting disorder, leading to exceassive loss of blood from the body.
(1) Neutrophils (2) Thrombocytes
(3) Erythrocytes (4) Leucocytes

Ans. (2)

86. Name a peptide hormone which acts mainly on hepatocytes, adipocytes and enhances cellular glucose uptake and utilization.
(1) Secretin (2) Gastrin
(3) Insulin (4) Glucagon

Ans. (3)

87. Osteoporosis, an age–related disease of skeletal system, may occur due to :-
(1) Decreased level of estrogen
(2) Accumulation of uric acid leading to inflammation of joints.
(3) Immune disorder affecting neuro–muscular junction leading to fatigue.
(4) High concentration of Ca^{++} and Na^{+}.

Ans. (1)

88. Serum differs from blood in :-
(1) Lacking clotting factors
(2) Lacking antibodies
(3) Lacking globulins
(4) Lacking albumins

Ans. (1)

89. Lungs do not collapse between breaths and some air always remains in the lungs which can never be expelled because :-
(1) There is a positive intrapleural pressure
(2) Pressure in the lungs is higher than the atomospheric pressure.
(3) There is a negative pressure in the lungs.
(4) There is a negative intrapleural pressure pulling at the lung walls

Ans. (4)

90. The posterior pituitary gland is **not** a 'true' endocrine gland because :-
(1) It is under the regulation of hypothalamus
(2) It secretes enzymes
(3) It is provided with a duct
(4) It only stores and releases hormones

Ans. (4)

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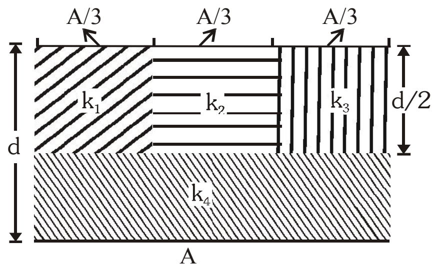
91. A parallel-plate capacitor of area A, plate separation d and capacitance C is filled with four dielectric materials having dielectric constants k_1, k_2, k_3 and k_4 as shown in the figure below. If a single dielectric material is to be used to have the same capacitance C in this capacitor, then its dielectric constant k is given by :-



(1) $\frac{2}{k} = \frac{3}{k_1+k_2+k_3} + \frac{1}{k_4}$

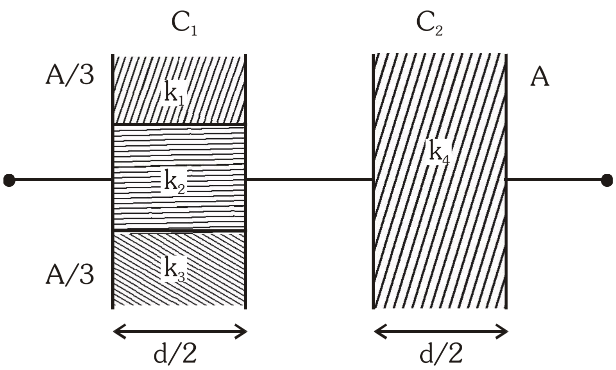
(2) $\frac{1}{k} = \frac{1}{k_1} + \frac{1}{k_2} + \frac{1}{k_3} + \frac{3}{2k_4}$

(3) $k = k_1 + k_2 + k_3 + 3k_4$

(4) $k = \frac{2}{3}(k_1 + k_2 + k_3) + 2k_4$

Ans. (1)

Sol. Circuit can be redrawn as

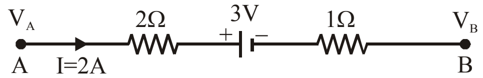


$$\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2}$$

$$\frac{d}{A\epsilon_0 k} = \frac{1}{\frac{\frac{A}{3}\epsilon_0 (k_1+k_2+k_3)}{d/2}} + \frac{1}{\frac{A\epsilon_0 k_4}{d/2}}$$

$$\Rightarrow \frac{2}{k} = \frac{3}{k_1+k_2+k_3} + \frac{1}{k_4}$$

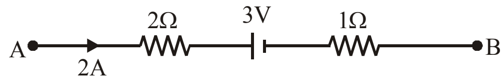
92. The potential difference $(V_A - V_B)$ between the points A and B in the given figure is :-



(1) + 6 V (2) + 9 V (3) – 3 V (4) + 3 V

Ans. (2)

Sol.



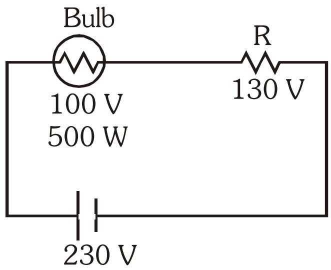
$V_B = V_A - (2 \times 2) - 3 - (2 \times 1) \Rightarrow V_A - V_B = 9V$

93. A filament bulb (500 W, 100 V) is to be used in a 230 V main supply. When a resistance R is connected in series, it works perfectly and the bulb consumes 500 W. The value of R is :-

(1) 26 Ω (2) 13 Ω (3) 230 Ω (4) 46 Ω

Ans. (1)

Sol.



$$R_{bulb} = \frac{V^2}{P} = \frac{100^2}{500} = 20\ \Omega$$

According to question $\frac{R}{R_{bulb}} = \frac{130}{100}$

$$\Rightarrow \frac{R}{20} = \frac{130}{100} \Rightarrow R = 26\ \Omega$$

94. A long wire carrying a steady current is bent into a circular loop of one turn. The magnetic field at the centre of the loop is B. It is then bent into a circular coil of n turns. The magnetic field at the centre of this coil of n turns will be :-

(1) 2nB (2) $2n^2B$ (3) nB (4) n^2B

Ans. (4)

Sol. Since $\ell = 2\pi R = n(2\pi r) \Rightarrow r = \frac{R}{n}$

For one turn $B = \frac{\mu_0 i}{2R}$ and

For n turn $B' = \frac{\mu_0 ni}{2r} \Rightarrow B' = \frac{\mu_0 n^2 i}{2R} = n^2B$

95. A bar magnet is hung by a thin cotton thread in a uniform horizontal magnetic field and is in equilibrium state. The energy required to rotate it by 60° is W. Now the torque required to keep the magnet in this new position is :-

(1) $\frac{\sqrt{3}W}{2}$ (2) $\frac{2W}{\sqrt{3}}$

(3) $\frac{W}{\sqrt{3}}$ (4) $\sqrt{3}\,W$

Ans. (4)

Sol. $\tau = PE \sin 60°$ .....(1)

$W = PE\,(1 - \cos 60°)$ .....(2)

From (1) and (2)

$$\frac{\tau}{W} = \frac{\sqrt{3}/2}{1/2} \Rightarrow \tau = W\sqrt{3}$$

96. An electron is moving in a circular path under the influence of a transverse magnetic field of 3.57×10^{-2} T. If the value of e/m is 1.76×10^{11} C/kg, the frequency of revolution of the electron is :-

(1) 62.8 MHz (2) 6.28 MHz

(3) 1 GHz (4) 100 MHz

Ans. (3)

Sol. $f = \frac{eB}{2\pi m}$

$$f = \frac{1.76 \times 10^{11} \times 3.57 \times 10^{-2}}{2 \times 3.14}$$

$f = 10^9$ Hz or 1 GHz

97. Which of the following combinations should be selected for better tuning of an L-C-R circuit used for communication ?

(1) R = 15 Ω, L = 3.5 H, C = 30 μF

(2) R = 25 Ω, L = 1.5 H, C = 45 μF

(3) R = 20 Ω, L = 1.5 H, C = 35 μF

(4) R = 25 Ω, L = 2.5 H, C = 45 μF

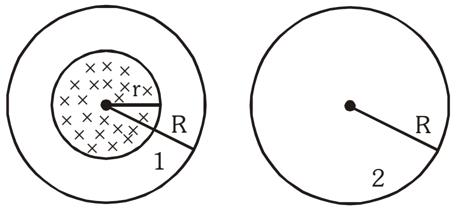
Ans. (1)

Sol. For Better tuning, Q-factor must be high.

$$\therefore\ Q = \frac{\omega_0 L}{R} = \frac{1}{\sqrt{LC}}\left(\frac{L}{R}\right) = \frac{1}{R}\sqrt{\frac{L}{C}}$$

R and C should be small and L should be high.

98. A uniform magnetic field is restricted within a region of radius r. The magnetic field changes with time at a rate $\frac{d\vec{B}}{dt}$. Loop 1 of radius R > r encloses the region r and loop 2 of radius R is outside the region of magnetic field as shown in the figure below. Then the e.m.f. generated is :-



(1) $-\frac{d\vec{B}}{dt}\pi R^2$ in loop 1 and zero in loop 2

(2) $-\frac{d\vec{B}}{dt}\pi r^2$ in loop 1 and zero in loop 2

(3) Zero in loop 1 and zero in loop 2

(4) $-\frac{d\vec{B}}{dt}\pi r^2$ in loop 1 and $-\frac{d\vec{B}}{dt}\pi r^2$ in loop 2

Ans. (2)

Sol. For Loop 1

$$\varepsilon_{ind} = -A\left(\frac{d\vec{B}}{dt}\right)\cos 0° = -\pi r^2\left(\frac{d\vec{B}}{dt}\right)$$

For Loop 2, $\varepsilon_{ind} = 0$ as no flux linkage

99. The potential differences across the resistance, capacitance and inductance are 80 V, 40 V and 100 V respectively in an L-C-R circuit. The power factor of this circuit is :-

(1) 0.8 (2) 1.0 (3) 0.4 (4) 0.5

Ans. (1)

Sol. $\tan\phi = \frac{V_L - V_C}{V_R} = \frac{100 - 40}{80} = \frac{3}{4}$ or $\phi = 37°$

Power factor = $\cos\phi = \cos 37° = \frac{4}{5}$ or 0.8

100. A 100 Ω resistance and a capacitor of 100 Ω reactance are connected in series across a 220 V source. When the capacitor is 50% charged, the peak value of the displacement current is :-

(1) 4.4 A (2) $11\sqrt{2}$ A (3) 2.2 A (4) 11 A

Ans. (3)

Sol. $$(i_d)_{max} = (i_c)_{max} = i_0 = \frac{\varepsilon_0}{Z} = \frac{220\sqrt{2}}{\sqrt{100^2 + 100^2}}$$

$$\Rightarrow (i_d)_{max} = \frac{220\sqrt{2}}{100\sqrt{2}} = 2.2\,A$$

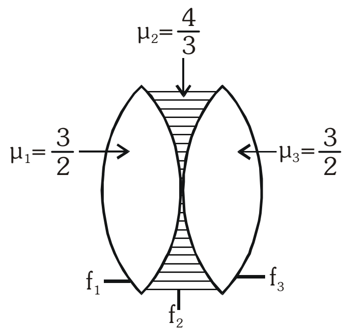
As we are asked amplitude of displacement current. So, need not worry about charge on capacitor.

101. Two identical glass ($\mu_g = 3/2$) equiconvex lenses of focal length f each are kept in contact. The space between the two lenses is filled with water ($\mu_w = 4/3$). The focal length of the combination is :-

(1) 4f/3 (2) 3f/4 (3) f/3 (4) f

Ans. (2)

Sol.



$$f_1 = f_3 = \frac{R}{2\left(\frac{3}{2}-1\right)} = R = f \text{ (given)}$$

$$f_2 = \frac{-R}{2\left(\frac{4}{3}-1\right)} = \frac{-3}{2}R = -\frac{3}{2}f$$

$$\frac{1}{f_{eq}} = \frac{1}{f_1}+\frac{1}{f_2}+\frac{1}{f_3} = \frac{1}{f}+\left(-\frac{2}{3f}\right)+\frac{1}{f}$$

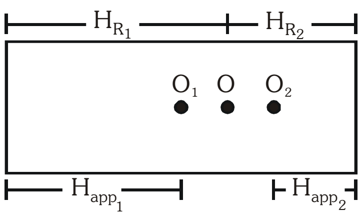
$$\Rightarrow \frac{1}{f_{eq}} = \frac{4}{3f} \Rightarrow f_{eq} = \frac{3f}{4}$$

102. An air bubble in a glass slab with refractive index 1.5 (near normal incidence) is 5 cm deep when viewed from one surface and 3 cm deep when viewed from the opposite face. The thickness (in cm) of the slab is :-

(1) 12 (2) 16 (3) 8 (4) 10

Ans. (1)

Sol.



$$H_{app} = \frac{H_R}{\mu_g} \Rightarrow H_R = \mu_g H_{app}$$

So, $H_{R_1} = \mu_g H_{app_1}$ and $H_{R_2} = \mu_g H_{app_2}$

So, thickness = $H_{R_1} + H_{R_2}$

$$= \mu_g\left[H_{app_1} + H_{app_2}\right] = \frac{3}{2}[5+3] = \frac{3}{2}\times 8 = 12\,\text{cm}$$

103. The interference pattern is obtained with two coherent light sources of intensity ratio n. In the interference pattern, the ratio $\frac{I_{max}-I_{min}}{I_{max}+I_{min}}$ will be :-

(1) $\frac{\sqrt{n}}{(n+1)^2}$ (2) $\frac{2\sqrt{n}}{(n+1)^2}$

(3) $\frac{\sqrt{n}}{n+1}$ (4) $\frac{2\sqrt{n}}{n+1}$

Ans. (4)

Sol. Let $\frac{I_1}{I_2} = \frac{n}{1}$

$$\frac{I_{max}-I_{min}}{I_{max}+I_{min}} = \frac{\left(\sqrt{I_1}+\sqrt{I_2}\right)^2 - \left(\sqrt{I_1}-\sqrt{I_2}\right)^2}{\left(\sqrt{I_1}+\sqrt{I_2}\right)^2 + \left(\sqrt{I_1}-\sqrt{I_2}\right)^2} = \frac{4\sqrt{I_1 I_2}}{2(I_1+I_2)}$$

Dividing numerator and denominator by I_2

$$\text{required ratio} = \frac{2\sqrt{I_1/I_2}}{\left(\frac{I_1}{I_2}+1\right)} = \frac{2\sqrt{n}}{n+1}$$

104. A person can see clearly objects only when they lie between 50 cm and 400 cm from his eyes. In order to increase the maximum distance of distinct vision to infinity, the type and power of the correcting lens, the person has to use, will be :-

(1) concave, – 0.2 diopter

(2) convex, + 0.15 diopter

(3) convex, + 2.25 diopter

(4) concave, – 0.25 diopter

Ans. (4)

Sol. As we want to correct myopia. So, far point must go to infinity.

$v = -4$ m, $u = -\infty$, P = ?

$$P = \frac{1}{f} = \frac{1}{v} - \frac{1}{u} = \frac{1}{-4} - \frac{1}{\infty} = -0.25\text{ D}$$

(–) implies concave mirror

105. A linear aperture whose width is 0.02 cm is placed immediately in front of a lens of focal length 60 cm. The aperture is illuminated normally by a parallel beam of wavelength 5×10^{-5} cm. The distance of the first dark band of the diffraction pattern from the centre of the screen is :-

(1) 0.20 cm (2) 0.15 cm

(3) 0.10 cm (4) 0.25 cm

Ans. (2)

Sol. f = D = 60 cm

For first minima,

$$y = \frac{\lambda D}{a} = \frac{5\times10^{-7}\times 60}{2\times10^{-2}\times10^{-2}} = \frac{5\times10^{-3}\times 60}{2} = 0.15\text{ cm}$$

106. Electrons of mass m with de-Broglie wavelength λ fall on the target in an X-ray tube. The cutoff wavelength (λ_0) of the emitted X-ray is :-

(1) $\lambda_0 = \frac{2m^2c^2\lambda^3}{h^2}$ (2) $\lambda_0 = \lambda$

(3) $\lambda_0 = \frac{2mc\lambda^2}{h}$ (4) $\lambda_0 = \frac{2h}{mc}$

Ans. (3)

Sol. $\lambda = \frac{h}{p} \Rightarrow p = \frac{h}{\lambda}$

$E = \frac{p^2}{2m} = \frac{h^2}{2m\lambda^2}$

Also in X-ray $E = \frac{hc}{\lambda_0}$

$\therefore \frac{hc}{\lambda_0} = \frac{h^2}{2m\lambda^2} \Rightarrow \lambda_0 = \frac{2mc\lambda^2}{h}$

107. Photons with energy 5 eV are incident on a cathode C in a photoelectric cell. The maximum energy of emitted photoelectrons is 2 eV. When photons of energy 6 eV are incident on C, no photoelectrons will reach the anode A, if the stopping potential of A relative to C is :-

(1) – 1 V (2) – 3 V

(3) + 3 V (4) + 4 V

Ans. (2)

Sol. $eV_s = \frac{1}{2}mv_{max}^2 = h\nu - \phi_0$

$2 = 5 - \phi_0 \Rightarrow \phi_0 = 3$ eV

In second case

$eV_s = 6 - 3 = 3$ eV $\Rightarrow V_s = 3$ V.

$\therefore V_{AC} = -3$ V

108. If an electron in a hydrogen atom jumps from the 3rd orbit to the 2nd orbit, it emits a photon of wavelength λ. When it jumps from the 4th orbit to the 3rd orbit, the corresponding wavelength of the photon will be :-

(1) $\frac{20}{7}\lambda$ (2) $\frac{20}{13}\lambda$

(3) $\frac{16}{25}\lambda$ (4) $\frac{9}{16}\lambda$

Ans. (1)

Sol. Transition : $3 \to 2 \Rightarrow$ Wavelength λ.
Transition : $4 \to 3 \Rightarrow$ Wavelength $\lambda' = ?$

$$\frac{\frac{1}{\lambda} = R_H Z^2\left(\frac{1}{2^2} - \frac{1}{3^2}\right)}{\frac{1}{\lambda'} = R_H Z^2\left(\frac{1}{3^2} - \frac{1}{4^2}\right)} \Rightarrow \frac{\lambda'}{\lambda} = \frac{20}{7} \Rightarrow \lambda' = \frac{20\lambda}{7}$$

109. The half-life of a radioactive substance is 30 minutes. The time (in minutes) taken between 40% decay and 85% decay of the same radioactive substance is :-

(1) 45 (2) 60 (3) 15 (4) 30

Ans. (2)

Sol. decay 40% $\to$ 85%
Remaining 60% $\to$ 15%

$60\% \xrightarrow{t_{1/2}} 30\% \xrightarrow{t_{1/2}} 15\%$

$\therefore t = 2t_{1/2} = 60$ min.

110. For CE transistor amplifier, the audio signal voltage across the collector resistance of 2 kΩ is 4 V. If the current amplification factor of the transistor is 100 and the base resistance is 1 kΩ, then the input signal voltage is :-

(1) 30 mV (2) 15 mV

(3) 10 mV (4) 20 mV

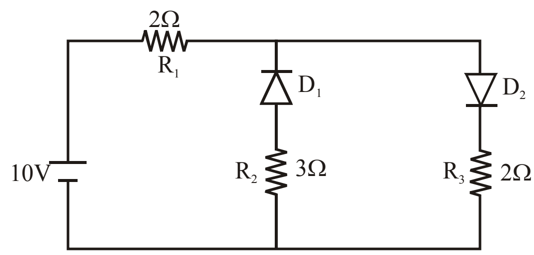
Ans. (4)

Sol. $\beta = 100$; $V_0 = 4V$; $R_i = 10^3\,\Omega$;
$R_0 = 2 \times 10^3\,\Omega$; $V_i = ?$

$$\frac{V_0}{V_i} = \beta\frac{R_0}{R_i} \Rightarrow \frac{4}{V_i} = 100 \times \frac{2\times10^3}{10^3}$$

$\Rightarrow V_i = 20$ mV

111. The given circuit has two ideal diodes connected as shown in the figure below. The current flowing through the resistance R_1 will be :-



(1) 1.43 A (2) 3.13 A

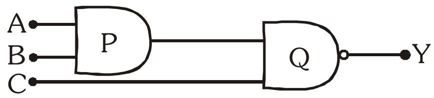
(3) 2.5 A (4) 10.0 A

Ans. (3)

Sol. Current will not flow through D_1 as it is reverse biased. Current will flow through cell, R_1, D_2 and R_3.

$\therefore i = \frac{10}{2+2} = 2.5$ A

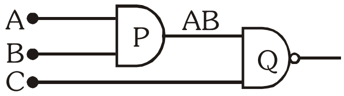
112. What is the output Y in the following circuit, when all the three inputs A,B,C are first 0 and then 1 ?



(1) 1,0 (2) 1,1 (3) 0,1 (4) 0.0

Ans. (1)

Sol.



$y = \overline{(AB)C}$

for A = B = C = 0 ; y = 1
for A = B = C = 1 ; y = 0

113. Planck's constant (h), speed of light in vacuum (c) and Newton's gravitational constant (G) are three fundamental constants. Which of the following combinations of these has the dimension of length?

(1) $\sqrt{\frac{hc}{G}}$ (2) $\sqrt{\frac{Gc}{h^{3/2}}}$ (3) $\frac{\sqrt{hG}}{c^{3/2}}$ (4) $\frac{\sqrt{hG}}{c^{5/2}}$

Ans. (3)

Sol. $\ell \propto h^x G^y c^z$

$M^0L^1T^0 = (ML^2T^{-1})^x (M^{-1}L^3T^{-2})^y (LT^{-1})^z$

$= M^{x-y} L^{2x+3y+z} T^{-x-2y-z}$

Equating :

$$\left.\begin{aligned} x - y &= 0 \\ 2x + 3y + z &= 1 \\ -x - 2y - z &= 0 \end{aligned}\right\} \Rightarrow x = \frac{1}{2}; y = \frac{1}{2}; z = -\frac{3}{2} \qquad \Rightarrow \ell \propto \frac{\sqrt{hG}}{c^{3/2}}$$

114. Two cars P and Q start from a point at the same time in a straight line and their positions are represented by $x_p(t) = at + bt^2$ and $x_Q(t) = ft - t^2$. At what time do the cars have the same velocity ?

(1) $\frac{a+f}{2(1+b)}$ (2) $\frac{f-a}{2(1+b)}$

(3) $\frac{a-f}{1+b}$ (4) $\frac{a+f}{2(b-1)}$

Ans. (2)

Sol. $x_P(t) = at + bt^2$ $\qquad x_Q(t) = ft - t^2$

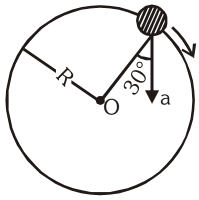
$v_P = a + 2bt$ $\qquad v_Q = f - 2t$

as $v_P = v_Q$

$a + 2bt = f - 2t$

$\Rightarrow \quad t = \frac{f-a}{2(1+b)}$

115. In the given figure, a = 15 m/s² represents the total acceleration of a particle moving in the clockwise direction in a circle of radius R = 2.5 m at a given instant of time. The speed of the particle is :-



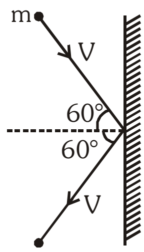
(1) 5.7 m/s (2) 6.2 m/s
(3) 4.5 m/s (4) 5.0 m/s

Ans. (1)

Sol. $a\cos 30° = a_c = \frac{v^2}{R}$

$\Rightarrow \quad v^2 = aR \times \frac{\sqrt{3}}{2} \Rightarrow v^2 = 32.47 \Rightarrow v \simeq 5.7$ m/s

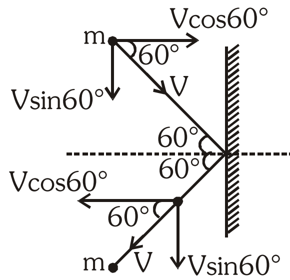
116. A rigid ball of mass m strikes a rigid wall at 60° and gets reflected without loss of speed as shown in the figure below. The value of impulse imparted by the wall on the ball will be :-



(1) $\frac{mV}{2}$ (2) $\frac{mV}{3}$ (3) mV (4) 2mV

Ans. (3)

Sol.



$\overrightarrow{\Delta V} = \vec{V}_f - \vec{V}_i$

$= \left(-V\cos 60°\hat{i} - V\sin 60°\hat{j}\right)$

$\qquad - \left(V\cos 60°\hat{i} - V\sin 60°\hat{j}\right)$

$\overrightarrow{\Delta V} = -2V\cos 60°\hat{i}$

Impulse

$I = \left|\overrightarrow{\Delta P}\right| = m\left|\overrightarrow{\Delta V}\right| = m(2V\cos 60°) = mV$

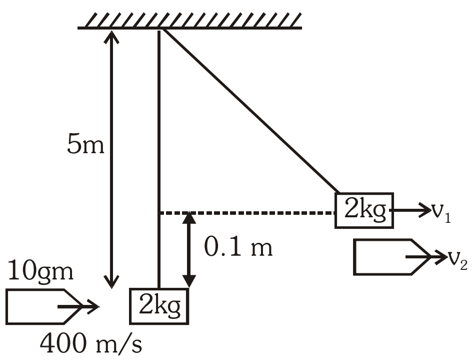
117. A bullet of mass 10g moving horizontally with a velocity of 400 ms^{-1} strikes a wooden block of mass 2 kg which is suspended by a light inextensible string of length 5 m. As a result, the centre of gravity of the block is found to rise a vertical distance of 10 cm. The speed of the bullet after it emerges out horizontally from the block will be :-

(1) 120 ms^{-1} (2) 160 ms^{-1}

(3) 100 ms^{-1} (4) 80 ms^{-1}

Ans. (1)

Sol.



Applying momentum conservation

$$\frac{10}{1000}\times 400 + 0 = 2\times v_1 + \frac{10}{1000}\times v_2$$

$\Rightarrow$ $4 = 2v_1 + 0.01v_2$ ......(1)

Applying work energy theorem for block

$W = \Delta KE$

$$\Rightarrow\ 2\times 10\times 0.1 = \frac{1}{2}\times 2\times {v_1}^2$$

$\Rightarrow$ $v_1 = \sqrt{2} = 1.4$ m/s

Putting the value of v_1 is equation (2)

$4 = 2\times 1.4 + 0.01\ v_2 \Rightarrow v_2 = 120$ m/s

118. Two identical balls A and B having velocities of 0.5 m/s and –0.3 m/s respectively collide elastically in one dimension. The velocities of B and A after the collision respectively will be :-

(1) –0.3 m/s and 0.5 m/s

(2) 0.3 m/s and 0.5 m/s

(3) –0.5 m/s and 0.3 m/s

(4) 0.5 m/s and –0.3 m/s

Ans. (4)

Sol. Since both bodies are identical and collision is elastic. Therefore velocities will be interchanged after collision.

$v_A = -0.3$ m/s and $v_B = 0.5$ m/s

119. A particle moves from a point $(-2\hat{i}+5\hat{j})$ to $(4\hat{j}+3\hat{k})$ when a force of $(4\hat{i}+3\hat{j})$ N is applied. How much work has been done by the force ?

(1) 5 J (2) 2 J (3) 8 J (4) 11 J

Ans. (1)

Sol. $W = \vec{F}.\vec{s} = \left(4\hat{i}+3\hat{j}\right).\left[2i-\hat{j}+3\hat{k}\right] = 8-3 = 5J$

120. Two rotating bodies A and B of masses m and 2m with moments of inertia I_A and I_B ($I_B > I_A$) have equal kinetic energy of rotation. If L_A and L_B be their angular momenta respectively, then :-

(1) $L_B > L_A$ (2) $L_A > L_B$

(3) $L_A = \frac{L_B}{2}$ (4) $L_A = 2L_B$

Ans. (1)

Sol. $K_A = K_B \Rightarrow \frac{L_A^2}{2I_A} = \frac{L_B^2}{2I_B}$

$\because\ I_B > I_A \quad \therefore\ L_A^2 < L_B^2 \Rightarrow L_A < L_B$

121. A solid sphere of mass m and radius R is rotating about its diameter. A solid cylinder of the same mass and same radius is also rotating about its geometrical axis with an angular speed twice that of the sphere. The ratio of their kinetic energies of rotation (E_{sphere} / $E_{cylinder}$) will be :-

(1) 1 : 4 (2) 3 : 1

(3) 2 : 3 (4) 1 : 5

Ans. (4)

Sol.

$$E_{sphere} = \frac{1}{2}I_s\omega^2 = \frac{1}{2}\times\frac{2}{5}MR^2\times\omega^2$$

$$E_{cylinder} = \frac{1}{2}I_c(2\omega)^2 = \frac{1}{2}\times\frac{MR^2}{2}\times 4\omega^2$$

$$\frac{E_{sphere}}{E_{cylinder}} = \frac{1}{5}$$

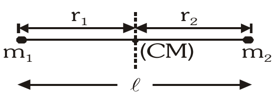
122. A light rod of length ℓ has two masses m_1 and m_2 attached to its two ends. The moment of inertia of the system about an axis perpendicular to the rod and passing through the centre of mass is :-

(1) $(m_1 + m_2)\ell^2$ (2) $\sqrt{m_1m_2}\,\ell^2$

(3) $\dfrac{m_1m_2}{m_1+m_2}\ell^2$ (4) $\dfrac{m_1+m_2}{m_1m_2}\ell^2$

Ans. (3)

Sol.

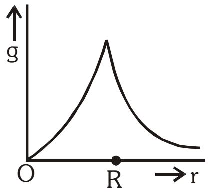


$$r_1 = \frac{m_2\ell}{m_1+m_2},\quad r_2 = \frac{m_1\ell}{m_1+m_2}$$

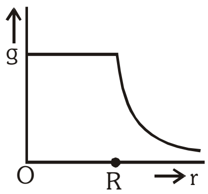
$$I_{cm} = m_1r_1^2 + m_2r_2^2 = \frac{m_1m_2}{m_1+m_2}\ell^2$$

123. Starting from the centre of the earth having radius R, the variation of g (acceleration due to gravity) is shown by :-

(1)



(2)



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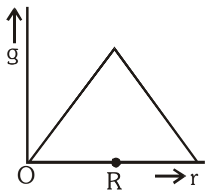

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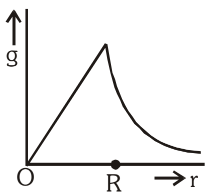
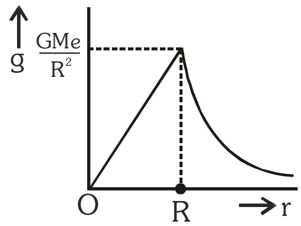


Ans. (4)

Sol. $g = \left(\dfrac{GM_e}{R_e^3}\right)r \qquad 0 < r \le R_e$

$g = \dfrac{GM_e}{r^2} \qquad r \ge R_e$



124. A satellite of mass m is orbiting the earth (of radius R) at a height h from its surface. The total energy of the satellite in terms of g_0, the value of acceleration due to gravity at the earth's surface, is :-

(1) $\dfrac{2mg_0R^2}{R+h}$ (2) $-\dfrac{2mg_0R^2}{R+h}$

(3) $\dfrac{mg_0R^2}{2(R+h)}$ (4) $-\dfrac{mg_0R^2}{2(R+h)}$

Ans. (4)

Sol. Total energy $= -\dfrac{GM_em}{2(R+h)}$

$\because\ g_0 = \dfrac{GM_e}{R^2} \Rightarrow M_e = \dfrac{g_0R^2}{G}$

$\therefore$ Energy $= -\dfrac{mg_0R^2}{2(R+h)}$

125. A rectangular film of liquid is extended from (4 cm × 2 cm) to (5 cm × 4 cm). If the work done is 3×10^{-4} J, the value of the surface tension of the liquid is :-

(1) 0.2 Nm^{-1} (2) 8.0 Nm^{-1}

(3) 0.250 Nm^{-1} (4) 0.125 Nm^{-1}

Ans. (4)

Sol. $W = T(2\Delta A)$

$$\Rightarrow T = \frac{W}{2\Delta A} = \frac{3\times10^{-4}}{2\times12\times10^{-4}} = 0.125\ Nm^{-1}$$

126. Three liquids of densities ρ_1, ρ_2 and ρ_3 (with $\rho_1 > \rho_2 > \rho_3$), having the same value of surface tension T, rise to the same height in three identical capillaries. The angles of contact θ_1, θ_2 and θ_3 obey:-

(1) $\frac{\pi}{2} < \theta_1 < \theta_2 < \theta_3 < \pi$

(2) $\pi > \theta_1 > \theta_2 > \theta_3 > \frac{\pi}{2}$

(3) $\frac{\pi}{2} > \theta_1 > \theta_2 > \theta_3 \geq 0$

(4) $0 \leq \theta_1 < \theta_2 < \theta_3 < \frac{\pi}{2}$

Ans. (4)

Sol. $h = \frac{2T\cos\theta}{\rho g r}$

as r, h, T are same

$\Rightarrow \frac{\cos\theta}{\rho} = \text{constant}$

$\Rightarrow \frac{\cos\theta_1}{\rho_1} = \frac{\cos\theta_2}{\rho_2} = \frac{\cos\theta_3}{\rho_3}$

as $\rho_1 > \rho_2 > \rho_3$

$\Rightarrow \cos\theta_1 > \cos\theta_2 > \cos\theta_3$

$\Rightarrow \theta_1 < \theta_2 < \theta_3$

As water rises $\Rightarrow$ θ must be acute

So, $0 \leq \theta_1 < \theta_2 < \theta_3 < \pi/2$

127. Two identical bodies are made of a material for which the heat capacity increases with temperature. One of these is at 100 °C, while the other one is at 0°C. If the two bodies are brought into contact, then, assuming no heat loss, the final common temperature is :-

(1) less than 50 °C but greater than 0 °C

(2) 0 °C

(3) 50 °C

(4) more than 50 °C

Ans. (4)

Sol. Let θ be the final common temperature. Further, let s_c and s_h be the average heat capacities of the cold and hot (initially) bodies respectively (where $s_c < s_h$ given)

From, principle of calorimetry,

heat lost = heat gained

$s_h(100°C - \theta) = s_c\theta$

$\therefore\ \theta = \frac{s_h}{(s_h + s_c)} \times 100°C = \frac{100°C}{\left(1 + \frac{s_c}{s_h}\right)}$

$\because\ s_c / s_h < 1 \qquad \therefore\ 1 + s_c / s_h < 2$

$\therefore\ \theta > \frac{100°C}{2}$ or $\theta > 50°C$

128. A body cools from a temperature 3T to 2T in 10 minutes. The room temperature is T. Assume that Newton's law of cooling is applicable. The temperature of the body at the end of next 10 minutes will be :-

(1) $\frac{4}{3}T$ (2) T (3) $\frac{7}{4}T$ (4) $\frac{3}{2}T$

Ans. (4)

Sol. Newton's laws of cooling

$$\frac{T_1 - T_2}{t} = k\left(\frac{T_1 + T_2}{2} - T\right)$$

$$\frac{3T - 2T}{10} = k\left(\frac{5T - 2T}{2}\right) \Rightarrow \frac{T}{10} = k\left(\frac{3T}{2}\right) \quad ...(i)$$

$$\frac{2T - T'}{10} = k\left(\frac{2T + T'}{2} - T\right)$$

$$\Rightarrow \frac{2T - T'}{10} = k\left(\frac{T'}{2}\right) \quad ...(ii)$$

By solving (i) and (ii)

$$T' = \frac{3}{2}T$$

129. One mole of an ideal monatomic gas undergoes a process described by the equation PV^3 = constant. The heat capacity of the gas during this process is

(1) 2 R (2) R (3) $\frac{3}{2}R$ (4) $\frac{5}{2}R$

Ans. (2)

Sol. PV^x = constant (Polytropic process)

Heat capacity in polytropic process is given by

$$\left[C = C_V + \frac{R}{1-x}\right]$$

Given that PV^3 = constant $\Rightarrow$ x = 3 ...(1)

also gas is monoatomic f = 3 ...(2)

by formula

$$C = \frac{fR}{2} + \frac{R}{1-x}$$

$$C = \frac{3}{2}R - \frac{R}{2} = R$$

130. The temperature inside a refrigerator is t_2°C and the room temperature is t_1°C. The amount of heat delivered to the room for each joule of electrical energy consumed ideally will be :-

(1) $\frac{t_2+273}{t_1-t_2}$ (2) $\frac{t_1+t_2}{t_1+273}$

(3) $\frac{t_1}{t_1-t_2}$ (4) $\frac{t_1+273}{t_1-t_2}$

Ans. (4)

Sol. Heat delivered = Q_1

$$COP(\beta) = \frac{t_2+273}{t_1-t_2} = \frac{Q_2}{W} = \frac{Q_1-W}{W} = \frac{Q_1}{W} - 1$$

$$\Rightarrow \frac{Q_1}{W} = 1 + \frac{t_2+273}{t_1-t_2} = \frac{t_1+273}{t_1-t_2}$$

131. A given sample of an ideal gas occupies a volume V at a pressure P and absolute temperature T. The mass of each molecule of the gas is m. Which of the following gives the density of the gas ?

(1) P/(kTV) (2) mkT

(3) P/(kT) (4) Pm/(kT)

Ans. (4)

Sol. $\frac{P}{\rho} = \frac{RT}{M_w}$ (Gas equation)

$$\Rightarrow \rho = \frac{PM_w}{RT} = \frac{P\times(mN_A)}{kN_AT} = \frac{Pm}{kT}$$

132. A body of mass m is attached to the lower end of a spring whose upper end is fixed. The spring has negligible mass. When the mass m is slightly pulled down and released, it oscillates with a time period of 3s. When the mass m is increased by 1 kg, the time period of oscillations becomes 5 s. The value of m in kg is :-

(1) $\frac{16}{9}$ (2) $\frac{9}{16}$

(3) $\frac{3}{4}$ (4) $\frac{4}{3}$

Ans. (2)

Sol. $T = 2\pi\sqrt{\frac{m}{k}}$

$$3 = 2\pi\sqrt{\frac{m}{k}} \quad ...(1)$$

$$5 = 2\pi\sqrt{\frac{m+1}{k}} \quad ...(2)$$

$$\frac{(1)^2}{(2)^2} \Rightarrow \frac{9}{25} = \frac{m}{m+1} \Rightarrow m = \frac{9}{16}$$

133. The second overtone of an open organ pipe has the same frequency as the first overtone of a closed pipe L metre long. The length of the open pipe will be

(1) $\frac{L}{2}$ (2) 4 L (3) L (4) 2 L

Ans. (4)

Sol. For second overtone (3rd harmonic) in open organ pipe,

$$\frac{3\lambda}{2} = \ell_0 \Rightarrow \lambda = \frac{2\ell_0}{3}$$

for first overtone (3rd harmonic) in closed organ pipe,

$$\frac{3\lambda}{4} = \ell_C \Rightarrow \lambda = \frac{4\ell_C}{3} = \frac{4L}{3}$$

So, $\frac{2\ell_0}{3} = \frac{4L}{3} \Rightarrow \ell_0 = 2L$

134. Three sound waves of equal amplitudes have frequencies (n – 1), n, (n + 1). They superimpose to give beats. The number of beats produced per second will be :-

(1) 3 (2) 2 (3) 1 (4) 4

Ans. (2)

Sol. Net beat frequency
= LCM of individual beat frequencies
= LCM of [(n, n–1), (n, n+1), (n–1, n+1)]
= LCM of (1, 1, 2)
= 2 Hz

So, no. of beats per second = 2

135. An electric dipole is placed at an angle of 30° with an electric field intensity 2×10^5 N/C. It experiences a torque equal to 4 Nm. The charge on the dipole, if the dipole length is 2 cm, is :-

(1) 5 mC (2) 7 μC (3) 8 mC (4) 2 mC

Ans. (4)

Sol. $\tau = PE\sin\theta$

$\tau = q\ell E\sin\theta$

$4 = q\times2\times16^{-3}\times2\times10^5\sin30°$

$\Rightarrow q = 2$ mC

NEET–II (2016) TEST PAPER WITH ANSWER & SOLUTIONS (HELD ON SUNDAY 24th JULY, 2016)

136. Hot concentrated sulphuric acid is a moderately strong oxidizing agent. Which of the following reactions does not show oxidizing behaviour ?

(1) $C + 2H_2SO_4 \rightarrow CO_2 + 2SO_2 + 2H_2O$

(2) $CaF_2 + H_2SO_4 \rightarrow CaSO_4 + 2HF$

(3) $Cu + 2H_2SO_4 \rightarrow CuSO_4 + SO_2 + 2H_2O$

(4) $3S + 2H_2SO_4 \rightarrow 3SO_2 + 2H_2O$

Ans. (2)

Sol. $CaF_2 + H_2SO_4 \rightarrow CaSO_4 + 2HF$

In this reaction, oxidation number of none of the atom is not changed. Hence H_2SO_4 is not acting as oxidising agent.

137. Which of the following pairs of d-orbitals will have electron density along the axes ?

(1) $d_{z^2}, d_{x^2-y^2}$ (2) $d_{xy}, d_{x^2-y^2}$

(3) d_{z^2}, d_{xz} (4) d_{xz}, d_{yz}

Ans. (1)

Sol. dz^2 and $dx^2–y^2$ has electron density concentrated on the axis.

138. The correct geometry and hybridization for XeF_4 are :

(1) Planar triangle, sp^3d^3

(2) square planar, sp^3d^2

(3) octahedral, sp^3d^2

(4) trigonal bipyramidal, sp^3d

Ans. (3)

Sol. XeF_4, $AB_4L_2 \rightarrow sp^3d^2$

$\rightarrow$ geometry $\rightarrow$ octahedral

$\rightarrow$ shape $\rightarrow$ square planar

139. Among the following which one is a wrong statement?

(1) SeF_4 and CH_4 have same shape

(2) I_3^+ has bent geometry

(3) PH_5 and $BiCl_5$ do not exist

(4) $p\pi$-$d\pi$ bonds are present in SO_2

Ans. (1)

Sol. (1) SeF_4 –sp^3d, lp = 1, shape = see-saw

CH_4 –sp^3, lp = 0, shape =tetrahedral

(2) I_3^+ –sp^3, lp =2, shape = bent/angular

(3) PH_5 = d-orbital contraction absent

$BiCl_5$ = due to inert pair effect

(Bi^{+5} act as OA, Cl^- act as RA)

(4) SO_2 : O=S=O

$P\pi$-$d\pi$, $P\pi$–$P\pi$ both type bonds are present

140. The correct increasing order of trans-effect of the following species is :

(1) $Br^- > CN^- > NH_3 > C_6H_5^-$

(2) $CN^- > Br^- > C_6H_5^- > NH_3$

(3) $NH_3 > CN^- > Br– > C_6H_5^-$

(4) $CN^- > C_6H_5^- > Br^- > NH_3$

Ans. (4)

Sol. Trans effect order – $C\bar{N} > C_6H_5^- > Br^- > NH_3$

141. Which one of the followng statements related to lanthanons is **incorrect** ?

(1) All the lanthanons are much more reactive than aluminium

(2) Ce(+4) solutions are widely used as oxidizing agent in volumetric analysis

(3) Europium shows +2 oxidation state.

(4) The basicity decreases as the ionic radius decreases from Pr to Lu.

Ans. (1)

Sol. (1) Lanthanon's are less reactive than aluminium due to high IP (Lanthenoid contraction)

(2) Ce^{+4} is good oxidising agent and easily converted into Ce^{+3}

(3) Eu(63) = $4f^7\ 5d^0\ 6s^2$, $Eu^{+2} = 4f^7$

(4) In lanthenoids series 'Ce' to Lu ionic radius regular decreases and covalent character increase, basic character of hydroxide decrease

142. Jahn-Teller effect **not** observed in high spin complexes of :-

(1) d^4 (2) d^9 (3) d^7 (4) d^8

Ans. (4)

Sol. John Teller effect explain axial distortion in perfect octahedral geometry. It is present in d^4 high spin, d^7 low spin and d^9 configuations which have odd number of electrons in eg set.

A weak John Teller effect in also present in d^7 high spin complex which has odd number of electrons in the set.

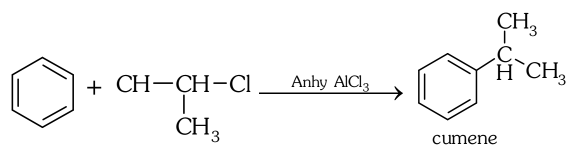
143. Which of the following can be used as the halide component for Friedel-Crafts reaction ?

(1) Chloroethene (2) Isopropyl chloride

(3) Chlorobenzene (4) Bromobenzene

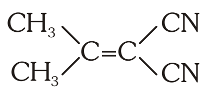
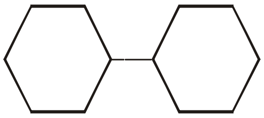
Ans. (2)

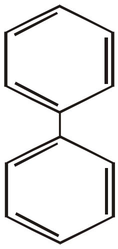
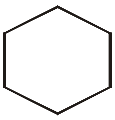
Sol.



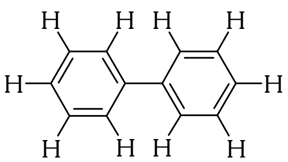
But in chlorobenzene, Bromobenzene, chloroethene lone pair of halogen are delocalised with π bonds, so attain double bond character.

144. In which of the following molecules, all atoms are coplanar ?

(1) 
(2) 

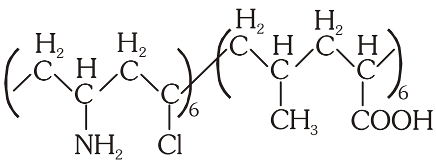
(3) 
(4) 

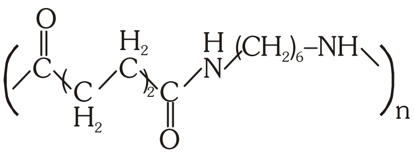
Ans. (3)

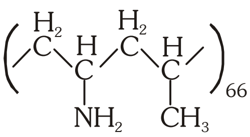
Sol. 

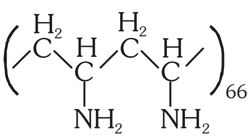
All carbons are sp^2 hybridised

145. Which one of the following structures represents nylon 6,6 polymer ?

(1) 

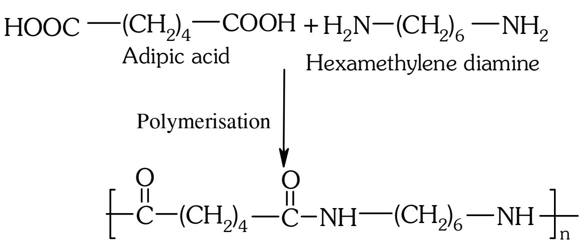
(2) 

(3) 

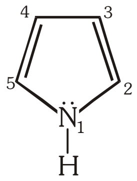
(4) 

Ans. (2)

Sol.



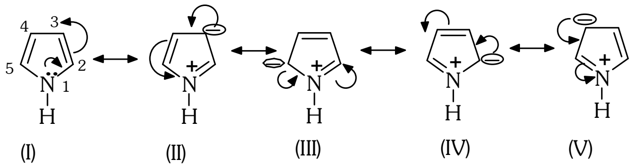
146. In pyrrole



The electron density is maximum on :-

(1) 2 and 4
(2) 2 and 5
(3) 2 and 3
(4) 3 and 4

Ans. (2)

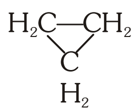


Maximum electron density at (2) and (5) as resonating structures III & IV are more stable than (II) & (V) so are major contributor.

147. Which of the following compounds shall not produced propene by reaction with HBr followed by elimination of direct only elimination reaction ?

(1) $H_2C=C=O$

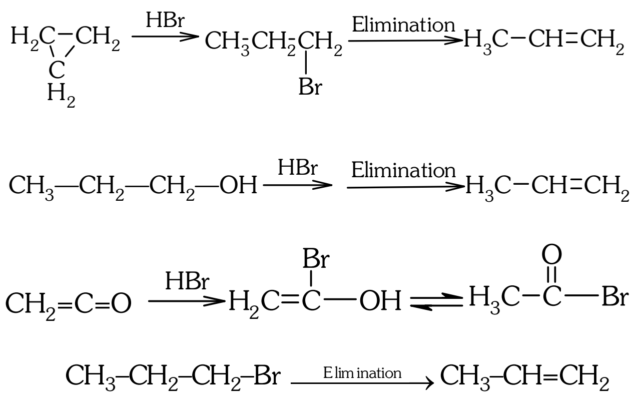
(2) $H_3C-\overset{H_2}{C}-CH_2Br$

(3) 

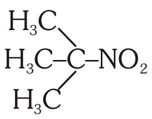
(4) $H_3C-\overset{H_2}{C}-CH_2OH$

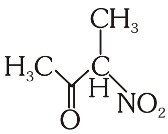
Ans. (1)

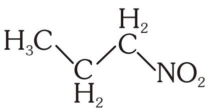
Sol.

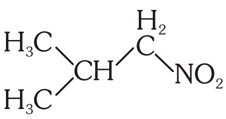


148. Which one of the following nitro-compounds does not react with nitrous acid ?

(1) 

(2) 

(3) 

(4) 

Ans. (1)

Sol. 3°-Nitro compound does not react with HNO_2 because of absence of α–H

149. The central dogma of molecular genetics states that the genetic information flows from :-

(1) DNA → RNA → Proteins

(2) DNA → RNA → Carbohydrates

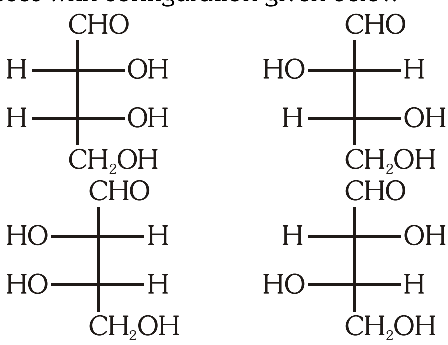
(3) Amino acids → Proteins → DNA

(4) DNA → Carbohydrates → Proteins

Ans. (1)

Sol. DNA $\xrightarrow{\text{Transcription}}$ RNA $\xrightarrow{\text{Translation}}$ Protein

150. The **correct** corresponding order names of four aldoses with configuration given below



respectively, is :-

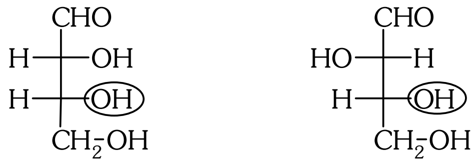
(1) L-erythrose, L-threose, D-erythrose, D-threose

(2) D-erythrose, D-threose, L-erythrose, L-threose

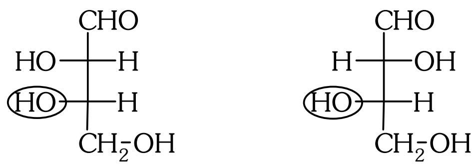
(3) L-erythrose, L-threose, L-erythrose, D-threose

(4) D-threose, D-erythrose, L-threose, L-erythrose

Ans. (2)

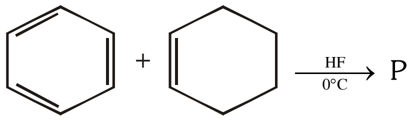
Sol. 

D-Erythrose D-Threose

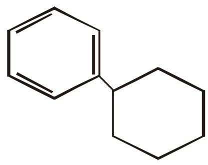


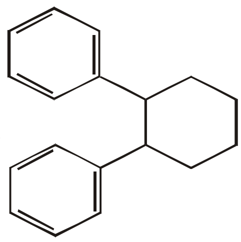
L-Erythrose L-Threose

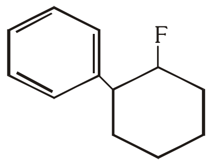
151. In the given reaction

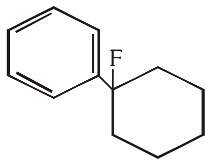


the product P is :-

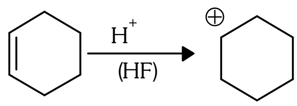
(1) 

(2) 

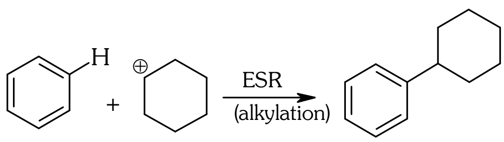
(3) 

(4) 

Ans. (1)

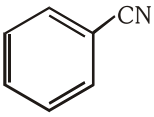
Sol. 

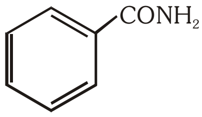
Carbocation

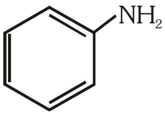


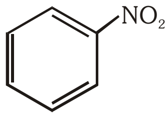
[Friedel Craft reaction]

152. A given nitrogen-containing aromatic compound A reacts with Sn/HCl, followed by HNO_2 to give an unstable compound B. B, on treatment with phenol, forms a beatiful coloured compound C with the molecular formula $C_{12}H_{10}N_2O$. The structure of compound A is :-

(1) 

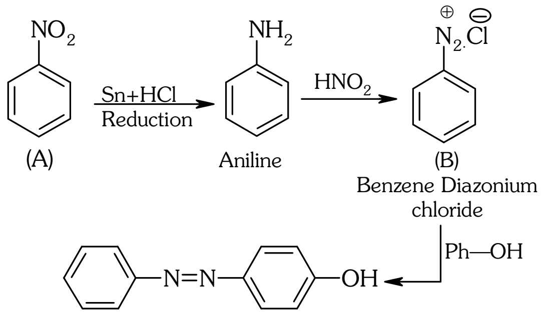
(2) 

(3) 

(4) 

Ans. (4)

Sol.



p-Hydroxy azo benzene (red colour dye)

153. Consider the reaction

$CH_3CH_2CH_2Br + NaCN \rightarrow CH_3CH_2CH_2CN + NaBr$

This reaction will be the fastest in

(1) N,N'-dimethylformamide (DMF)

(2) water

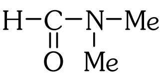
(3) ethanol

(4) methanol

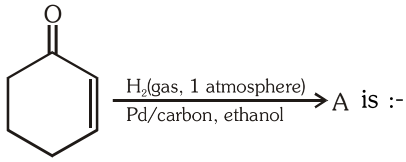
Ans. (1)

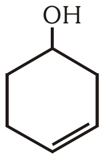
Sol. $CH_3–CH_2–CH_2Br$ + NaCN $\rightarrow CH_3CH_2CH_2CN$+ NaBr

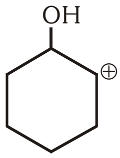
This reaction follows by S_N2 path, which is favoured by polar aprotic solvents like DMF, DMSO, etc.

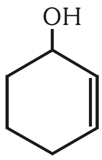
DMF (Dimethyl formamide) 

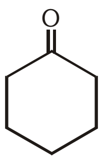
154. The **correct** structure of the product A formed in the reaction



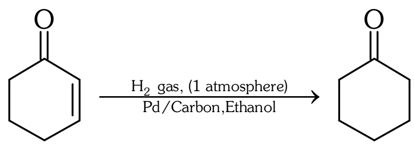
(1) 

(2) 

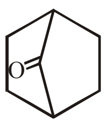
(3) 

(4) 

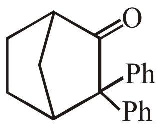
Ans. (4)

Sol. 

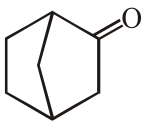
155. Which among the given molecules can exhibit tautomerism ?



I



II



III

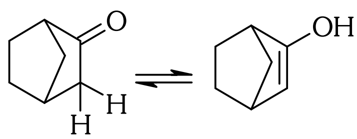
(1) Both I and II

(2) Both II and III

(3) III only

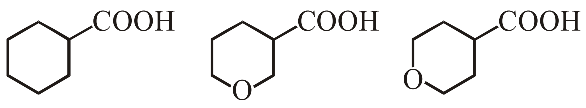
(4) Both I and III

Ans. (3)

Sol. 

Keto form Enol form

156. The **correct** order of strengths of the carboxylic acids



I II III

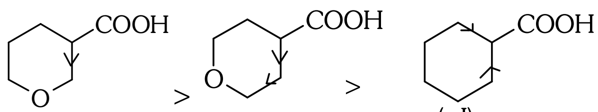
is

(1) III > II > I (2) II > I > III

(3) I > II > III (4) II > III > I

Ans. (4)

Sol. Acidic Strength



more(—I) > less (—I) > (+I)

157. The compound that will react most readily with gaseous bromine has the formula

(1) C_4H_{10} (2) C_2H_4

(3) C_3H_6 (4) C_2H_2

Ans. (3)

Sol. Gaseous Bromine reacts with alkene to give allylic substituted product by free radical mechanism

$$CH_3\text{–}CH\text{=}CH_2 \xrightarrow{Br_2(gas)} \underset{\displaystyle Br}{H_2C}\text{–}\underset{\displaystyle H}{C}\text{=}CH_2$$

158. Which one of the following compounds shows the presence of intramolecular hydrogen bond ?

(1) Cellulose

(2) Concentrated acetic acid

(3) H_2O_2

(4) HCN

Ans. (1)

Sol. In acetic acid, H_2O_2 and HCN inter molecular hydrogen bond present but in cellulose intramolecular hydrogen bond present.

159. The molar conductivity of a 0.5 mol/dm³ solution of $AgNO_3$ with electrolytic conductivity of 5.76×10^{-3} S cm⁻¹ at 298 K is

(1) 0.086 S cm²/mol

(2) 28.8 S cm²/mol

(3) 2.88 S cm²/mol

(4) 11.52 S cm²/mol

Ans. (4)

Sol. C = 0.5 mol / dm³

$\kappa = 5.76 \times 10^{-3}$ S cm^{-1}

T = 298 K

$$\lambda_m = \frac{\kappa \times 1000}{M} = \frac{5.76 \times 10^{-3}}{0.5} = 11.52 \ \text{Scm}^2/\text{mol}$$

160. The decomposition of phosphine (PH_3) on tungsten at low pressure is a first-order reaction. It is because the

(1) rate is independent of the surface coverage

(2) rate of decomposition is very slow

(3) rate is proportional to the surface coverage

(4) rate is inversely proportional to the surface coverage

Ans. (3)

Sol. The decomposition of PH_3 on tungsten at low pressure is a first order reaction because rate is proportional to the surface coverage.

161. The coagulation values in millimoles per litre of the electrolytes used for the coagulation of As_2S_3 are given below :

I. (NaCl) = 52, II. ($BaCl_2$) = 0.69,

III. ($MgSO_4$) = 0.22

The **correct** order of their coagulating power is

(1) III > II > I (2) III > I > II

(3) I > II > III (4) II > I > III

Ans. (1)

Sol. Coagulation power $\propto \dfrac{1}{\text{coagulation value}}$

So, the order is III > II > I

162. During the electrolysis of molten sodium chloride, the time required to produce 0.10 mol of chlorine gas using a current of 3 amperes is

(1) 220 minutes (2) 330 minutes

(3) 55 minutes (4) 110 minutes

Ans. (4)

Sol. $2Cl^- \rightarrow Cl_2(g) + 2e^-$

$$W = \frac{E}{96500} \times it$$

$$0.1 \times 71 = \frac{35.5}{96500} \times 3 \times t(\text{sec})$$

t (s) = 6433.33 sec

t(min) = 107.22 min ≈ 110 min.

163. How many electrons can fit in the orbital for which n = 3 and l = 1 ?

(1) 10 (2) 14 (3) 2 (4) 6

Ans. (3)

Sol. n=3, l =1 ⇒3p

Total 2 electron can fit in the orbital of 3p

164. For a sample of perfect gas when its pressure is changed isothermally from p_i to p_f, the entropy change is given by

(1) $\Delta S = nRT \ln\left(\frac{p_f}{p_i}\right)$ (2) $\Delta S = RT \ln\left(\frac{p_i}{p_f}\right)$

(3) $\Delta S = nR \ln\left(\frac{p_f}{p_i}\right)$ (4) $\Delta S = nR \ln\left(\frac{p_i}{p_f}\right)$

Ans. (4)

Sol. $\Delta S = nC_{pm} \ell n \frac{T_f}{T_i} + nR \ell n \frac{P_i}{P_f}$

For isothermal $T_i = T_f$, ln1 = 0

$$\Delta S = nR \ell n \frac{P_i}{P_f}$$

165. The van't Hoff factor (i) for a dilute aqueous solution of the strong electrolyte barium hydroxide is

(1) 2 (2) 3

(3) 0 (4) 1

Ans. (2)

Sol. $Ba(OH)_2$ is strong electrolyte, so its 100% dissociation occurs in solution

$$Ba(OH)_2 \rightarrow Ba^{+2}(aq) + 2OH^-(aq)$$

Van't Hoff factor = total number of ions present in solution i =3

166. The percentage of pyridine (C_5H_5N) that forms pyridinium ion ($C_5H_5N^+H$) in a 0.10 M aqueous pyridine solution (K_b for $C_5H_5N = 1.7 \times 10^{-9}$) is

(1) 0.77% (2) 1.6%

(3) 0.0060% (4) 0.013%

Ans. (4)

Sol. Pyridine ($C_5H_5H_5N$) is a weak base

$K_b = C\alpha^2$

$$\alpha = \sqrt{\frac{1.7 \times 10^{-9}}{0.1}}$$

$$\alpha = 1.30 \times 10^{-4}$$

$$\%\alpha = 1.30 \times 10^{-4} \times 100$$

$$\%\alpha = 0.013\%$$

167. In calcium fluoride, having the fluorite structure, the coordination numbers for calcium ion (Ca^{2+}) and fluoride ion (F^-) are

(1) 8 and 4 (2) 4 and 8

(3) 4 and 2 (4) 6 and 6

Ans. (1)

Sol. In CaF_2, the coordination numbers for

Ca^{+2} = 8

$F^- = 4$

168. If the E°_{cell} for a given reaction has a negative value, which of the following gives the **correct** relationships for the values of ΔG° and K_{eq} ?

(1) $\Delta G^{\circ} < 0;\ K_{eq} > 1$

(2) $\Delta G^{\circ} < 0;\ K_{eq} < 1$

(3) $\Delta G^{\circ} > 0;\ K_{eq} < 1$

(4) $\Delta G^{\circ} > 0;\ K_{eq} > 1$

Ans. (3)

Sol. $\because E^0_{cell} = -ve$

$\therefore \Delta G^0 = -nF\ E^0_{cell}$

$\Delta G^0 = +ve \Rightarrow \Delta G > 0$

$\because \Delta G^0 = -2.303RT \log K_{eq}$

$\therefore K_{eq} < 1$

169. Which one of the following is **incorrect** for ideal solution ?

(1) $\Delta P = P_{obs} - P_{\text{calculated by Raoult's law}} = 0$

(2) $\Delta G_{mix} = 0$

(3) $\Delta H_{mix} = 0$

(4) $\Delta U_{mix} = 0$

Ans. (2)

Sol. For an ideal solution $\Delta H_{mix} = 0$

$\Delta U_{mix} = 0$

$\Delta S_{mix} \neq 0$

According to $\Delta G_{mix} = \Delta H_{mix} - T\Delta S_{mix}$

$\Rightarrow \Delta G_{mix} \neq 0$

Incorrect answer, is $\Delta G_{mix} = 0$

170. The solubility of AgCl(s) with solubility product 1.6×10^{-10} in 0.1 M NaCl solution would be

(1) 1.6×10^{-11} M

(2) zero

(3) 1.26×10^{-5} M

(4) 1.6×10^{-9} M

Ans. (4)

Sol.

$NaCl(aq)$	$\rightarrow$ $Na^+(aq)$	+	$Cl^-(aq)$
0.1M	0		0
0	0.1M		$0.1+S$

$AgCl(s)$	$\rightleftharpoons$ $Ag^+(aq)$	+	$Cl^-(aq)$
a	0		0
$a-S$	S		$S+0.1$

$K_{sp} = 1.6 \times 10^{-10} = [Ag^+][Cl^-] = S(0.1+S)$

$\because K_{sp}$ is small, S is neglected with respect to 0.1 M

$1.6 \times 10^{-10} = S \times 0.1$

$S = 1.6 \times 10^{-9}$ M

171. Suppose the elements X and Y combine to form two compounds XY_2 and X_3Y_2. When 0.1 mole of XY_2 weighs 10 g and 0.05 mole of X_3Y_2 weighs 9 g, the atomic weights of X and Y are

(1) 20, 30 (2) 30, 20

(3) 40, 30 (4) 60, 40

Ans. (3)

Sol. Let atomic weight of x is A_x and y is A_y

$$n_{xy_2} = 0.1 = \frac{10}{A_x + 2A_y}$$

$$A_x + 2A_y = 100 \ldots(1)$$

$$n_{x_3y_2} = 0.05 = \frac{9}{3A_x + 2A_y}$$

$3A_x + 2A_y = 180 \ldots(2)$

on solving eq. (1) and (2)

$A_x = 40,\ A_y = 30$

172. The number of electrons delivered at the cathode during electrolysis by a current of 1 ampere in 60 seconds is (charge on electron = 1.60×10^{-19} C)

(1) 3.75×10^{20} (2) 7.48×10^{23}

(3) 6×10^{23} (4) 6×10^{20}

Ans. (1)

Sol. $Q = ne$

$i.t = n.e$

$$n = \frac{1 \times 60}{1.6 \times 10^{-19}} = 3.75 \times 10^{20} \text{ electrons}$$

173. Boric acid is an acid because its molecule

(1) accepts OH^- from water releasing proton

(2) combines with proton from water molecule

(3) contains replaceable H^+ ion

(4) gives up a proton

Ans. (1)

Sol. $B(OH)_3 + H_2O \rightleftharpoons [B(OH)_4]^- + H^+$

174. AlF_3 is soluble in HF only in presence of KF. It is due to the formation of

(1) AlH_3 (2) $K[AlF_3H]$

(3) $K_3[AlF_3H_3]$ (4) $K_3[AlF_6]$

Ans. (4)

Sol. $AlF_3 + 3KF \rightarrow K_3[AlF_6]$

175. Zinc can be coated on iron to produce galvanized iron but the reverse is not possible. It is because

(1) zinc has lower negative electrode potential than iron

(2) zinc has higher negative electrode potential than iron

(3) zinc is lighter than iron

(4) zinc has lower melting point than iron

Ans. (2)

Sol. Zinc has higher negative electrode potential than iron, so iron cannot be coated on zinc.

176. The suspension of slaked lime in water is known as

(1) milk of lime

(2) aqueous solution of slaked lime

(3) limewater

(4) quicklime

Ans. (1)

Sol. Aqueous solution of slaked lime $\Rightarrow$ lime water

Suspension solution of slaked lime $\Rightarrow$ milk of lime

177. The hybridizations of atomic orbitals of nitrogen in NO_2^+, NO_3^- and NH_4^+ respectively are

(1) sp, sp^2 and sp^3

(2) sp^2, sp and sp^3

(3) sp, sp^3 and sp^2

(4) sp^2, sp^3 and sp

Ans. (1)

Sol. $NO_2^+ = sp$ Linear

$NO_3^- = sp^2$ Trigonal planar

$NH_4^+ = sp^3$ Tetrahedral

178. Which of the following fluoro-compounds is most likely to behave as a Lewis base ?

(1) CF_4 (2) SiF_4

(3) BF_3 (4) PF_3

Ans. (4)

Sol. PF_3 act as Lewis base due to present of lone pair on P atom.

179. Which of the following pairs of ions is isoelectronic and isostructural ?

(1) SO_3^{2-}, NO_3^- (2) ClO_3^-, SO_3^{2-}

(3) CO_3^{2-}, NO_3^- (4) ClO_3^-, CO_3^{2-}

Ans. (2 & 3)

Sol. (2) In SO_3^{2-}, ClO_3^-, No. of electrons = 42,

Shape : Pyramidal

(3) In CO_3^{-2}, NO_3^-, No. of electrons = 32

Shape : trigonal planar

180. In context with beryllium, which one of the following statements is **incorrect** ?

(1) Its salts rarely hydrolyze.

(2) Its hydride is electron-deficient and polymeric.

(3) It is rendered passive by nitric acid.

(4) it forms Be_2C.

Ans. (1)

Sol. Be salts are covalent nature, so easily hyrolysed.