CODE-B

AMU-2016

TEST PAPER WITH SOLUTION & ANSWER KEY

Date: 10 April, 2016 | Duration : 3 Hours | Max. Marks: 200

IMPORTANT INSTRUCTIONS

- Complete all entries on the cover page and put you signature in the space provided.
- Use only Ball Point Pen (black / blue) for making entries in the Question booklet and the OMR Answer Sheet.
- Candidates should also read carefully the instructions printed on the Admission Test Card and the OMR Answer Sheet before attempting to answer the questions.

1. The Question Booklet contains 200 questions. Count the number of questions before attempting the questions. Discrepancy, If any, must immediately be brought to the notice of the Invigilator.
2. All questions are compulsory.
3. The time (Test duration) as specified above shall be reckoned from the moment of distribution of the question booklets.
4. Blank space in the Question Booklet may be used for rough work.
5. Each question is followed by four alternative answer. Select only one answer. Select only answer, which you consider as the most appropriate. Shade the relevant circle against the corresponding question number on the OMR Answer Booklet.
6. Answers Should ONLY be marked on the OMR Answer Sheet. No Answer should be written on the Question Booklet
7. The candidate is required to separate the original OMR Answer Sheet and its carbonless copy at the perforation carefully after the Admission Test. He/She shall hand over the original OMR Answer Sheet to the Invigilator before leaving his/her seat and take with him/her the carbonless copy of the OMR Answer Sheet and Question Booklet.
8. Failure to hand over the original OMR answer Sheet and the admit card will lead to cancellation of the candidature.

Name of the Candidate (in Capital letters) : _____

Roll Number : in figures : ☐☐☐☐☐☐☐☐   in words : _____

Name of Examination Centre (in Capital letters) : _____

Candidate's Signature : _____ Invigilator's Signature : _____

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PART A – CHEMISTRY (PAPER CODE : B)

1. The highest oxidation state shown by any transition elements is
(a) +8   (b) +5   (c) +6   (d) +7

Ans. (a)

Sol. Highest oxidation state by any transition element is +8 by osmium.

2. Out of SO_2, $BeCl_2$, O_3, H_2O and $HgCl_2$, the linear species are
(a) SO_2 and O_3 (b) SO_2 and H_2O (c) $BeCl_2$ and $HgCl_2$ (d) O_3 and H_2O

Ans. (c)

Sol. Linear species are $BeCl_2$ and $HgCl_2$

3. The size of Zr is very similar to
(a) La   (b) Hf   (c) Ta   (d) W

Ans. (b)

Sol. The size of Zr is very similar to Hf due to lanthanoid contraction

4. The hydrogen bond is strongest in
(a) O–H………S   (b) S–H………O   (c) F–H………F   (d) F–H………O

Ans. (c)

Sol. The hydrogen bond is strongest in F–H…..F due to small size and high electronegativity of fluorine.

5. The oxidation number of cobalt in $K[Co(CO)_4]$ is
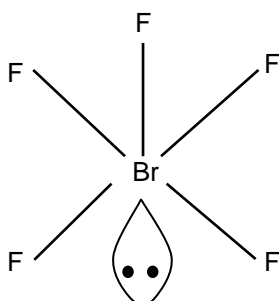(a) +1   (b) +3   (c) –1   (d) –3

Ans. (c)

Sol. $K[Co(CO)_4]$ Let the oxidation state of Co is x
$1 + x + 4(0) = 0$
$x = -1$

6. Hybridization and shape of BrF_5 is
(a) sp^3d, Trigonal bipyramidal   (b) sp^3d^2, Trigonal bipyramidal
(c) dsp^2, square planar   (d) sp^3d^2, square pyramidal

Ans. (d)

Sol. In BrF_5, Bromine has sp^3d^2 hybridization, square pyramidal shape due to the presence of 1 lone pair of electron.

7. The most stable coordination compound is

(a) $[Fe(H_2O)_6]^{3+}$ (b) $[Fe(NH_3)_6]^{3+}$ (c) $[Fe(C_2O_4)_3]^{3-}$ (d) $[FeCl_6]^{3+}$

Ans. (c)

Sol. Due to the presence of bidentate chelating ligand, $(C_2O_4)^{-2}$ Stability of coordination compound increases due to chelation.

8. Ca^{2+} and Mg^{2+} ions in the hard water are estimated by simple titration with

(a) Na_2EDTA (b) $NaEDTA$ (c) Na_3EDTA (d) Na_4EDTA

Ans. (d)

Sol. $Na_4(EDTA)$, EDTA is a tetravalent anion.

9. The bond order of which of the following molecules/ ion(s) is 3

(a) O_2 and NO^+ (b) N_2 and NO^+ (c) N_2 and NO (d) N_2^+ and NO^+

Ans. (b)

Sol. Isoelectronic species have same bond order

N_2 and NO^+ $\Rightarrow$ 14 electrons. $\Rightarrow$ B.O. = 3.

10. Diamond and graphite are

(a) Isomers   (b) Isotopes   (c) Allotropes   (d) Polymers

Ans. (c)

Sol. Diamond and graphite are the crystalline allotropes of carbon.

11. Structure of BrF_3 is

(a) Trigonal bipyramidal   (b) Perfect T-shaped

(c) Bent T-shaped   (d) Trigonal planar

Ans. (c)

Sol. Due to the presence of two lone pair of electrons on bromine, it has bent T-shaped.

12. The activation energy for a reaction that doubles the rate when the temperature is raised from 300 K to 310 K is

(a) 50.6 KJ mol^{-1} (b) 53.6 KJ mol^{-1} (c) 56.6 KJ mol^{-1} (d) 59.6 KJ mol^{-1}

Ans. (b)

Sol. $\log 10 \dfrac{K_2}{K_1} = \dfrac{\varepsilon_A}{2.303R}\left[\dfrac{1}{T_1} - \dfrac{1}{T_2}\right]$

$K_2 = 2K_1$

$\log10 \dfrac{2K_1}{K_1} = = \dfrac{\varepsilon_a}{2.303 \times 8.314}\left[\dfrac{1}{3} - \dfrac{1}{310}\right]$

$\log10\,2 = \dfrac{\varepsilon_a}{2.303 \times 8.314}\left[\dfrac{310 - 300}{300 \times 310}\right]$

$0.30 = \dfrac{\varepsilon_a}{2.303 \times 8.314}\left(\dfrac{10}{93000}\right)$

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$$\varepsilon_a = \frac{0.3010 \times 2.303 \times 8.314 \times 93000}{10000 \quad 10 \times 100 0 \times 1000}$$

ε_a = 53.6 KJ/mol.

13. Reaction A + B → C + D follows rate law r = k $[A]^{\frac{1}{2}}$ $[B]^{\frac{1}{2}}$ starting with 1 M of A and B each. What is the time taken for concentration of A to become 0.1 M ?

(a) 10 sec   (b) 100 sec   (c) 1000 sec   (d) 434 sec

Ans. **(Bonus) Incomplete information**

Sol.

14. Sodium metal crystallizes in body centred cubic lattice with cell edge 4.29 A⁰. What is the radius of sodium atom?

(a) 1.66 A⁰   (b) 1.76 A⁰   (c) 1.86 A⁰   (d) 1.96 A⁰

Ans. (c)

Sol. for bcc unit cell

$$r = \frac{\sqrt{3}\,a}{4}$$

$$= \frac{\sqrt{3} \times 4.29}{4}$$

$$= \frac{1.73 \times 4.29}{4}$$

$$= 1.855\ A$$

$$r \approx 1.86\ A^0$$

15. 200 mL of a strong acid solution of pH 2.0 is mixed with 800 mL of another acid solution of pH 3.0. The pH of the resultant solution is

(a) 2.55   (b) 2.97   (c) 2.40   (d) 2.10

Ans. (a)

Sol. $[H^+] = 10^{-2}$ N for Acid$_1$

$[H^+] = 10^{-3}$ N for Acid$_2$

$$[H^+] = N_R = \frac{N_1V_1 + N_2V_2}{(V_1 + V_2)}$$

$$N_R = \frac{10^{-2} \times 200 + 10^{-3} \times 800}{1000} = \frac{2 + 0.8}{1000}$$

$$N_R = \frac{2.8}{1000}$$

$[H^+] = \boxed{N_R = 28 \times 10^{-4}}$

pH = – log[H⁺]

pH = – log 28 × 10⁻⁴

pH = 4 – log 28

pH = 4 – [log 2 × 2 × 7]

pH = 4 – [log 2 + log 2 + log 7]

pH = 4 – [0.3010 + 0.3010 + 0.8451]

pH = 4 – 1.447

pH = 2.55

16. For a certain reaction R → products, a plot of log [R] versus time gives a straight line with a slope of – 1.46 sec^{-1}. The order of reaction is

(a) Zero   (b) One   (c) Two   (d) Fractional

Ans. (b)

Sol. ln R = ln R_0 – kT, slope = –k, slope = –1.46, so k = 1.46 sec^{-1} unit of k in first order is sec^{-1} so this is first order reaction.

17. The equation, $\dfrac{P}{x} = \dfrac{1}{k'} + \dfrac{P}{k''}$ is

(a) Gibbs adsorption isotherm   (b) Freundlich adsorption isotherm

(c) Langmuir adsorption isotherm   (d) BET equation

Ans. (c)

Sol. It is a Langmuir adsorption isotherm equation.

18. The charge on As_2S_3 sol is due to

(a) adsorption of S^{2-} ions   (b) absorption of S^{2-} ions
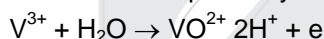
(c) adsorption of H^+ ions   (d) absorption of H^+ ions

Ans. (a)

Sol. As_2S_3 sol is a negatively charged colloid due to the adsorption of S^{-2} ions, usually common ions are adsorbed on colloidal particles.

19. Oxidation states of vanadium in

V → V^{2+} + 2e,

V^{2+} → V^{3+} + e,
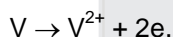
are 2 and 3 respectively. The oxidation states of vanadium in this following reaction.

V^{3+} + H_2O → VO^{2+} $2H^+$ + e

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

Ans. (d)

Sol. VO^{2+}

x + 1(– 2) = + 2

x – 2 = 2

x = + 4

20. 1 mol of A and 0.5 mole of B were enclosed in a three litres vessel. The following equilibrium was established under suitable conditions.

A + 2B ⇌ C

At equilibrium, the amount of B was found to be 0.3 mol. The equilibrium constant K_c at the experimental temperature will be

(a) 11.1   (b) 1.11   (c) 0.01   (d) 2.50

Ans. **(a)**

Sol.

A	+	2B	⇌	C
1		0.5		0
1 – 0.1		0.5–0.2		0.1
0.9		0.3		0.1
$\dfrac{0.9}{3}$		$\dfrac{0.3}{3}$		$\dfrac{0.1}{3}$
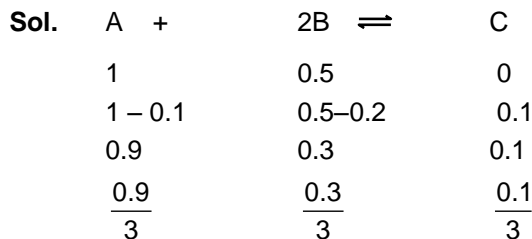
$$K = \frac{[C]}{[A][B]^2} = \frac{[0.1/3]}{[0.9/3][0.3/3]^2}$$

$$= 11.11$$

21. The inonization constant of a weak acid is 1.6×10^{-5} and the molar conductivity at infinite dilution is 380×10^{-4} Sm^2 mol^{-1}. If the cell constant is 0.01 m^{-1} then conductance of 0.01 M acid solution is :

(a) 1.52×10^{-5} S   (b) 1.52 S   (c) 1.52×10^{-3}S   (d) 1.52×10^{-4} S

Ans. **(c)**

Sol. $Ka = C\alpha^2$

$$Ka = C\left(\frac{\lambda_m^c}{\lambda_m^\infty}\right)^2$$

$$1.6 \times 10^{-5} = 0.01\left(\frac{\lambda_m^c}{380\times10^{-4}}\right)^2$$

$$16 \times 10^{-6} = 10^{-2}\left(\frac{\lambda_m^c}{380\times10^{-4}}\right)^2$$

$$16 \times 10^{-4} = \left(\frac{\lambda_m^c}{380\times10^{-4}}\right)^2$$

$$\frac{\lambda_m^c}{380\times10^{-4}} = \sqrt{16\times10^{-4}}$$

$$\lambda_m^c = 380 \times 10^{-4} \times 4 \times 10^{-2}$$

$$\lambda_m^c = 1520 \times 10^{-6} = 152 \times 10^{-5} = 1.52 \times 10^{-3}$$

22. 0.01 mole of NaOH is added to 1 litre of a buffer solution which contains 0.1 M acetic acid and 0.1M sodium acetate. If the pKa value of acetic acid is 4.76 is, the pH of the solution is

(a) 4.76   (b) < 4.76   (c) 7.6   (d) > 4.76

Ans. **(d)**

Sol. Initially $pH = pka + \log\dfrac{[salt]}{[acid]}$

$$pH = 4.76 + \log \frac{0.1}{0.1}$$
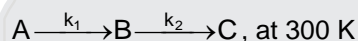
$$pH = 4.76 + \log 1$$

$$pH = 4.76 \qquad \therefore \qquad \log 1 = 0$$

After adding 0.01 mol of NaOH in 1 L = $\frac{0.01}{1}$ = 0.01 mol.

Conc. of salt slightly increases

So $\boxed{pH > 4.76}$

23. For consecutive first order reaction :

$$A \xrightarrow{k_1} B \xrightarrow{k_2} C \text{, at 300 K}$$

$k_1 = 2 \times 10^{-3} \text{ s}^{-1}$ and $k_2 = 5 \times 10^{-5} \text{ s}^{-1}$

The time which [B] will be maximum is

(a) 189.2s   (b) 1892 s   (c) 0 s   (d) ∞

Ans. **(b)**

Sol. $t_{max} = \dfrac{2.303 \log_{10} \dfrac{k_2}{k_1}}{k_2 - k_1}$

$= \dfrac{2.303 \log_{10} \dfrac{5 \times 10^{-5}}{2 \times 10^{-3}}}{2 \times 10^{-3} - 5 \times 10^{-5}}$ = 1892 s

24. Sucrose decomposes in acid solution into glucose and fructose according to first order rate law with a half life of 3.33 hrs at 25°C. What fraction of sample of sucrose remains after 9.00 hrs ?

(a) 0.333   (b) 0.666   (c) 0.153   (d) 0.250

Ans. **(c)**

Sol. $k = \dfrac{2.303}{t} \log_{10} \dfrac{a}{a-x}$

$\dfrac{0.693}{t_{1/2}} = \dfrac{2.303}{t} \log_{10} \dfrac{a}{a-x}$

$\dfrac{0.693}{3.33} = \dfrac{2.303}{9} \log_{10} \dfrac{a}{a-x}$

$\dfrac{a}{a-x} = 0.153$

25. Assuming that sea water is an aqueous solution of NaCl its density is 1.025 g/mL at 20°C and NaCl concentration is 3.5% (by mass), the normality of the sea water is

(a) 0.65 M   (b) 0.68 M   (c) 0.66 M   (d) 0.61 M

Ans. **(d)**

Sol. $N = \dfrac{w \times 1000}{Mw \times \dfrac{m}{d}}$

$N = \dfrac{3.5 \times 1.025 \times 1000}{58.5 \times 100}$

$N = \dfrac{3.5 \times 1.025 \times 10}{58.5}$

$N = 0.61\ N$

26. According to Freundlich adsorption isotherm, the amount of gas adsorbed per unit mass of the solid adsorbent varies directly with pressure when the value of n is

(a) 0   (b) 3   (c) 2   (d) 1

Ans. **(d)**

Sol. $\boxed{\dfrac{x}{m} = kp^{\frac{1}{n}}}$

slope = $\dfrac{x/m}{p} = 1$

n = 1

27. Tollen's reagent is

(a) Alkaline solution containing copper nitrate   (b) Ammonical silver nitrate
(c) Ammonical copper nitrate   (d) None of these

Ans. **(b)**

Sol. Tollen's reagent is ammonical silver nitrate solution ($NH_4OH + AgNO_3$).

28. Chloroform is slowly oxidized by air in presence of air to an extremely poisonous gas which is :

(a) AsH_3 (b) PH_3 (c) CO (d) $COCl_2$

Ans. **(d)**

Sol. $CHCl_3 + \tfrac{1}{2}O_2 \xrightarrow{light} \underset{\text{Phosgene}}{COCl_2} + HCl$
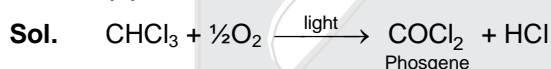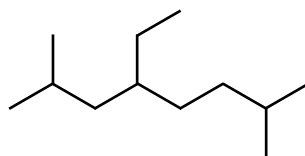
29. The drug showing potential control over "hyperacidity" in human is

(a) Ranitidine   (b) Iproniazid   (c) Soda-line   (d) Ursodeoxy cholic acid

Ans. **(a)**

Sol. The drug showing potential control over hyperacidity in human is Rantidine.

30. What is the IUPAC name for

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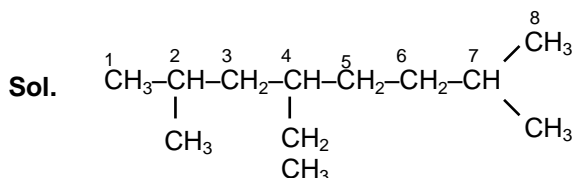**Ph.No. :** +91-744-3012222, 6635555 **| To Know more :** sms **RESO** at **56677**
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(a) 2-medhyle-5-isobutylhephtane   (b) 2, 7-dimethyl-4-ethyloctane

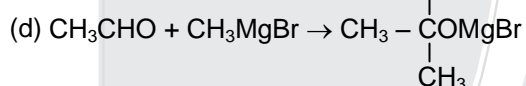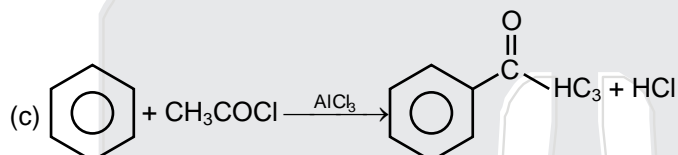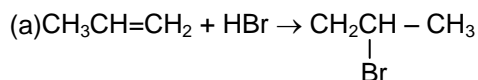(c) 2,7-dimethyl-5-ethyloctane   (d) 2-methyl-5-(2-methylpropyl) heptane

Ans. **(b)**

Sol.

$$CH_3\!-\!\overset{\underset{\displaystyle CH_3}{|}}{CH}\!-\!CH_2\!-\!\overset{\underset{\displaystyle CH_2}{\underset{\displaystyle CH_3}{|}}}{CH}\!-\!CH_2\!-\!CH_2\!-\!\overset{\overset{\displaystyle CH_3}{}}{\underset{\displaystyle CH_3}{CH}}$$

with numbering 1, 2, 3, 4, 5, 6, 7, 8

4-Ethyl-2,7-dimethyloctane (according to the question most probable answer is 2, 7-dimethyl-4-ethyloctane)

31. Which of the following intermediates is pyramidal in shape?

(a) $H_3C^{\oplus}$ (b) $H_2\ddot{C}$ (c) $H_3C:^{\ominus}$ (d) $HC \equiv C:^{\ominus}$

Ans. **(c)**

Sol. Carbanion having sp^3 hybrid carbon is   trigonal pyramidal
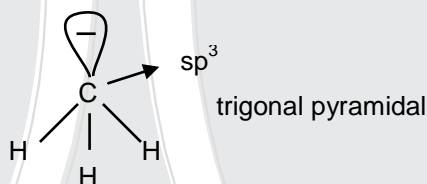
32. Which of the following free radicals is most stable ?

(a)   (b)   (c)   (d)
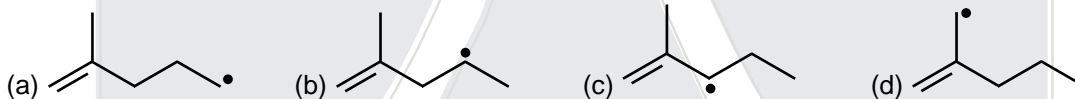
Ans. **(c)**

Sol. is stablised by hyperconjugation as well as by resonance.

33. Primary, secondary and tertiary amines can be distinguished with

(a) Hinberg test   (b) Lucas test   (c) Biurett test   (d) Carbylamines test

Ans. **(a)**

Sol. Hinsberg reagent (benzene sulphonyl-chloride) is used to distinguish between Primary, secondary and tertiary amines.

1^0 amine + Hinsberg reagent $\longrightarrow$ N-alkyl benzene sulphonamide (soluble in alkali).

2^0 amine + Hinsberg reagent $\longrightarrow$ N,N-dialkyl benzene sulphonamide (insoluble in alkali)

3^0 amine + Hinsberg reagent $\longrightarrow$ no reaction.

34. The order of basicity of amines in gaseous phase is :

(a) $3° > 2° \, 1° > NH_3$ (b) $2° > 3° > 1° > NH_3$ (c) $1° > 2° > 3° > NH_3$ (d) $2° > 1° > 3° > NH_3$

Ans. **(a)**

Sol. Basicity of amines in gaseous phase is determined by +I effect only

$3^0 > 2^0 > 1^0 > NH_3$

35.   Vitamin B_2 is

      (a) Thiamine   (b) pyridoxine   (c) Riboflavin   (d) Pantothenic acid

**Ans.**   **(c)**

Sol.   Vitamin B_2 is riboflavin

36.   Which of the following reactions is nucleophilic addition reaction ?

      (a) $CH_3CH=CH_2 + HBr \rightarrow CH_2CH - CH_3$
                                            |
                                            Br

      (b) $CH_3CH_2Br + aq.\ KOH \rightarrow CH_3CH_2OH + KBr$

      (c) Benzene $+ CH_3COCl \xrightarrow{AlCl_3}$ acetophenone $HC_3 + HCl$

      (d) $CH_3CHO + CH_3MgBr \rightarrow CH_3 - COMgBr$
                                                  CH_3

Ans.   **(d)**

Sol.   Carbonyl compound undergoes nucleophilic addition reaction with grignard reagent.

37.   Which of the followings does not respond to Friedel Craft reaction

      (a) benzene   (b) thiophene   (c) toluene (CH_3)   (d) aniline (NH_2)
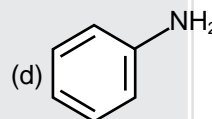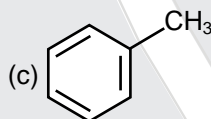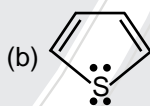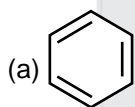
Ans.   **(d)**

Sol.   Because N-atom of NH_2 group gives its electron pair to Lewis acid (anhydrous $A(Cl_3)$) so electrophile is not generated:

38.   Which of the following is Zwitter ion :

      (a) $\overset{+}{N}H_3$ benzene SO_3^- (b) $CH_3 - C \equiv N$ (c) SO_3H benzene   (d) SO_3H benzene CH_3
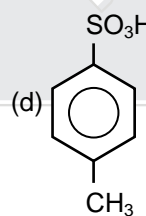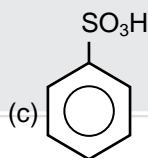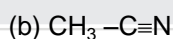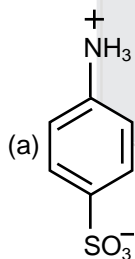
Ans.   (a)

Sol.   Sulphanilic acid exists as zwitter ion.

NH$_2$ / SO$_3$H Sulphanilic acid ⇌ NH$_3^+$ / SO$_3^-$ Zwitter ion
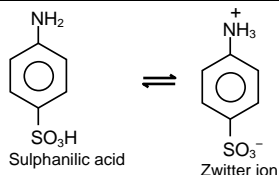
39. The reaction $ArN_2^+X^- \xrightarrow{Cu/HBr} Ar–Br + N_2 + CuX$ is known as :

(a) Gattermann Koch reaction   (b) Gatterman reaction

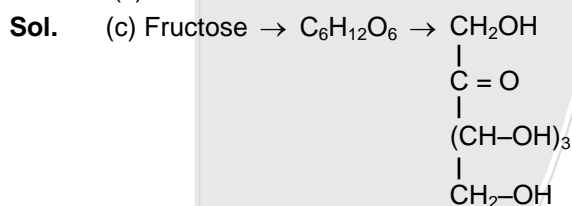(c) Sandymeyer reaction   (d) Sabatier – Senderen reaction

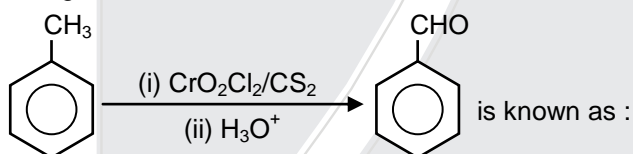**Ans.** (b)

Sol. It is Gattermann reaction.

40. Which of the following is a ketohexose?

(a) Glucose   (b) Sucrose   (c) Fructose   (d) Ribose

Ans. (c)

Sol. (c) Fructose $\rightarrow C_6H_{12}O_6 \rightarrow$ CH$_2$OH | C = O | (CH–OH)$_3$ | CH$_2$–OH

41. The given reaction:

CH$_3$ $\xrightarrow[\text{(ii) } H_3O^+]{\text{(i) } CrO_2Cl_2/CS_2}}$ CHO   is known as :

(a) Carbylamine reaction   (b) Hunsdeiker reaction

(c) Hoffmann reaction   (d) Etard reaction

Ans. (d)

Sol. Information based

42. α–D–Glucose and β-D–Glucose are a pair of :

(a) Anomers   (b) Epimers   (c) Both   (d) None

Ans. (a)

Sol. α-D-Glucose β-D-Glucose

α & β Glucose are anomers due to change in configuration around C$_1$ carbon atom only.

43. Amylopectin is a branched polymer of :

    (a) β–D–glucose   (b) α–D–glucose   (c) Fructose   (d) Rhamnose
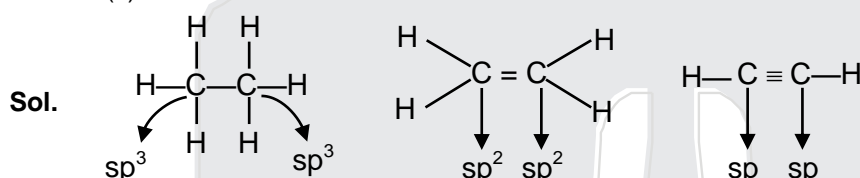
Ans. **(b)**

Sol. Amylopectin is a branched polymer of α–D–glucose.

44. In ethane, ethene and ethyne molecules, carbon atoms are present in hybrid states of :

    (a) sp^3–sp^2, sp^2–sp^2, sp^2–sp (b) sp^3–sp, sp^3–sp^2, sp^3–sp

    (c) sp^3–sp^3, sp^2–sp^2, sp–sp (d) sp^2–sp^3, sp^2–sp, sp^2–sp^3

Ans. (c)

Sol.

45. The correct order of increasing ionic character is :

    (a) $BeCl_2 < MgCl_2 < BaCl_2 < CaCl_2$ (b) $BeCl_2 < MgCl_2 < CaCl_2 < BaCl_2$

    (c) $BeCl_2 < BaCl_2 < MgCl_2 < CaCl_2$ (d) $BaCl_2 < CaCl_2 < MgCl_2 < BeCl_2$

Ans. **(b)**

Sol. Ionic character is decided by Fazan's rule. More large size of cation more will be ionic character.

46. The chemical formulae of Feldspar is :

    (a) $KAlSi_3O_8$

    (b) Na_3AlF_6

    (c) $NaAlO_2$

    (d) $K_2SO_4 . Al(SO_4)_3 . 4Al(OH)_3$

Ans. **(a)**

Sol.

47. If the ionization potential for hydrogen atom is 13.6eV then the ionization potential for He^+ ion should be:

    (a) 27.2 eV

    (b) 54.4 eV

    (c) 6.8 eV

    (d) 13.6 eV

Ans. **(b)**

Sol. Ionisation potential = $\dfrac{13.6\ Z^2}{n^2}$ = $\dfrac{13.6 \times 2^2}{1^2}$ = 54.4 eV.

48. Which of the following is the incorrect statement:

    (a) The second ionization potential of Mg is greater than the second ionization potential of Na.

(b) The first ionization potential of Al is less than the first ionization potential of Mg.

(c) The first ionization potential of Na is less than the first ionization potential of Mg.

(d) The third ionization potential of Mg is greater than that of Al.

Ans. **(a)**

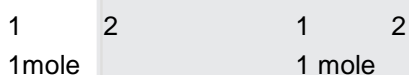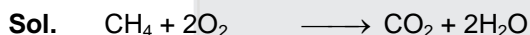**Sol.** The second ionization potential of Mg is **less** than the second ionization potential of Na.

49. The combustion of methane is expressed as :

$CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O (g)$
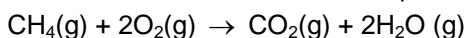
The number of moles of methane required to produce 11.0 g of CO_2 after combustion is :

(a) 0.02   (b) 0.20   (c) 0.25   (d) 0.50

Ans. **(c)**

Sol. $CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$
         1   2   1   2
         1mole   1 mole

no. of moles of CO_2 produced $n = \dfrac{W}{Mw} = \dfrac{11}{44} = 0.25$ moles.

So to produce 0.25 moles of CO_2, 0.25 moles of CH_4 are required.

50. The density of 3 M solution of NaCl is 1.25 gL^{-1}. The molality of this solution is :

(a) 2.79   (b) 1.79   (c) 0.79   (d) 2.98

Ans. **(a)**

Sol.   Molarity = 3 M.

3 moles of solute present in 1 litre of solution.

$d = \dfrac{m}{v}$

mass of solution = density of solution × volume of solution.

m = 1.25 × 1000

m = 1250 g.

Mass of solvent = mass of solution – mass of solute

= 1250 – 3 × 58.5

= 1074.50

Molality of solution, $m = \dfrac{n_{solute}}{W_{solvent}(g)} \times 1000$

$= \dfrac{3}{1074.50} \times 1000$

= 2.79 m

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PART B – PHYSICS (PAPER CODE : B)

51. Tube A has both ends open, while tube B has one end closed, otherwise they are identical. The ratio of fundamental frequencies of tubes A and B is

(a) 1 : 2   (b) 1 : 4   (c) 2 : 1   (d) 4 : 1

Ans. (c)

Sol. $f_A = \dfrac{V}{2\ell}$, $f_B = \dfrac{V}{4\ell}$

$\dfrac{f_A}{f_B} = \dfrac{2}{1}$

52. A parallel plate air capacitor is charged to a certain potential difference. When a dielectric is filled between the plates, the charge on the plates is needed to be increased three times to restore the former potential difference. The dielectric constant of the dielectric is

(a) 1.7   (b) 3   (c) 6   (d) 9

Ans. (b)

Sol. $\Delta V = \dfrac{q}{c}$

To maintain the ΔV, $q \rightarrow 3$ times, so $c \rightarrow 3$ time so $k = 3$

53. A solid sphere of radius R is charged uniformly throughout the volume. At what distance from its surface is the electric potential 1/4 of the potential at the centre ?

(a) 8R/3   (b) R/3   (c) 5R/3   (d) 2R/3

Ans. (c)

Sol. $V_{centre} = \dfrac{3}{2}\dfrac{kQ}{R}$

$V_{out} = \dfrac{kQ}{r} = \dfrac{1}{4} \times \left(\dfrac{3}{2}\dfrac{kQ}{R} \right)$

$r = \dfrac{8R}{3}$ distance from the surface = $\dfrac{8R}{3} - R = \dfrac{5R}{3}$

54. A parallel air capacitor has capacitance C_0. When it is half filled with a dielectric of dielectric constant 5, the percentage increase in its capacitance will be

(a) 400%   (b) 66.6%   (c) 33.3%   (d) 200%

Ans. (b) and (d)

Sol. $C' = \dfrac{\varepsilon_0 A}{d - t\left(1 - \dfrac{1}{k}\right)}$

$C' = \dfrac{\varepsilon_0 A}{d - \dfrac{d}{2}\left(1 - \dfrac{1}{5}\right)} = 1.67\,\dfrac{\varepsilon_0 A}{d}$

So increase will be 67%

but if the material is filled in right half :
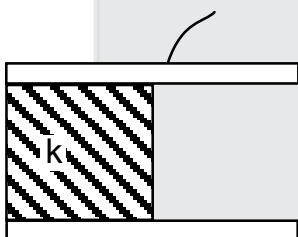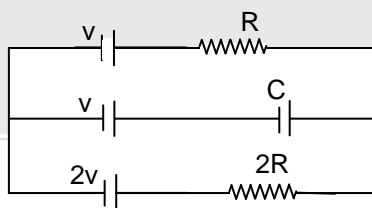

$C_{eq} = 5\,\dfrac{\varepsilon_0 \dfrac{A}{2}}{d} + \dfrac{\varepsilon_0 \dfrac{A}{2}}{d} = \dfrac{3\varepsilon_0 A}{d}$

So increase will be 200%

So ans. Will be (b) and (d)

55. The potential drop across the capacitor with steady current in the given circuit will be

(a) V/3　　　　　(b) V/2　　　　　(c) 2V/3　　　　　(d) V

Ans. (a)

Sol.
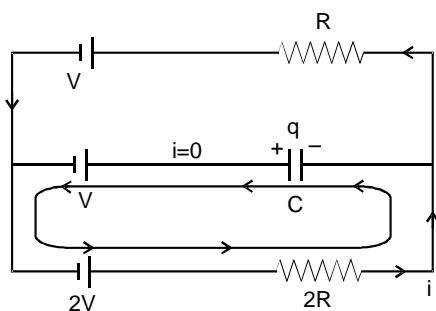
$$i = \frac{2V - V}{3R} = \frac{V}{3R}$$

Applying kirchoff loop:

$$-2V + i(2R) - \frac{q}{C} + V = 0 \text{ where } i = \frac{V}{3R}$$

$$q = -\frac{CV}{3} \qquad \Rightarrow \qquad \left|\Delta V_c\right| = \frac{V}{3}$$

56. Two resistance R_1 and R_2 are joined, as shown in the figure, to two batteries of e.m.f. E_1 and E_2 If E_2 is short-circuited , the current through R_1 is
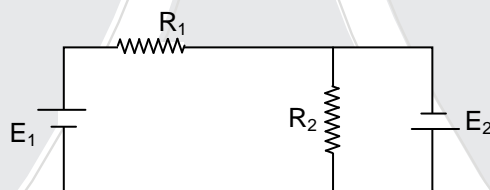
(a) E_1/R_1 (b) E_2/R_1 (c) E_2/R_2 (d) $E_1/(R_1 + R_2)$

Ans. (a)

Sol. $i = \dfrac{\varepsilon_1}{R_1}$ as R_2 is also shorted.

57. In the circuit diagram shown below, the time constant of the circuit is
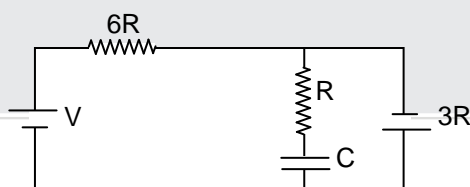
(a) RC   (b) $\dfrac{13RC}{4}$ (c) 3 RC   (d) $\dfrac{4RC}{4}$

Ans. (c)

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Sol.
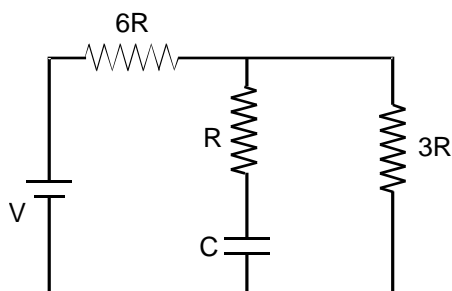
$\tau = R_{eq} \, C$

Where R_q = equal resistance across the capacitor

$$= \frac{(3R)(6R)}{3R + 6R} + R = 3R$$

$\tau = (3R) \, C$

58. An electric bulb has a rating of 500 W, 100 V. It is used in a circuit having a 200 V supply. What resistance must be connected in series with the bulb so that it deliver 500 W ?

    (a) 10 Ω (b) 20 Ω (c) 30 Ω (d) 40 Ω

Ans. (b)

Sol. $R_{bulb} = \dfrac{V^2}{P} = \dfrac{100 \times 100}{500} = 20\Omega$

If we connect a 20 Ω resistance in the series , the p.d. across the bulb will be 10 volt so power consumed will be 500 watt

59. Two wires of the same length are shaped into a square and a circle respectively when they carry the same current. The ratio of their magnetic moments is

    (a) 2 : π (b) π : 2   (c) 4 : π (d) π : 4

Ans. (d)

Sol. Length of the wire is same, so $4a = 2\pi R$

$\Rightarrow \quad \dfrac{a}{R} = \dfrac{\pi}{2}$

$M_{square} = i(a^2)$, $M_{circle} = i(\pi R^2)$

$$\frac{M_1}{M_2} = \frac{ia^2}{i(\pi R^2)} = \frac{1}{\pi}\left(\frac{q}{R}\right)^2 = \frac{1}{\pi}\left(\frac{\pi}{2}\right)^2 = \frac{\pi}{4}$$
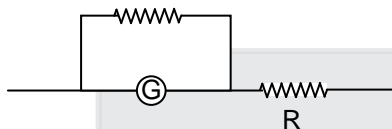
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60. A galvanometer of resistance G Ω is shunted by a resistance S Ω. How much resistance should be added in series so that the current in the circuit remains the same ?

(a) $\dfrac{2S^2}{S+G}$ (b) $\dfrac{2G^2}{S+G}$ (c) $\dfrac{G^2}{S+G}$ (d) $\dfrac{SG}{S+G}$

Ans. (c)

Sol. If we connect an another resistor of resistance R, the equivalent resistance will be

$$R_{eq} = \dfrac{GS}{G+S} + R = G$$

Solving we get $R = \dfrac{G^2}{G+S}$

61. An electron of charge e moves in a circular orbit of radius r around the nucleus at a frequency v. The magnetic moment associated with the orbital motion of the electron is

(a) πver^2 (b) $\dfrac{\pi vr^2}{e}$ (c) $\dfrac{\pi ve}{r}$ (d) $\dfrac{\pi vr^2}{v}$

Ans. (a)

Sol. $i_{eq} = \dfrac{q}{T} = \dfrac{e}{1/f} = ef$

$M = n\, i_{eq}\, A = (1)\,(ef)\,\pi r^2 = ef\pi r^2$

62. An electron moves in circular orbit of radius 0.51×10^{-10} m around a nucleus at a frequency of 6.8×10^{15} Hz. Find the magnetic induction at the nucleus. ($\mu_0 = 4\pi \times 10^{-7}$ TmA^{-1})

(a) 11.2 tesla   (b) 13.4 tesla   (c) 15.6 tesla   (d) 17.8 tesla

Ans. (b)

Sol. $B = \dfrac{\mu_0}{4\pi} \dfrac{qv\sin 90^o}{r^2}$ where $T = \dfrac{2\pi r}{V} = \dfrac{1}{f}$

$v = 2\pi rf$

$\Rightarrow \qquad B = \dfrac{\mu_0 qf}{2r}$

$B = \dfrac{(4\pi \times 10^{-7})(6.8 \times 10^{15})}{2 \times 0.51 \times 10^{-10}} = 13.4$ Tesla

63. A loop of area 80 cm^2 is rotating at 30 revolutions per sec in a magnetic field of 50 gauss. What is the maximum magnitude of the oscillating electromotive force induced in the loop ?

(a) 7.5×10^{-3} V   (b) 6.5×10^{-3} V   (c) 5.5×10^{-3} V   (d) 4.5×10^{-3} V

Ans. (a)

Sol. $V_{max} = NBA\omega$, where $B = 50 \times 10^{-4}$ Tesla

$V_{max} = (1) (50 \times 10^{-4}) (80 \times 10^{-4})(2\pi \times 30)$

$V_{max} = 7.5 \times 10^{-3}$ volt

64. In a series LR-circuit $X_1 = 3R$. Now a capacitor with $X_c = 2R$ is added in series. Ratio of the new to the old power factor is
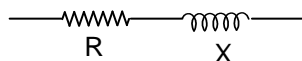
(a) $\sqrt{2}$ (b) $1\sqrt{2}$ (c) 2   (d) 1

Ans. No option correct

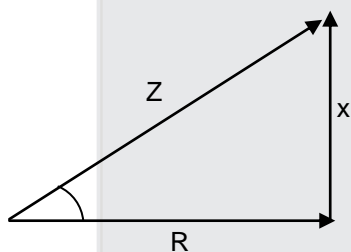**Sol.** Power factor $\cos\theta = \dfrac{R}{|z|}$

$\cos \phi_1 = \dfrac{R}{\sqrt{R^2 + (3R)^2}} = \dfrac{1}{\sqrt{10}}$

$\cos \phi_2 = \dfrac{R}{\sqrt{R^2 + (3R - 2R)^2}} = \dfrac{1}{\sqrt{2}}$

$\dfrac{\cos\phi_2}{\cos\phi_1} = \sqrt{5}$

65. Electromagnetic waves are transverse in nature is evident by

(a) Interference   (b) Polarisation   (c) Diffraction   (d) Refraction

Ans. (b)

Sol. Polarisation is an evidence of transverse nature of of light

66. The image formed by the objective of a compound microscope is

(a) Virtual and diminished   (b) Real and diminished

(c) Real and enlarged   (d) Virtual and enlarged

Ans. (c)

Sol. Image formed by the objective of the compound microscope is real and enlarged

67. Assume that light of wavelength 6000Å is coming from a star. What is the limit of resolution of telescope whose objective has a diameter of 100 inch?

(a) 7.3×10^{-7} rad   (b) 5.8×10^{-7} rad   (c) 3.6×10^{-7} rad   (d) 2.9×10^{-7} rad

Ans. (d)

Sol. $\Delta\theta_{min} = \dfrac{1.22\lambda}{d} = \dfrac{1.22\times 6000\times 10^{-10}}{2.5}$

$\begin{pmatrix} 1\,\text{inch} \approx 2.5\,\text{cm} \\ 100\,\text{inch} = 250\,\text{cm} \\ = 2.5\,\text{m} \end{pmatrix} \Rightarrow \Delta\theta_{min} = 2.9 \times 10^{-7}\,\text{rad}.$

68. What is the distance between adjacent maxima near the centre of interference pattern ? The wave length λ of light is 546 nm, the slit separation d is 0.12 mm and the slit-screen separation D is 55 cm.

    (a) 2.5 m   (b) 2.5 cm   (c) 5.0 cm   (d) 2.5 mm

Ans. (d)

Sol. $\beta = \dfrac{\lambda D}{d} = \dfrac{(546\times 10^{-9})(0.55)}{0.12\times 10^{-3}} = 2.5$ mm

69. In a photoelectric effect experiment with a given frequency of incident light, which of the following quantities depend on the intensity of the incident light ?

    (a) the maximum kinetic energy of the emitted electrons

    (b) the stopping potential

    (c) the photoelectric current

    (d) the cutoff frequency

Ans. (c)

Sol. The photo current depends on the intensity of light

70. The idea of quantum nature of length emerged in an attempt to explain the phenomenon of the

    (a) Black body radiation   (b) Thermo ionic emission

    (c) Radioactivity   (d) Polarization of light

Ans. (a)

71. Maximum wavelength of the radiation required to ionize a hydrogen atom from its ground state would fall in

    (a) Infrared region   (b) Ultra-violet region   (c) Visible region   (d) microwave region

Ans. (b)

Sol. Minimum energy to ionise the H atom from grand state is = 13.6 ev which comes in ultraviolet range.

72. The de-Broglie wavelength associated with an electron moving in the nth Bohr orbit of radius r is given by

    (a) $n\,\pi\,r$ (b) $\dfrac{nr}{2\pi}$ (c) $\dfrac{2\pi r}{n}$ (d) $\dfrac{\pi r}{n}$

Ans. (c)

Sol. $x = \dfrac{h}{p} = \dfrac{h}{mv}$ and $mvr = \dfrac{nh}{2\pi} \Rightarrow 2\pi r = n\lambda$

$\lambda = \dfrac{2\pi r}{n}$.

73. The binding energy of deuteron is 2.2 MeV and that of $_2^4He$ is 28 MeV. If two deuterons are fused to form on $_2^4He$, the energy released is

(a) 19.2 MeV (b) 23.6 MeV (c) 25.8 MeV (d) 30.2 MeV

Ans. (b)

Sol. $2(_1D^2) \rightarrow 2He^4$

$BE_1 = 2 \times 2.2$

$= 4.4$ MeV

$HE_f = 28$ MeV
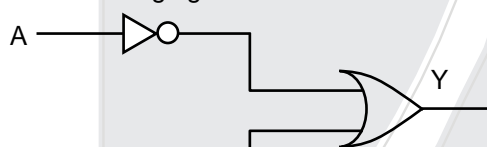
$\Delta E_{released} = 28 - 4.4 = 23.6$ MeV

74. On increasing the temperature of silicon (intrinsic) its resistance will

(a) decrease

(b) increase

(c) not be affected

(d) increase at times and will decrease at some other times

Ans. (a)

Sol. For Si, $T\uparrow \Rightarrow R\downarrow$

75. The following figure

represent a

(a) NAND gate (b) NOR gate (c) XOR gate (d) OR gate

Ans. (a)

Sol.
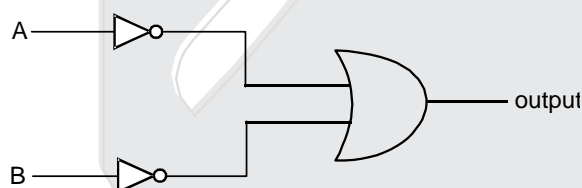
A	B	output
0	0	1
0	1	1
1	0	1
1	1	0

Since the truth table is similar to the NAND gate so the system will act like a NAND gate.

76. The maximum peak to peak voltage of an AM wave is 16 mV and the minimum peak to peak voltage is 4 mV. The modulation factor is

(a) 0.25   (b) 0.60   (c) 1.66   (d) 4.0

Ans. **(b)**

Sol. $A_c + A_m = 16$ m volt

$A_c - A_m = 4$ m volt

$A_c = 10$ m volt, $A_m = 6$ m volt

$\mu = \dfrac{A_m}{A_c} = \dfrac{6}{10} = 0.6$.

77. If the time period of oscillation of a pendulum is measured as 2.5 second using a stop watch with the least count $\dfrac{1}{2}$ seconds, then the permissible error in the measurement is

(a) 10%   (b) 20%   (c) 30%   (d) 40%

Ans. **(b)**

Sol. % error $= \dfrac{\Delta T}{T} \times 100 = \dfrac{\frac{1}{2}}{2.5} \times 100 = 20\%$.

78. Pressure P is given by $P = \dfrac{a - x^2}{bt}$, where x is distance and t is time, the dimensions of a and b are

(a) $M^0 L^2 T^0, M^1 L^3 T^1$ (b) $M^{-1} L^2 T^0, M^1 L^{-3} T^1$

(c) $M^0 L^2 T^0, M^{-1} L^3 T^1$ (d) $M^0 L^2 T^0, M^1 L^2 T^1$

Ans. **(c)**

Sol. $p = \dfrac{a - x^2}{bt} \Rightarrow [a] = [x^2] = L^2$

$\dfrac{M^1 L^1 T^{-2}}{L^2} = \dfrac{L^2}{[b]\, T}$

$[b] = M^{-1} L^3 T^1$.

79. $\hat{i}$ and $\hat{j}$ are unit vectors along x-axis and y-axis respectively. What is the magnitude and direction of vectors $\hat{i} + \hat{j}$ and $\hat{i} - \hat{j}$?

(a) $\sqrt{2}$, 45° ; $\sqrt{2}$, − 45°   (b) 0, 45° ; $\sqrt{2}$, 45°

(c) $\sqrt{2}$, 45° ; $\sqrt{2}$, 45°   (d) $\sqrt{2}$, 45° ; $\sqrt{2}$, 135°

Ans. (a)

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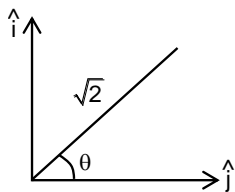
Sol. Magnitude of $\hat{i} + \hat{j}$

$= \sqrt{(1)^2 + (1)^2 + 2 \times 1 \times 1 \times \cos 90°} = \sqrt{2}$

$\tan \theta = \dfrac{p}{b} = \dfrac{1}{\sqrt{2}}$

$\theta = 45° = \hat{i} - \hat{j}$
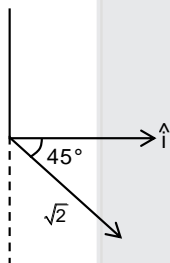
$= \sqrt{(1)^2 + (1)^2 - 2 \times 1 \times \cos 90°}$

$= \sqrt{2}$

$\theta = -45°$.

80. Two seconds after projection, a projectile is moving at 30° above the horizontal, after one more second it is moving horizontally. The magnitude of its initial velocity is (g = 10 m/s^2)

(a) 20 m/s   (b) 20 $\sqrt{3}$ m/s   (c) 20 $\sqrt{6}$ m/s   (d) 30 m/s

Ans. (b)

Sol. $\dfrac{T}{2} = \dfrac{u_y}{g} = 3 \quad \Rightarrow \quad u_y = 30$

After two seconds

$v_y = u_y + a_y t$

$v_y = 30 + (-10)\,(2) = 10$

$\tan \theta = \dfrac{v_y}{u_y} \Rightarrow \tan 30° = \dfrac{10}{v_x} \Rightarrow v_x = 10\sqrt{3}$

$u = \sqrt{u_x^2 + u_y^2} = \sqrt{\left(10\sqrt{3}\right)^2 + (30)^2} = 20\sqrt{3}$ m/sec.

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Ph.No. : +91-744-3012222, 6635555 **| To Know more :** sms **RESO** at **56677**
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81. A car, starting from rest, is moving with a constant acceleration a till it attains velocity v ms^{-1}. After that it is moves with a constant retardation d till it comes to rest. The average speed of the car duing its whole journey is given by
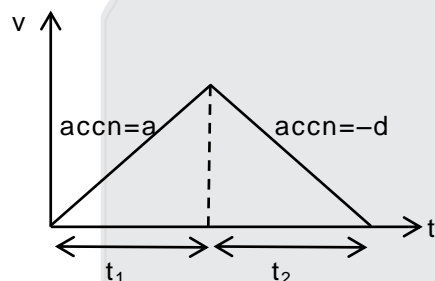
(a) $\dfrac{a\,dv}{a+d}$ (b) $\dfrac{dv}{2a}$ (c) $\dfrac{v}{2}$ (d) $\dfrac{a\,v}{2\,d}$

Ans. (c)

Sol. $at_1 = bt_2$ ....(1)

$at_1 = v$

$t_1 = \dfrac{v}{a}$ $\Rightarrow$ $t_2 = \dfrac{v}{b}$

$(v) = \dfrac{\text{total distance travelled}}{\text{total time}} = \dfrac{\frac{1}{2}(t_1+t_2)v}{t_1+t_2} = \dfrac{v}{2}$.

82. A man of mass 60 kg standing on a horizontal conveyer belt moving with an acceleration 1.0 ms^{-2} remains stationery with respect to the belt. If the coefficient of static friction between the belt and the shoes of the man is 0.2, the maximum acceleration of the belt upto which the man will remain stationery (g = 10 ms^{-2}) is

(a) 1.2 ms^{-2} (b) 1.5 ms^{-2} (c) 2.5 ms^{-2} (d) 2.0 ms^{-2}

Ans. (d)

Sol. fr = ma ≤ μ_s mg

a ≤ μ_sg $\Rightarrow$ a ≤ (0.2) 10 $\Rightarrow$ a ≤ 2.

83. A driver takes 0.2 second to apply the brakes after he sees a need for it. If he is driving at a speed of 54 km/h and the brakes cause a declaration of 6.0 m/s^2, the distance traveled by the car after he sees the need to put the brakes on is

(a) 100 m   (b) 50 m   (c) 21.75 m   (d) 36.2 m

Ans. (c)

Sol. u = 54 × $\dfrac{5}{18}$ = 15 m/sec.

$S_1 = u \times \Delta t = 15 \times 0.2 = 3m$

For S_2 : $v^2 = u^2 + 2aS \Rightarrow 0^2 = (15)^2 + 2(-6)\,(s)$

$S_2 = \dfrac{225}{12} = 18.75 \Rightarrow S_{total} = S_1 + S_2 = 3 + 18.75 = 21.74$ m.

84. A spring of spring constant 5×10^3 N m^{-2} is stretched initially by 5 cm from the unscratched position. The work required to stretch if further by another 5 cm is

(a) 12.50 Nm (b) 18.75 Nm (c) 25.00 Nm (d) 6.25 Nm

Ans. (b)

Sol. $u = \dfrac{1}{2}kx^2$

$u_1 = \dfrac{1}{2} \times 5 \times 10^3 \times 5 \times 10^{-2} \times 5 \times 10^{-2}$

$= \dfrac{125 \times 10^{-1}}{2} = 6.25$ Joule

$u_2 = \dfrac{1}{2}kx_2^2$

$= \dfrac{1}{2} \times 5 \times 10^3 \times 10 \times 10^{-2} \times 10 \times 10^{-2}$

$= 250 \times 10^{-1}$

$= 25$ Joule

$w = \Delta u = u_2 - u_1 = 25 - 6.25 = 18.75$ Joule

85. A body starts from rest and acquires a velocity V in time T. The work done on the body in time t will be proportional to

(a) $\dfrac{Vt}{T}$ (b) $\dfrac{V^2t^2}{T}$ (c) $\dfrac{V^2t}{T^2}$ (d) $\dfrac{V^2t^2}{T^2}$

Ans. (d)

Sol. From t = 0 to t = T

$V = 0 + aT \qquad \Rightarrow \qquad a = \dfrac{V}{T}$

From t = 0 to t = t

$v = 0 + \left(\dfrac{V}{T}\right)t$

$W_{all} = \Delta KE$

$W_{all} = \dfrac{1}{2}m\left(\dfrac{V}{T}t\right)^2$

So Ans will be (d)

86. A solid sphere rolls without sliding (slipping) at a uniform velocity of 100 m/s along a straight line on a horizontal floor. Its kinetic energy is (Mass of the sphere = 1 kg Radius = 10 cm)

(a) $\dfrac{7}{5}$J (b) $\dfrac{2}{5}$J (c) $\dfrac{7}{10}$J (d) 1 J

Ans. (c)

Sol. $KE = \dfrac{1}{2} mV^2 + \dfrac{1}{2} I_{cm} \omega^2$ where $V = \omega R$

$KE = \dfrac{1}{2} mV^2 + \dfrac{1}{2} I_{cm} \left(\dfrac{V}{R}\right)^2 = \dfrac{1}{2} mV^2 \left(1 + \dfrac{I_{cm}}{MR^2}\right)$

$KE = \dfrac{1}{2} \times 1 \times (100)^2 \left(1 + \dfrac{2}{5}\right) \qquad \Rightarrow \qquad KE = \dfrac{7}{10} \times 10^4 \, J$

So the closest answer is (c)

87. Square piece of side 2.0 m is removed from a uniform square plate of side 6.0 m. The centre of mass of the piece is at x = 2.0 m, y = 0 and the centre of mass of the square plate is at x = y = 0. Find the x and y coordinates of the centre of mass of the remaining plate.

(a) – 0.35 m, 0   (b) – 0.25 m, 0   (c) – 0.35 m, –0.25 m   (d) 0, –2.35 m

Ans. (b)

Sol. $\vec{r}_{cm} = \dfrac{m_1 \vec{r}_1 - m_2 \vec{v}_2}{m_1 - m_2}$

$r_{cm} = \dfrac{(36)(0\hat{i} + 0\hat{j}) - (4)(2\hat{i} + 0\hat{j})}{36 - 4}$

$r_{cm} = -0.25\hat{i} + 0\hat{j} \qquad$ So Ans. will be

88. A particle is moving along a circular path with uniform speed. Through what angle does its angular velocity change when it completes half of the circular path?

(a) 0º   (b) 45º   (c) 180º   (d) 360º

Ans. (a)

Sol. The direction of $\vec{\omega}$ is axial so its direction will remain constant.

89. At a distance of 10 R_e from earth's centre, where R_e is the earth radius the speed of an asteroid, headed directly towards earth, is found to be 12.0 km/s. What will be the asteroid's speed when it reaches earth's surface? (Neglect the effects of earth's atmosphere); R_e = 6400 km

(a) 22.0 km/s   (b) 16.0 km/s   (c) 10.0 km/s   (d) 8.0 km/s

Ans. (b)

Sol. Applying the energy conservation :-

$K_i + U_i = K_f + U_f$

$\dfrac{1}{2} m (12 \times 10^3)^2 + \left(\dfrac{-GMm}{10R}\right) = \dfrac{1}{2} mV_f^2 + \left(\dfrac{-GMm}{R}\right)$

$\dfrac{1}{2} m (V_f^2 - (12 \times 10^3)^2) = \dfrac{9}{10} \dfrac{GMm}{R}$ where $\left(g = \dfrac{GM}{R^2}\right)$

$\dfrac{1}{2} (V_f^2 - (12 \times 10^3)^2) = \dfrac{9}{2} gR$

Solving we get

$V_f = 16 \times 10^3$ m/sec

Ans. is (b)

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90. Two uniform solid spheres of equal radii 'R' but masses 'M' and '4M' have a centre to centre separation of 6R. The two spheres are held fixed. A projectile of mass 'm' is projected from the surface of the sphere of mass 'M' directly towards the centre of second sphere, as shown in figure. What must be the minimum speed v of the projectile so that it reaches the surface of the second sphere
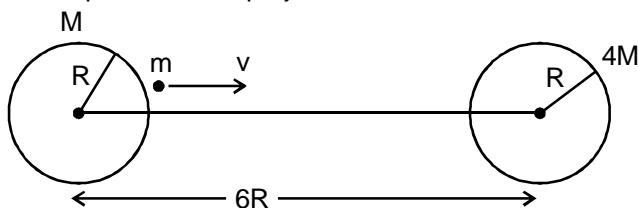
(a) $v = \left(\dfrac{3GM}{5R}\right)^{\frac{1}{2}}$ (b) $v = \left(\dfrac{2GM}{5R}\right)^{\frac{1}{2}}$ (c) $v = \left(\dfrac{GM}{5R}\right)^{\frac{1}{2}}$ (d) $v = \left(\dfrac{4GM}{5R}\right)^{\frac{1}{2}}$

Ans. (a)

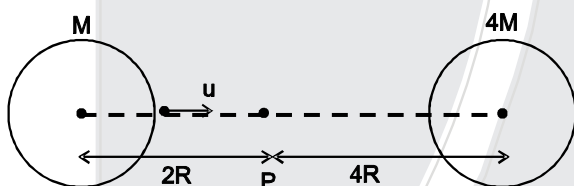**Sol.** For equilibrium the gravity field due to both the spheres should be cancelled out

$\Rightarrow \qquad \dfrac{GM}{x^2} = \dfrac{G(4m)}{(6R-x)^2} \qquad \Rightarrow \qquad x = 2R$

To reach the other planet the particle has to cross the maxima of Potential (unstable equilibrium position 'p'). Applying energy conservation from the starting point to the point P :

$K_i + U_i = K_f + U_f$

$\dfrac{1}{2}mu^2 \left[(m)\left(-\dfrac{GM}{R} - \dfrac{G(4m)}{5R} \right) \right] = 0 + m\left(-\dfrac{GM}{2R} - \dfrac{G(4m)}{4R} \right)$

Solving we get $u = \sqrt{\dfrac{3GM}{5R}}$ Ans is (a)

91. Water from a tap emerges vertically downward with an initial speed of 1.0 ms^{-1}. The cross sectional area of the tap is 10^{-1} m^2. Assume that the pressure is constant throughout the stream of water and that the flow is steady. What is the cross-sectional area of the stream 0.15 m below the tap?

(a) 5 × 10^{-5} m^2 (b) 2.5 × 10^{-3} m^2 (c) 5 × 10^5 m^2 (d) 2.5 × 10^{-3} m^2

Ans. (a)

Sol. $V = \sqrt{u^2 + 2gh} = \sqrt{(1)^2 + 2\times(0\times 0.15)} = 2\, m/sec$

$A_1V_1 = A_2V_2$

$(10^{-4})\,(1) = (A_2)\,(2) \qquad \Rightarrow \qquad A_2 = 0.5 \times 10^{-4} = 5 \times 10^{-5}$

Ans is (a)

92. If the work done in stretching a wire by 1 mm is 2 J, the work necessary for stretching another wire of the same material but double the radius and half the length by 1 mm is

(a) 16 J   (b) 8 J   (c) 2 J   (d) $\dfrac{1}{2}$ J

Ans. (a)

Sol. $K = \dfrac{yA}{\ell_0}$, for the second wire A → 4 times and $\ell \to \dfrac{1}{2}$ times so $K = \dfrac{4}{1/2} = 8$ times

$\therefore W = \dfrac{1}{2}kx^2$ so for the second wire W → 8 times

Ans is (a)

93. When a copper ball is heated, the largest percentage increase will occur in its

(a) Diameter   (b) area   (c) volume   (d) density

Ans. (c)

Sol. $\alpha : \beta : \gamma = 1 : 2 : 3$

So % increase will be maximum in volume.

94. At what temperature is the root mean square speed of an atom in an argon gas cylinder equal to the r.m.s speed of a helium gas atom at –20ºC (atomic mass of Ar = 39.9 u, He = 4.0 u)

(a) 2524 ºC   (b) 2250 ºC

(c) 200 ºC   (d) r.m.s speed cannot be calculated at –20 ºC

Ans. **(b)**

Sol. $\sqrt{\dfrac{3RT_1}{M_1}} = \sqrt{\dfrac{3RT_2}{M_2}}$

$\sqrt{\dfrac{T_1}{40}} = \sqrt{\dfrac{253}{4}} \quad \Rightarrow \quad T_1 = 2530$ K

$T_1 = 2267$ K, so closest answer is (b)

95. A gas mixture consists of 2 moles of oxygen and 4 moles of helium at temperature T. Neglecting all vibrational modes, the total internal energy of the system

(a) 4 RT   (b) 9 RT   (c) 15 RT   (d) 11 RT

Ans. (d)

Sol. $du = (du)_{o2} + (du)_{He}$

$= (\mu C_V dT)_{02} + (\mu C_V dT)_{He}$

$\dfrac{2 \times 5R \times T}{2} + \dfrac{4 \times 3R}{2} \times dT$

= 5RT + 6RT

du = 11 RT

96. In a refrigerator, the system extracts heat Q_2 from the cold reservoir and releases Q_1 amount of heat to the hot reservoir, with work w done on the system. The coefficient of performance of the refrigerator is given by

(a) $\dfrac{Q_1}{Q_1 - Q_2}$ (b) $\dfrac{Q_2}{Q_1 - Q_2}$ (c) $\dfrac{w}{Q_1}$ (d) $\dfrac{w}{Q_2}$

Ans. (b)

Sol. $cop = \dfrac{Q_2}{W} = \dfrac{Q_2}{Q_1 - Q_2}$

97. Which law of thermodynamics leads to the concept of temperature?
(a) Zeroth law   (b) First law   (c) Second law   (d) Both zeroth and first laws

Ans. (a)

98. A Carnot engine has an efficiency of $\dfrac{1}{6}$. When the temperature of sink is reduced by 62ºC. its efficiency is doubled. The temperature of source is

(a) 372 ºC   (b) 305 ºC   (c) 186 ºC   (d) 99 ºC

Ans. (d)

Sol. $\dfrac{T_1 - T_2 '}{T_1} = 2\dfrac{(T_1 - T_2)}{T_1}$

$T_1 - (T_2 - 62) = 2\,(T_1 - T_2)$

$T_1 - T_2 + 62 = 2T_1 - 2T_2$

$T_2 + 62 = T_1$

$n = 1 - \dfrac{T_2}{T_1}$

$= 1 - \dfrac{(T_1 - 62)}{T_1}$

$\dfrac{1}{6} = \dfrac{T_1 - T_1 + 62}{T_1}$

$T_1 = 6 \times 62$

$T_1 = 372ºK$

$T = 372 - 273 = 99ºC$

99. A source of sound of frequency 600 Hz is placed inside water. The speed of sound in water is 1500 m/s and in air it is 300 m/s. The frequency of sound recorded by an observer who is standing in air is
(a) 200 Hz   (b) 3000 Hz   (c) 120 Hz   (d) 600 Hz

Ans. (d)

Sol. Frequency does not charge with medium

100. If a simple harmonic motion is represented by

$$\frac{d^2x}{dt^2} + \alpha x = 0$$

Its time period is

(a) $\dfrac{2\pi}{\alpha}$ (b) $\dfrac{2\pi}{\sqrt{\alpha}}$ (c) $2\pi\alpha$ (d) $2\pi\sqrt{\alpha}$

Ans. (b)

Sol. $\dfrac{d^2x}{dt^2} + \omega^2 x = 0$

$\dfrac{d^2x}{dt^2} + \mu\alpha = 0$

$\omega^2 = \alpha \qquad \Rightarrow \qquad w = \sqrt{\alpha}$

$T = \dfrac{2\pi}{\omega} = \dfrac{2\pi}{\sqrt{\alpha}}$.

PART C – BIOLOGY(PAPER CODE : B)

101. Acoelomates is characteristic of :

(a) Mollusca   (b) Platyhelminthes   (c) Aschelminthes   (d) Coelentrates

Ans. (b)

Sol. Coelenterate lack mesoderm, so can't be taken as acoelomate.

102. Secretin is a gastro intestinal tract hormone that :

(a) acts on exocrine portion of pancreas and stimulates the secretion of water and bicarbonate ions

(b) acts on endocrine portion of pancreas and stimulates α cells to secrete glucagon

(c) acts on gastric glands and stimulates secretion of hydrochloric acid and pepsinogen

(d) stimulates secretion of gastric lipase from stomach

Ans. (a)

103. Acid neutralizer present in mucus of saliva :

(a) Biucarbonate ion   (b) Thiocynate

(c) Sodium acetate   (d) Sodium hydroxide

Ans. (a)

104. Which of the following binds with haemoglobin irreversibly ?

(a) Carbon dioxide   (b) Oxygen

(c) Carbon monoxide   (d) Nitrogen

Ans. (c)

105. Helper T cells are distinguished from cytotoxic T cells by the presence of:

(a) CD_2 (b) CD_4 (c) CD_3 (d) IL-2 receptor

Ans. (b)

106. Dissociation of oxyhaemoglobin in blood increases when there is:

(a) increase in pH and decrease in CO_2 concentration

(b) decrease in temperature and increase in O_2 concentration

(c) increase in O_2 concentration and decrease in CO_2 concentration

(d) decrease in pH and increase in CO_2 concentration

Ans. **(d)**

Sol. Bohr effect is due to increased pCO_2 and decrease in pH. O_2 carrying capacity of blood decreases.

107. Earthworm has no skeleton but during burrowing, the anterior end becomes turgid and acts as a hydraulic skeleton. It is due to :

(a) Setae   (b) Gut peristalsis   (c) Septum   (d) coelomic fluid

Ans. **(d)**

108. Which of the following is considered as a hyperglycemic factor ?

(a) Insulin   (b) Glucagon   (c) Aldosterone   (d) Parathormone

Ans. **(b)**

109. Third ventricle of brain is located in

(a) Diencephalon   (b) Rhombencephalon

(c) Mesencephalon   (d) Cerebrum

Ans. **(a)**

Sol. Diocoel is also called 3rd ventricle.

110. Which one of the following is not a zymogen ?

(a) Trypsinogen   (b) Pepsinogen   (c) Angiotensin-II   (d) Procollagenase

Ans. **(c)**

Sol. Angiotensin II is formed from Angiotensinogen secreted by liver.

111. Which of the following is the earliest discovered amino acid ?

(a) Glycine   (b) Methionine   (c) Phenylalanine   (d) Asparagine

Ans. **(d)**

112. Which one of the following stage of malarial parasite is not found in the vector ?

(a) Ookinite   (b) Sporozoite   (c) Merozoite   (d) Zygote

Ans. **(c)**

113. _____hormone contracts gallbladder to release bile.

(a) Gastrin   (b) Secretin   (c) Enterogastrin   (d) Cholecystokinin

Ans. **(d)**

114. Intake of ORS inhibits the secretion of:

(a) Vasopressin   (b) Oxytocin   (c) Melatonin   (d) Thyroxine

Ans. **(a)**

Sol. Due to intake of ORS, body fluid volume is retained, so no need to secrete ADH.

115. Hardening of arteries due to precipitation of Ca salts and cholesterol causes :

(a) Heart attack   (b) Arteriosclerosis   (c) Atherosclerosis   (d) Hypertension

Ans. **(c)**

116. Which of the following is a coenzyme ?

(a) Fe^{++} (b) Mucus   (c) NAD^+ (d) Lyase

Ans. **(c)**

117. The hormone which regulates the gene-expression of the target cells is:

(a) Prolactin   (b) Oxytocin   (c) Thyroxin   (d) Growth –hormone

Ans. **(c)**

Sol. Thyroxine is lipid soluble hormone, so can cross plasma membrane & will bind to DNA with the help of intracellular receptor.

118. Transfer of an ovum of a donor the fallopian tube of a surrogate mother is:

(a) ET   (b) IUT   (c) GIFT   (d) ZIFT

Ans. **(c)**

119. Sudorific glands are a characteristic feature of:

(a) Birds   (b) Mammals   (c) Poisonous snakes   (d) Toads

Ans. **(b)**

120. The vector of *Wuchereria bancrofti* is :

(a) *Aedes*   (b) *Culex*   (c) *Anopheles*   (d) Pediculus

Ans. **(b)**

121. During pregnancy degeneration of corpus luteum is prevented by the hormone :

(a) HCG   (b) HPL   (c) LH   (d) Relaxin

Ans. **(a)**

122. The passage of eggs in the uterus is lubricated by the secretion from Mehlis's glands in:

(a) Liver fluke   (b) Ascaris   (c) Platypus   (d) Kangaroo

Ans. **(a)**

123. The following is not a character of RNA.

(a) RNA is unstable and degradable   (c) RNA mutates at faster rate than DNA

(c) RNA evolves slowly   (d) RNA is catalytic/reactive

Ans. **(c)**

124. In sponges, the cells that can be converted into other types of cells are called as:

(a) Phagocytes   (b) Archeocytes   (c) Collenocytes   (d) Trophocyte

Ans. **(b)**

125. Which one of the following life cycle stage of liver fluke is infective to the intermediate host ?
(a) Metacercaria   (b) Miracidia   (c) Sporocyst   (d) Cercaria
Ans. **(b)**
Sol. Miracidium is ciliated larva of *Fasciola*, which enters in Snail.

126. Echinococcus is an example of:
(a) Nemathelminthes   (b) Platyhelminthes   (c) Bacteria   (d) Protista
Ans. **(b)**

127. The causative agent of Kala-azar is:
(a) *Plasmodium vivax*   (b) *Leishmania donavani*
(c) *Trypanosoma gambiense*   (d) *Wuchereria bancrofti*
Ans. **(b)**

128. Connective tissues are derived from embryonic:
(a) Ectoderm   (b) Endo-mesoderm   (c) Endoderm   (d) Mesoderm
Ans. **(b)**
Sol.

129. Which of the following nitrogenous base is double ringed ?
(a) Guanine   (b) Thymine   (c) Uracil   (d) Cytosine
Ans. **(a)**
Sol. Guanine is purine, rest are pyrimidines.

130. Left and right cerebral hemispheres are linked by a broad nerve band called :
(a) Corpus callosum   (b) Corpus luteum
(c) Corpora quadrigemina   (d) Anterior choroid plexus
Ans. **(a)**

131. Enamel is composed principally of :
(a) Ca phosphate   (b) Ca sulphate   (c) Ca chloride   (d) Na phosphate
Ans. **(a)**

132. Carbon dioxide is carried in blood :
(a) as dissolved gas   (b) as bicarbonates
(c) in combination with haemoglobin   (d) All of the above
Ans. **(d)**

133. Oogenesis takes place is :
(a) Squamous epithelium of ovary   (b) Interstitial cells of ovary
(c) Follicles of ovary   (d) Germinal epithelium of ovary
Ans. **(Bonus or may be D)**

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Sol. Ooganesis occur in oogonial cells of ovary, which are cuboidal in shape. Germinal epithelia of ovary is a misnomer.

134. Cowper's glands are found in :
(a) Female amphibians
(b) Male mammals
(c) Female mammals
(d) Male amphibians
Ans. **(b)**

135. Mechanism of organic evolution proposed by Hugo de Vries is based upon :
(a) Mutation
(b) Variation
(c) Adaptation
(d) Reprouction
Ans. **(a)**

136. Human body temperature is regulated by the centre located in :
(a) Cerebrum
(b) Cerebellum
(c) Medulla
(d) Hypothalamus
Ans. **(d)**

137. Close resemblance in the appearance of Monarch butterfly and Queen butterfly is an example
(a) Mullerian mimicry
(b) Batesian mimicry
(c) Camouflage
(d) Warning colouration
Ans. **(a)**
Sol. Both Monarch butterfly & Queen butterfly are unpalatable, so it represent Mullerian mimicry.

138. In man, vertebrocondral ribs are :
(a) 2nd, 3rd, and 4th
(b) 5th, 6th, and 7th
(c) 8th, 9th, and 10th
(d) 11th and 12th only
Ans. **(c)**

139. In metagenesis of cnidarian like *obelia*, the polyps and medusae are respectively.
(a) N and 2N
(b) 2N and N
(c) 2N and 2N
(d) N and N
Ans. **(c)**
Sol.

140. The cofactor for the enzyme carboxypeptidase is
(a) Copper
(b) Iron
(c) Zinc
(d) manganese
Ans. **(c)**

141. Hard-drug includes
(a) smack
(b) Ganja
(c) Charas
(d) Tobacco
Ans. **(a)**

142. in DNA finger printing, DNA hybridization with the help of specific DNA probe is done through
(a) Western blotting
(b) northern blotting
(c) Southern blotting
(d) Eastern blotting
Ans. **(c)**

143. Which one of the following is a disaccharide
(a) Maltose   (b) Ribose   (c) Glucose   (d) Fructose
Ans. **(a)**

144. Black-foot disease is caused due to pollution of ground water as a consequence of increased seepage of :
(a) Nitrates   (b) Fluorides   (c) Arsenic   (d) Mercury
Ans. **(c)**

145. Sinus venosus in frog is formed by the union of :
(a) 2 precavals and 2 postcavals   (b) 1 precavals and 2 postcavals
(c) 1 precavals and 1 postcavals   (d) 2 precavals and 1 postcavals
Ans. **(d)**

146. The tongue of frog is :
(a) Short, protrusible and attached at distal end
(b) Short, protrusible and attached at front end
(c) Long, non- protrusible attached at front end
(d) Long, protrusible attached at front end
Ans. **(d)**

147. Ampulla of Lorenzini is found in fishes, it is a :
(a) Thermoreceptor   (b) Chemoreceptor   (c) Rheoreceptor   (d) Touch recepetor
Ans. **(a)**

148. Isolation of DNA from a fungal cell involves the use of enzyme :
(a) Chitinase   (b) Lysozyme   (c) Eco RI   (d) Hind-II
Ans. **(a)**

149. The gene for ABO blood group is located on :
(a) Chromosome 4   (b) Chromosome 7   (c) Chromosome 9   (d) Chromosome 11
Ans. **(c)**

150. In *Amoeba*, whenever soluble organic substance and salts are absorbed, the mode of nutrition is called as :
(a) Holozoic   (b) Pinocytosis   (c) Holophytic   (d) Symbiosis
Ans. **(b)**

151. The fungus used for commercial production of citric acid is :
(a) *Clostridium*   (b) *Saccharomyces*   (c) *Aspergillus*   (d) *Penicillium*
Ans. **(c)**

152. The infectious ribonucleic acid is referred to as :
(a) Prion   (b) phycobiont   (c) Viroid   (d) Ribozyme
Ans. **(c)**

153. Criteria of essentiality of nutrients in plants was given by

(a) Shull (1923 (b) Bendict (1927) (c) Arnon (1938) (d) Sachis (1960)

Ans. **(c)**

154. First enzyme to be isolated in pure crystalline form was

(a) Zymase (b) Urease (c) invertase (d) Diastase

Ans. **(a)**

155. Amongst hydrophytes finely dissected leaves occur in

(a) Rooted floating leaved plants (b) Submerged plants

(c) Emerged plants (d) Free floating plants

Ans. **(b)**

156. Which of the following pigments are not stored in a cell-organelle?

(a) Carotenes (b) Anthocyanins (c) Xanthophylls (d) Chlorophylls

Ans. **(b)**

Sol. Antho cyanin is purple pigment that is found in vaculole.

157. Ferrodoxin (Fd) is a

(a) Non-heme iron protein (b) Heme iron protein

(c) Copper containing protein (d) None of above

Ans. **(b)**

158. The primary hormone causing abscission of leaves is

(a) IAA (b) Ethylene (c) ABA (d) Cytokinin

Ans. **(c)**

159. Down syndrome is one of the most common chromosome abnromalities in human. It occurs

(a) When there is an extra copy of chromosome 21

(b) When there is an extra copy of chromosome 22

(c) When there is an extra copy of chromosome 11

(d) When there is an extra copy of chromosome 09

Ans. **(a)**

160. The branch of science that uses computer methods in the studies of genomes is called as

(a) proteomics (b) Bioinformatics (c) Metabolomics (d) Transcriptomics

Ans. **(b)**

161. Large holes in Swiss cheese are formed due to production of a large amount of CO_2 by

(a) *Propionobacterium* (b) *Mycobacterium* (c) *Saccharomyces* (d) *Penicillium*

Ans. **(a)**

162. Production of zoospores is the characteristic of the members of

(a) Ascomycetes   (b) *Phycomycetes*   (c) *Basidiomycetes*   (d) *Deuteromycetes*

Ans. **(b)**

Sol. Zoospores are mode of asexual reproduction that is found in phycomycetes.

163. Which of the following is not an oligosaccharide

(a) Inuline   (b) Maltose   (c) Sucrose   (d) Raffinose

Ans. **(a)**

164. Fungus *Albugo* is a member of

(a) Phycomycetes   (b) Ascomycetes   (c) Basidiomycetes   (d) Deuteromycetes

Ans. **(a)**

165. "Die back disease" in citrus plant is caused by the deficiency of

(a) Zinc   (b) Copper   (c) manganese   (d) Boron

Ans. **(b)**

166. Acid rain is caused by

(a) SO_2, SO_3 (b) SO_2, CO (c) CO, NH_3 (d) SO_2, NH_3

Ans. **(a)**

Sol. Acid rain is caused due to SO_2, NO_2

167. Density of population D is

(a) S(size) / W(weight)   (b) S(space)/N(number)

(c) N(number)/ S(space)   (d) W(weight)/S(size)

Ans. **(c)**

168. Citrus canker is a

(a) Bacterial disease   (b) Algal disease   (c) Viral disease   (d) Fungal disease

Ans. **(a)**

Sol. Citrus canker is caused due to *Xanthomonas citri*.

169. Which element is not essential for plants ?

(a) K   (b) Na   (c) Ca   (d) B

Ans. **(b)**

170. Bacteria with single flagellum situated at one end of the cell only

(a) *Pasteurella*   (b) *Spirillum volutans*   (c) *Pseudomonas*   (d) *Nitrosomonas*

Ans. **(c)**

171. Place occupied by an organism in relation to environment is

(a) Habit   (b) Habitat   (c) Edaphic   (d) Niche

Ans. **(d)**

172. Porphyra belongs to

(a) Fungi   (b) Algae   (c) Bacteria   (d) Bryophyta

Ans. **(b)**

173. Which of the following are the indicators of pollution

(a) Lichen   (b) Fungi   (c) Algae   (d) Viruses

Ans. **(a)**

Sol. Lichens are indicator of SO_2 pollution

174. An aggregrate of slime moulds, which may grow and spread over several feet, is called

(a) Plasmodium   (b) Plasmopara   (c) Mycoplasma   (d) Pesudoparenchyma

Ans. **(a)**

175. Phycobiont and mycobiont togther constitute

(a) Phycomycetes   (b) Lichen   (c) Phycobilins   (d) Myhcorrhiza

Ans. **(b)**

176. Photosynthates are translocated from source ot sink organs mainly in the form of

(a) Glucose   (b) Fructose   (c) Strach   (d) Surcose

Ans. **(d)**

Sol. Photosynthates are translocated from source to sink organs mainly in the form of non-reducing sugar sucrose

177. Photolysis of water during photosynthesis takes place in presence of

(a) Mn   (b) $C\ell$ (c) Mn and $C\ell$ (d) Mn and Hg

Ans. **(c)**

178. Slime moulds are

(a) photosynthetic   (b) Parasitic   (c) Symbiotic   (d) Saprophytic

Ans. **(d)**

Sol. Slime monlds are saprophytic protists

179. Gibberellin faciltates seed germination by triggering the synthesis of

(a) α- amylse   (b) β- amylase

(c) α- amylase and β- amylase   (d) $\alpha-$ amylase and protease

Ans. **(d)**

180. The last and stable community in an area is called

(a) Pioneer community   (b) Climax community

(c) Transitional community   (d) Seral community

Ans. **(b)**

181. Ustilago is a member of kingdom

(a) Monera   (b) Fungi   (c) Plantae   (d) animalia

Ans. **(b)**

Sol. Ustilago is a member of class-Basidiomycetes of kingdom fungi

182. Which of the following is a freeliving nitrogen fixing bacterium

(a) Rhizobium   (b) Azatobacter

(c) Xanthomonas   (d) Rhizopus

Ans. **(b)**

183. The bacterium that helps in breakdown of cellulose in rumen of cattle is

(a) Clostridium   (b) Lactobacillus   (c) Methanobacterium   (d) Escherichia

Ans. **(c)**

184. Who proved experimentally that DNA is genetic material

(a) O. avery and colleagues   (b) J. Waston F. Crick

(c) W. arber and colleagues   (d) G. Mendel

Ans. **(a)**

185. The inhibitory effect of red light on flowering during critical dark period is short day plants can be overcome by

(a) Blue light   (b) Far-red light   (c) Infra-red rays   (d) Ultraviolete rays

Ans. **(b)**

186. Lecithin carrier theory of mineral absorption was proposed by

(a) Pfeffer in 1900   (b) Lundegradh and burstrom in 1993

(c) Bennet Clark in 1956   (d) Lundegardh and pfeffer in 1964

Ans. **(c)**

187. Who is known as Darwin of 20th Century

(a) R.H. Whittaker   (b) D.J. Ivanowsky

(c) Ernst Mayr   (d) T. O. Diener

Ans. **(c)**

188. Photosynthetic reaction centre from the photosynthetic bacterium was crystallized by

(a) Gulierrez   (b) Burnell and hatch

(c) Fluggs and heldt   (d) Huber, mitchel and Deisenhofer

Ans. **(d)**

189. The essential element found in minimum concentration in agricultural soil is

(a) Iron   (b) Magnesium   (c) Manganese   (d) Molybdenum

Ans. **(d)**

190. Cyclosporin A, used as immunosuppressive agent in organ transplants, is produced by

(a) Trichoderma   (b) Monoascus

(c) Streptococcus   (d) Staphylococcus

Ans. **(a)**

Sol. Cyclosporia–A immuno-suppressive drug obtained from *Trichoderma polysporum*.

191. Which of the following is an introduced variety crop

(a) Soybean   (b) Sonora-64

(c) Taichung native 1   (d) All of the above

Ans. **(d)**

192. Whiptail disease of cauliflower plant is caused by deficiency of

(a) Mo   (b) B   (c) Fe   (d) Ni

Ans. **(a)**

193. The term Protista for unicellular organisms was proposed by

(a) Haeckel   (b) Copeland   (c) Linnaeus   (d) Pasteur

Ans. **(a)**

174. Noise is

(a) Loud sound   (b) Unwanted sound

(c) Constant sound   (d) Sound of high frequency

Ans. **(b)**

195. Free central Placentation is found in

(a) Dianthus   (b) Argemone   (c) Primrose   (d) Both (a) and (c)

Ans. **(d)**

196. The first nif genes were isolated from

(a) Klebsiella aergoenosa   (b) klebsiella oxytoca

(c) Klebsiella pneumoniae   (d) Lkebsiella granulonatis

Ans. **(c)**

197. Yoghurt is produced with the help of

(a) Lactobacillus bulgaricus and Lactobcillus thermophilus

(b) Lactobacillus thermophilus and Streptocccus thermophilus

(c) Lactobacillus bulgaricus Streptocccus themophilus

(d) Lactobacillus kefir and Streptocccus thermphilus

Ans. **(c)**

198. Example of ex-situ biodiversity conservation is

(a) Botanical garden   (b) Biosphere reserve

(c) National park   (d) Reserve forest

Ans. **(a)**

199. Pyramid of energy in river ecosystem is

(a) Always upright   (b) Always Inverted   (c) Constant   (d) Declining

Ans.   **(a)**

200. Respiratory enzymes occur in bacteria in

(a) Plasma membrane   (b) Mitochondria

(c) Golgi apparatus   (d) Endoplasmic reticulum

Ans.   **(a)**