For students presently in

Class – 12 & 12 pass Code: 124271.0

IQ, Physics, Chemistry & Biology– PAPER - 1

Time Duration: 3 Hours **Maximum Marks: 450**

Instructions

Caution: Class, Paper, Code as given above MUST be correctly marked in the answer OMR sheet before attempting the paper. Wrong Class, Paper or Code will give wrong results.

1. This Question Paper contains only **3 Sections**. All questions will be Multiple Choice with single correct option out of four choices. The marking scheme is as per the table given below:

Section	Subject	Question No.	Marking Scheme for each questions	
			Correct Answer	Wrong Answer
Section – I	IQ	Q.NO: 1 to 30	+3	0
Section - II	Physics	Q.NO: 1 to 30	+3	0
	Chemistry	Q.NO: 31 to 60	+3	0
Section - III	Biology	Q.NO: 1 to 60	+3	0

2. Answers have to be marked on the OMR sheet. The Question Paper contains blank spaces for your rough work. No additional sheets will be provided for rough work.
3. Blank papers, clip boards, log tables, slide rule, calculator, cellular phones, pagers and electronic devices, in any form, are not allowed.
4. Before attempting paper write your Registration Number, Name and Test Centre in the space provided at the bottom of this sheet

Note: Please check this Question Paper contains all **150** questions. If not so, exchange for the correct Question Paper.

I.Q Section - I

Straight Objective Type

This section contains 30 multiple choice questions numbered 1 to 30. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

Directions (Q.1 to 3): In each of the following questions, there is a certain relation between two given numbers on one side : : and one number is given on another side of : : while another number is to be found from the given alternatives, having the same relation with this number as the numbers of the given pair bear. Choose the best alternative.

1. 3 : 11 : : 7 : ?
   (A) 22 (B) 29 (C) 18 (D) 51

2. 21 : 3 : : 574 : ?
   (A) 23 (B) 82 (C) 97 (D) 113

3. 18 : 30 : : 36 : ?
   (A) 54 (B) 62 (C) 64 (D) 66

4. After seeing a historical building a tourist asked, "How old is this building? " Guide replied, "It is older than 50 years. Two years ago its age was a perfect square and after two years will be a perfect cube." Then, what is the actual age of the building?
   (A) 343 (B) 216 (C) 64 (D) 123

Directions: (Q. 5 to 9) Read the following information and answer the following questions :
(i) There is a group of five people – A, B, C, D and E.
(ii) In the group, there are three professors, specialists in philosophy, Psychology and Economics.
(iii) A and D are unmarried ladies and are not specialist in any subject.
(iv) In the group there is a married couple and E is the husband.
(v) B is the brother of C, and he is neither a psychologist nor an economist.
(vi) Professor specialist in Psychology is also a lady.

5. Who is E's wife?
   (A) A (B) B (C) C (D) D

6. Which of the following group consists of all the males?
   (A) ABC (B) BCD (C) BC (D) BE

Space for Rough Work

7. Who is the professor of philosophy?
(A) A (B) B (C) C (D) E

8. Who is the professor of Economics?
(A) A (B) B (C) E (D) C

9. Which of the statements given above is super fluous?
(A) none of these (B) (i) (C) (iii) (D) (vi)

Directions: (Q.10 to 12) Read the following information carefully and answer the questions given below it:
A + B means A is the father of B
A – B means A is the wife of B
A × B means A is the brother of B
A ÷ B means A is the daughter of B.

10. If P × R – Q, which of the following is true?
(A) P is the brother-in-law of Q (B) P is the brother of Q
(C) P is the uncle of Q (D) P is the father of Q

11. If P + R ÷ Q, which of the following is true?
(A) P is the brother of Q (B) P is the son of Q
(C) P is the husband of Q (D) P is the father of Q

12. If P ÷R + Q, which of the following is true?
(A) P is the father of Q (B) P is the brother of Q
(C) P is the mother of Q (D) P is the sister of Q

13. At what time between 5:30 and 6 will the hands of a clock be at right angles?
(A) $43\frac{5}{11}$ min.past 5 (B) $43\frac{7}{11}$ min.past 5 (C) 40 min.past 5 (D) 45 min past 5

Space for Rough Work

14. The reflex angle between the hands of a clock at 10:25 is:
(A) 180° (B) $192\frac{1}{2}^{o}$ (C) 195° (D) $197\frac{1}{2}^{o}$

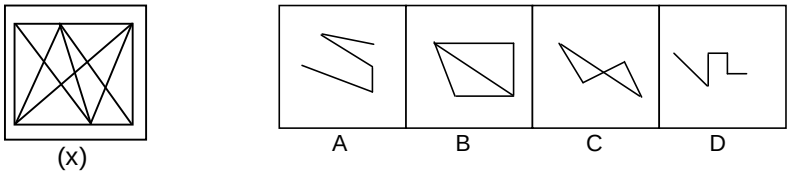
15. If 1st and 26th, 2nd and 25th, 3rd and 24th and so on, letters of the English alphabet are paired, then which of the following pairs is correct?
(A) GR (B) CW (C) IP (D) EV

16. If every alternative letter of English alphabet from B on wards (including B) is written in lower case (small letters) and the remaining letters are capitalized, then how will the first month of the second half of the year be written?
(A) JuLy (B) AuGuSt (C) jUlY (D) AugUSt

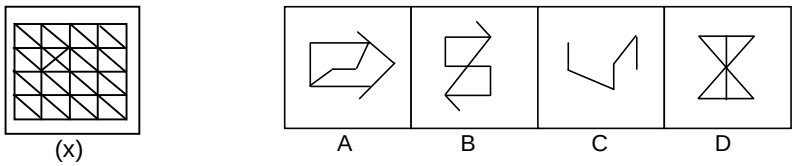
17. If only the first half of the English alphabet is reversed, how many letters will be there between K and R?
(A) 6 (B) 10 (C) 14 (D) 16

Directions: (Q.18 to 19) In each of the following questions, select the alternative figure which is embedded in the given figure (x):

18.



19.



20. If a boy walks from Nitin, meets Atul followed by Kunal, Dinesh and then Prashant, how many meters has he walked if he has traveled the straight distance all through?
(A) 155m (B) 185m (C) 215m (D) 245m

Space for Rough Work

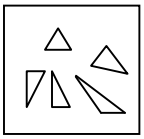
21. One evening before sunset two friends sumit and Mohit were talking to each other face to face. If Mohit's shadow was exactly to his right side, which direction was sumit facing?
(A) North (B) South (C) West (D) Data in adequate

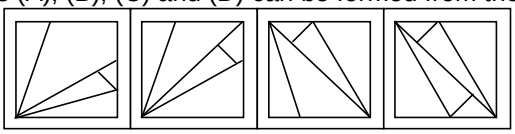
22. Three flags, each of different colours, are available for a military exercise. Using these flags, different codes can be generated by waving
(i) single flag of different colours, or
(ii) any two flags in a different sequence of colours, or
(iii) Three flags in a different sequence of colours. The maximum number of codes that can be generated is
(A) 6 (B) 9 (C) 15 (D) 18

23. Amar, Akbar and Anthony are friends, being looked after by a matron Farah. Amar weighs 50% more than Akbar and Anthony weights 25% less than Amar. Farah weighs one third of the combined weight of the three boys. All four together weight 232 kg. The correct arrangement of the person in the ascending coder of their weight is:
(A) Anthony, Akbar, Farah, Amar (B) Anthony, Akbar, Amar, Farah
(C) Akbar, Anthony, Amar, Farah (D) Akbar, Anthony, Farah, Amar

24. On another planet, the local terminology for earth, water, light, air and sky, are 'sky', 'light', 'air', 'water' and 'earth' respectively. If someone is thirsty there, what would he drink?
(A) sky (B) water (C) air (D) light

25. Find out which of the figures (A), (B), (C) and (D) can be formed from the pieces given in the figure (X)


(X)


A B C D

Space for Rough Work

26. In a certain code, BASIC is written as 'DDULE'. How is LEADER written in that code?
(A) NHCGGU (B) WGCFGT (C) OHDGHU (D) OGDFHT

27. My mother's age is three times the age of my sister. My father is thirty year elder to me. I was five years old when my sister was born. If my sister is 16 yrs old, what is the difference in the age of my parents (in years)
(A) 3 (B) 5 (C) 1 (D) 7

28. Man said "She is the daughter of the only son of my father's wife" whom he is referring to?
(A) sister (B) niece (C) daughter (D) aunt

29. If HOTEL is coded as 60. How will you code BORE?
(A) 38 (B) 40 (C) 52 (D) 42

30. A bird shooter said "there were all sparrows but six, all pigeons but six and all ducks but six in my back". How many birds he had in all?
(A) 18 (B) 6 (C) 9 (D) 12

Space for Rough Work

Physics Section - II

Straight Objective Type

Physics contains 30 multiple choice questions numbered 1 to 30. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

1. The physical quantities not having same dimensions are
   (A) torque and work (B) Linear momentum and Planck's constant
   (C) stress and Young's modulus (D) speed and $(\mu_0\varepsilon_0)^{-1/2}$

2. An open lift is coming down from the top of a building at a constant speed $v = 10$ m/s. A boy standing on the lift throws a stone vertically upwards at a speed of 30 m/s w.r.t. himself. The time after which he will catch the stone is
   (A) 4 sec (B) 6 sec (C) 8 sec (D) 10 sec

3. From a disc of radius R and mass M, a circular hole of diameter R, whose rim passes through the centre is cut. What is the moment of inertia of the remaining part of the disc about a perpendicular axis, passing through the centre?
   (A) $15MR^2/32$ (B) $13MR^2/32$ (C) $11MR^2/32$ (D) $9MR^2/32$

4. If a charge q is placed at the centre of the line joining two equal like charges Q, the system of three will be in equilibrium if q is
   (A) $-\frac{Q}{2}$ (B) $-\frac{Q}{4}$ (C) $-4Q$ (D) $+\frac{Q}{2}$

5. The molecules of a given mass of a gas have r.m.s velocity of 200 ms^{-1} at 27^0C and $1.0\times10^5 Nm^{-2}$ pressure. When the temperature and pressure of the gas are respectively, 127^0C and $0.05\times10^5 Nm^{-2}$, the r.m.s. velocity of its molecules in ms^{-1} is:
   (A) $100\sqrt{2}$ (B) $\frac{400}{\sqrt{3}}$ (C) $\frac{100\sqrt{2}}{3}$ (D) $\frac{100}{3}$

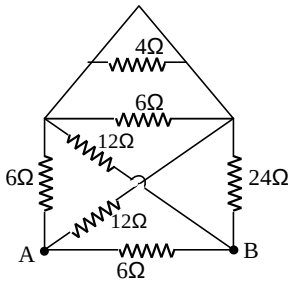
Space for Rough Work

6. A particle of mass m is observed from an inertial frame of reference and is found to move in a circle of radius r with a uniform speed v. The centrifugal force on it is :

(A) $\frac{mv^2}{r}$ towards the centre (B) $\frac{mv^2}{r}$ away the centre

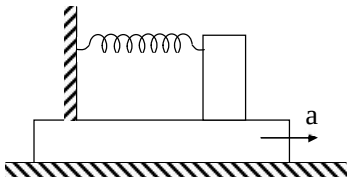
(C) $\frac{mv^2}{r}$ along the tangent through the particle (D) zero

7. In the circuit, shown in figure, equivalent resistance between A and B is



(A) 2.4 Ω (B) 6.2 Ω
(C) 4 Ω (D) 8 Ω

8. Find the maximum compression in the spring, if the lower block is shifted to rightwards with acceleration '*a*'. All the surfaces are smooth:



(A) $\frac{ma}{2k}$ (B) $\frac{2ma}{k}$ (C) $\frac{ma}{k}$ (D) $\frac{4ma}{k}$

9. Maximum displacement of x = 3sin ωt + 4 cos ωt will be :
(A) 3 (B) 4 (C) 5 (D) 7

10. A carnot engine having an efficiency of $\frac{1}{10}$ as heat engine, is used as a refrigerator. If the work done on the system is 10 J, the amount of energy absorbed from the reservoir at lower temperature is
(A) 90 J (B) 99 J (C) 100 J (D) 1 J

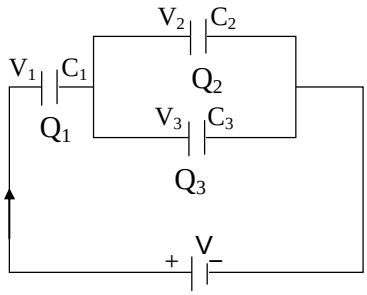
Space for Rough Work

11. The ratio of radius of two planets is K and ratio of acceleration due to gravity of both planet is g. What will be the ratio of their escape velocity ?
(A) $(kg)^{1/2}$ (B) $(kg)^{-1/2}$ (C) $(kg)^{2}$ (D) $(kg)^{-2}$

12. A body is falling from height 'h'. It takes t seconds to reach the ground. Calculate the time taken by it to cover the first h/16 height :
(A) $t/\sqrt{2}$ (B) t / 2 (C) t / 4 (D) t / 8

13. A body of mass *m* accelerates uniformly from rest to a speed v_0 in time t_0. The work done on the body till any time *t* is
(A) $\frac{1}{2}mv_0^2\left(\frac{t^2}{t_0^2}\right)$ (B) $\frac{1}{2}mv_0^2\left(\frac{t_0}{t}\right)$ (C) $mv_0^2\left(\frac{t}{t_0}\right)$ (D) $mv_0^2\left(\frac{t}{t_0}\right)^3$

14. In the given figure, three capacitors C_1 and C_2 and C_3 are joined to a battery, with symbols having their usual meanings, the correct conditions will be :
(A) $Q_1 = Q_2 = Q_3$ and $V_1 = V_2 = V_3 + V$
(B) $Q_1 = Q_2 + Q_3$ and $V = V_1 = V_2 + V_3$
(C) $Q_1 = Q_2 + Q_3$ and $V = V_1 + V_2$
(D) $Q_3 = Q_2$ and $V_2 = V_3$



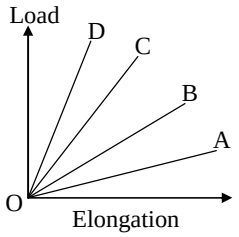
15. In a plane electromagnetic wave, the electric field oscillates sinusoidally at a frequency of 2.0×10^{10} Hz and amplitude 48 V m^{-1}. The wavelength of the wave is
(A) 1.5 m (B) 1.5×10^{-1}m (C) 1.5×10^{-2} m (D) 1.5×10^{-3}m

Space for Rough Work

16. A constant retarding force of 50 N is applied to a body of mass 20 kg moving initially with a speed of 15 m/sec. How long does the body take to stop?
(A) 2 sec (B) 4 sec (C) 6 sec (D) 8 sec

17. If $\hat{i}, \hat{j}$ and $\hat{k}$ are unit vectors along x, y and z-axes respectively, the angle θ between the vector $\hat{i}+\hat{j}+\hat{k}$ and vector $\hat{i}$ is given by
(A) $\theta = \cos^{-1}\left(\frac{1}{\sqrt{3}}\right)$ (B) $\theta = \sin^{-1}\left(\frac{1}{\sqrt{3}}\right)$ (C) $\theta = \cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$ (D) $\theta = \sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$

18. The load versus elongation graph for four wires of the same material is shown in the figure. The thickest wire is represented by the line
(A) OD (B) OC
(C) OB (D) OA



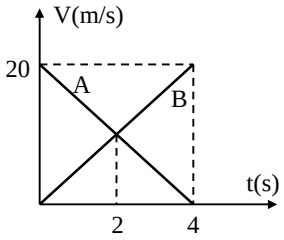
19. The fundamental frequency in an open organ pipe is equal to the third harmonic of a closed organ pipe. If the length of the closed organ pipe is 20 cm, the length of the open organ pipe is
(A) 12.5 cm (B) 8 cm (C) 13.2 cm (D) 16 cm

20. A ring is suspended from is one end and oscillating then its time period for small oscillations will be :
(A) $2\pi\sqrt{\frac{R}{g}}$ (B) $2\pi\sqrt{\frac{2R}{g}}$ (C) $2\pi\sqrt{\frac{R}{2g}}$ (D) $2\pi\sqrt{\frac{3R}{2g}}$

21. Two thin long, parallel wires, separated by a distance '*d*' carry a current of *i A* in the same direction. They will
(A) attract each other with a force of $\frac{«_0 i^2}{(2®d^2)}$ (B) repel each other with a force of $\frac{«_0 i^2}{(2®d^2)}$
(C) attract each other with a force of $\frac{«_0 i^2}{2®d}$ (D) repel each other with a force of $\frac{«_0 i^2}{2®d}$

Space for Rough Work

22. Speed-time graph of two cars A and B approaching towards each other is shown in figure. Initial distance between them is 60 m. The two cars will cross each other after time.



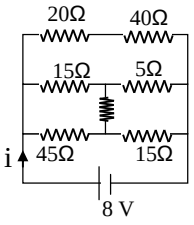
(A) 2 sec (B) 3 sec
(C) 1.5 sec (D) $\sqrt{2}$ sec

23. A rod of length 1m and mass 4 kg is fixed at one end and is initially hanging vertical. The free end is now raised until it makes an angle of 60° with the vertical. The amount of work required will be :
(A) 9.8 J (B) 19.6 J (C) 4.9 J (D) 2.45 J

24. Two discs of moment of inertia I_1 and I_2 are rotated about their geometrical axis with angular velocity ω_1 and ω_2 respectively. If the two discs are joint face to face coinciding their axes, then the kinetic energy of system :
(A) $\frac{1}{2}(I_1+I_2)(\omega_1+\omega_2)^2$ (B) $\frac{1}{2}(I_1+I_2)(\omega_1+\omega_2)$
(C) $\frac{1}{2}\frac{(I_1+\omega_1)(I_2+\omega_2)^2}{I_1+I_2}$ (D) None of these

25. A second pendulum is kept in a satellite. It is revolving around the earth at the height of 3R from the earth surface. Time period of second pendulum will be :
(A) zero (B) $2\sqrt{3}$ sec (C) 4 sec (D) infinity

26. In the given circuit, the value of *i* is



(A) 0.10 A (B) 0.20 A
(C) 0.40 A (D) 0.6 A

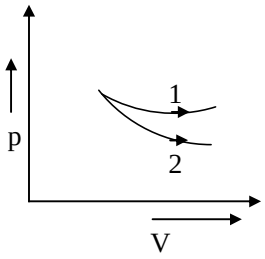
Space for Rough Work

27. Average velocity of a particle executing SHM in one complete vibration is:

(A) $\frac{A\mu}{2}$ (B) $A\mu$ (C) $\frac{A\mu^2}{2}$ (D) zero

28. P-V plots for two gases during adiabatic processes are shown in the figure. Plots 1 and 2 should correspond respectively to

(A) He and O_2 (B) O_2 and He
(C) He and Ar (D) O_2 and N_2



29. A bus moves on a horizontal path with constant acceleration a. A boy in the bus drops a ball outside. The acceleration of the ball w.r.t. the earth and the bus respectively are :

(A) a and g-a (B) a + g and g (C) g and $\sqrt{a^2+g^2}$ (D) a + g and a + g

30. A particle is projected at angle θ with speed u from the ground. The time after that its acceleration and velocity are perpendicular is :

(A) $\frac{u}{g}$ (B) $\frac{2u\sin\theta}{g}$ (C) $\frac{u\sin\theta}{g}$ (D) $\frac{u}{g\sin\theta}$

Space for Rough Work

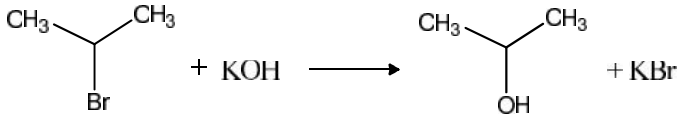
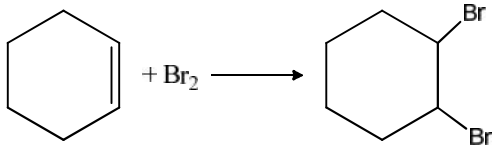
Chemistry

Straight Objective Type

Chemistry contains 30 multiple choice questions numbered 31 to 60. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

31. Which one of the following characteristics is associated with adsorption?
(A) ΔG and ΔS are negative but ΔH is positive
(B) ΔG is negative but ΔH and ΔS are positive
(C) ΔG, ΔH, ΔS all are negative
(D) ΔG and ΔH are negative but ΔS is positive

32. The pressure of H_2 required to make the potential of H_2 electrode zero in pure water at 298 K is
(A) 10^{-4} atm (B) 10^{-14} atm (C) 10^{-12} atm (D) 10^{-10} atm

33. For the following reactions
(a) $CH_3CH_2CH_2Br + KOH \longrightarrow CH_3CH = CH_2 + KBr + H_2O$
(b) 
(c) 
Which of the following statements is correct.
(A) (a) elimination (b) substitution reaction (c) addition reaction
(B) (a) elimination (b) addition (c) substitution
(C) (a) substitution (b) addition (c) addition
(D) (a) & (b) are elimination (c) addition

Space for Rough Work

34. Match the compounds given in column I and shape given in column II and mark the correct option.

	Column I		Column II
(a)	XeF_6	(i)	distorted octahedral
(b)	XeO_3	(ii)	square planar
(c)	$XeOF_4$	(iii)	pyramidal
(d)	XeF_4	(iv)	square pyramidal

(A) a-iv, b-i, c-ii, d-iii (B) a-i, b-iii, c-iv, d-ii (C) a-i, b-ii, c-iv, d-iii (D) a-iv, b-iii, c-i, d-ii

35. Consider the nitration of benzene using mixed conc. H_2SO_4 and HNO_3. If a large amount of $KHSO_4$ is added to the mixture, the rate of nitration will be
(A) doubled (B) faster (C) slower (D) unchanged

36. Which of the following statements is false?
(A) Mg^{2+} ions are important in the green parts of plants
(B) Mg^{2+} ions form a complex with ATP
(C) Ca^{2+} ions are important in blood clotting
(D) Ca^{2+} ions are not important in maintaining the regular beating of the heart.

37. Which of the following has longest C – O bond length? (Free C – O bond length in CO is 1.128 Å .)
(A) $[Mn(CO)_6]^+$ (B) $Ni(CO)_4$ (C) $[Co(CO)_4]^-$ (D) $[Fe(CO)_4]^{2-}$

38. Which of the following reagents would distinguish cis-cyclopentane-1, 2- diol from the trans-isomer?
(A) Aluminium isopropoxide (B) Acetone (C) Ozone (D) MnO_2

Space for Rough Work

39. The correct statement regarding a carbonyl compound with a hydrogen atom on its alphacarbon, is
    (A) a carbonyl compound with a hydrogen atom on its alpha-carbon rapidly equilibrates with its corresponding enol and this process is known as keto-enol tautomerism.
    (B) a carbonyl compound with a hydrogen atom on its alpha-carbon never equilibrates with its corresponding enol.
    (C) a carbonyl compound with a hydrogen atom on its alpha-carbon rapidly equilibrates with its corresponding enol and this process is known as aldehyde-ketone equilibration.
    (D) a carbonyl compound with a hydrogen atom on its alpha-carbon rapidly equilibrates with its corresponding enol and this process is known as carbonylation.

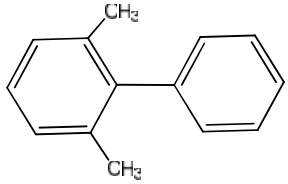
40. Consider the molecules CH_4,NH_3 and H_2O. Which of the given statements is false?
    (A) The $H-C-H$ bond angle in CH_4 is larger than the $H-N-H$ bond angle in NH_3.
    (B) The $H-C-H$ bond angle in CH_4, the $H-N-H$ bond angle in NH_3, and the $H-O-H$ bond angle in H_2O are all greater than 90^o.
    (C) The $H-O-H$ bond angle in H_2O is larger than the $H-C-H$ bond angle in CH_4
    (D) The $H-O-H$ bond angle in H_2O is smaller than the $H-N-H$ bond angle in NH_3.

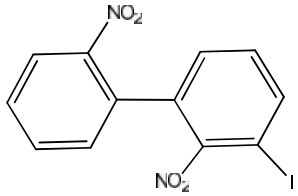
41. Consider the following liquid – vapour equilibrium.
    Liquid $\rightleftharpoons$ Vapour
    Which of the following relations is correct?
    (A) $\frac{d\ln P}{dT}=\frac{\Delta H_v}{RT^2}$ (B) $\frac{d\ln G}{dT^2}=\frac{\Delta H_v}{RT^2}$ (C) $\frac{d\ln P}{dT}=\frac{-\Delta H_v}{RT}$ (D) $\frac{d\ln P}{dT^2}=\frac{-\Delta H_v}{T^2}$

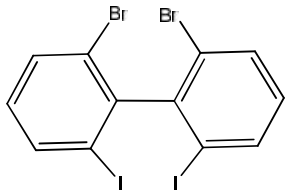
42. Which of the following statements about the composition of the vapour over an ideal 1:1 molar mixture of benzene and toluene is correct? Assume that the temperature is constant at 25^oC. (Given, Vapour Pressure Data at 25^oC, benzene = 12.8 kPa toluene = 3.85 kPa)
    (A) Not enough information is given to make a prediction.
    (B) The vapour will contain a higher percentage of benzene.
    (C) The vapour will contain a higher percentage of toluene.
    (D) The vapour will contain equal amounts of benzene and toluene.

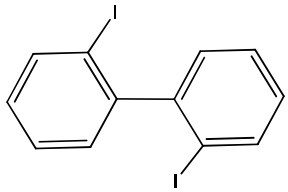
Space for Rough Work

43. Which of the following biphenyls is optically active.

(A) 

(B) 

(C) 

(D) 

44. Lithium has a bcc structure. Its density is 530 kg m^{-3} and its atomic mass is 6.94 $g\ mol^{-1}$. Calculate the edge length of a unit cell of Lithium metal. ($N_A = 6.02 \times 10^{23}\ mol^{-1}$)
(A) 264 pm (B) 154 pm (C) 352 pm (D) 527 pm

45. Which of the following statements about hydrogen is incorrect?
(A) Dihydrogen does act as a reducing agent
(B) Hydrogen has three isotopes of which tritium is the most common
(C) Hydrogen never acts as cation in ionic salts
(D) Hydronium ion, H_3O^+ exists freely in solution.

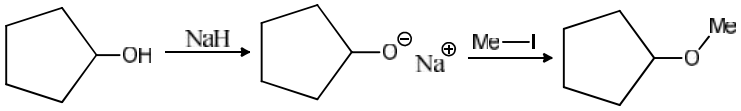
Space for Rough Work

46. The product obtained as a result of a reaction of nitrogen with CaC_2 is
(A) Ca_2CN (B) $CaCN_2$ (C) CaCN (D) $CaCN_3$

47. The initiator most often used in cationic polymerization is
(A) BF_3 (B) $AlCl_3$ (C) H_2SO_4 (D) All of these

48. Which one of the following orders is correct for the bond dissociation enthalpy of halogen molecules?
(A) $F_2 > Cl_2 > Br_2 > I_2$ (B) $I_2 > Br_2 > Cl_2 > F_2$ (C) $Cl_2 > Br_2 > F_2 > I_2$ (D) $Br_2 > I_2 > F_2 > Cl_2$

49. The reaction



can be classified as:
(A) Williamson alcohol synthesis reaction
(B) Williamson ether synthesis reaction
(C) Alcohol formation reaction
(D) Dehydration reaction

50. Which is the correct statement for the given acids?
(A) Phosphinic acid is a diprotic acid while phosphonic acid is a monoprotic acid
(B) Phosphinic acid is a monoprotic acid while phosphonic acid is a diprotic acid
(C) Both are diprotic acids
(D) Both are triprotic acids

51. *MY* and NY_3, two nearly insoluble salts, have the same K_{sp} values of 6.2×10^{-13} at room temperature Which statement would be true in regard to *MY* and NY_3 ?
(A) The addition of the salt of KY to solution of *MY* and NY_3 will have no effect on their solubilities.
(B) The molar solubilities of MY and NY_3 in water are identical.
(C) The molar solubility of MY in water is greater than that of NY_3.
(D) The salts MY and NY_3 are more soluble in 0.5 M KY than in pure water.

Space for Rough Work

52. Which of the following is an analgesic?
(A) Chloromycetin (B) Novalgin (C) Penicillin (D) Streptomycin

53. Which one of the following statements is correct when SO_2 is passed through acidified $K_2Cr_2O_7$ solution?
(A) Green $Cr_2(SO_4)_3$ is formed (B) The solution turns blue.
(C) The solution is decolourized. (D) SO_2 is reduced.

54. Match items of Column I with the items of Column II and assign the correct code:

	Column I		Column II
(a)	Cyanide process	(i)	Ultrapure Ge
(b)	Froth floatation process	(ii)	Dressing of ZnS
(c)	Electrolytic reduction	(iii)	Extraction of Al
(d)	Zone refining	(iv)	Extraction of Au
		(v)	Purification of Ni

(A) a-iii, b-iv, c-v, d-i (B) a-iv, b-ii, c-iii, d-i (C) a-ii, b-iii, c-i, d-v (D) a-i, b-ii, c-iii, d-iv

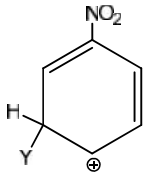
55. The correct statement regarding RNA and DNA, respectively is
(A) The sugar component in RNA is $2'-$ deoxyribose and the sugar component in DNA is arabinose.
(B) The sugar component in RNA is arabinose and the sugar component in DNA is $2'-$ deoxyribose.
(C) The sugar component in RNA is ribose and the sugar component in DNA is $2'-$ deoxyribose.
(D) The sugar component in RNA is arabinose and the sugar component in DNA is ribose.

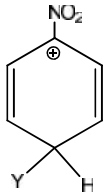
56. The correct order of atomic radii in group 13 element is
(A) B < Ga < Al < Tl < In (B) B < Al < Ga < In < Tl
(C) B < Al < In < Ga < Tl (D) B < Ga < Al < In < Tl

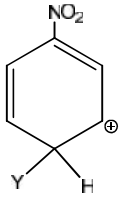
57. Hydrocarbon (A) reacts with bromine by substitution to form an alkayl bromide which by Wurtz reaction is converted to gaseous hydrocarbon containing less than 4 carbon atom (A) is
(A) ethane (B) ethene (C) ethyne (D) methane

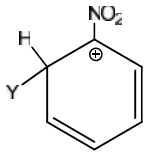
Space for Rough Work

58. Which of the following carbocation is expected to be most stable?

(A) 

(B) 

(C) 

(D) 

59. Following solutions were prepared by mixing different volumes of *NaOH* and *HCl* of different Concentrations. pH of which one of them will be equal to 2.

(A) 60 ml $\frac{M}{10}$HCl + 40 ml $\frac{M}{10}$NaOH

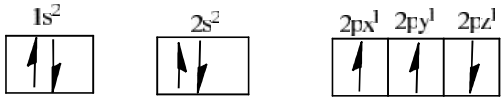
(B) 55 ml $\frac{M}{10}$HCl + 45 ml $\frac{M}{10}$*NaOH*

(C) 75 ml $\frac{M}{5}$HCl + 25 ml $\frac{M}{5}$NaOH

(D) 100 ml $\frac{M}{10}$HCl + 100 ml $\frac{M}{10}$NaOH

60. Which one is a wrong statement?

(A) The electronic configuration of N atom is



(B) An orbital is designated by three quantum numbers while an electron in an atom is designated by four quantum numbers.

(C) The total orbital angular momentum of election in s orbital is zero

(D) The value of m for dz^2 is zero.

Space for Rough Work

Biology Section - III

Straight Objective Type

Biology contains 60 multiple choice questions numbered 1 to 60. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

1. A particular species of plant produces light, non-sticky pollen in large numbers and its stigmas are long and feathery. These modifications facilitate pollinations by:
   (A) Insects (B) Water (C) Wind (D) Animals

2. A stain is injected into a plant cell of a tissue. It got spread to other cells, which may be through:
   (A) Gap junction (B) Plasmodesmata (C) Both (A) and (B) (D) ER

3 Okazaki fragments, during DNA replication, are joined by:
   (A) Isomerases (B) Ligases (C) Hydrolases (D) Lyases

4. The DNA dependent DNA polymerase polymerise DNA in _____ direction.
   (A) $3' \rightarrow 5'$ (B) $5' \rightarrow 3'$ (C) Both $5' \rightarrow 3'$ and $3' \rightarrow 5'$ (D) $3' \rightarrow 4'$

5. In the biological name Pinus nigra nigra, the specific and subspecies names are identical so, it represents:
   (A) Autonym (B) Synonym (C) Homonym (D) Tautonym

6. A typical monohybrid test-cross ratio is:
   (A) 1 : 1 (B) 1 : 1 : 2 (C) 2 : 3 (D) 1 : 1 : 1 : 1

7. Leghaemoglobin is:
   (A) O_2 Scavenger (B) Red/Pink coloured
   (C) Both (A) and (B) (D) Exactly same as haemoglobin found in animal blood

8. Which one of the following is not a fungal disease?
   (A) Rust of wheat (B) Smut of Bajra
   (C) Black rot of crucifers (D) Red rot of sugarcane

9. Rate of transpiration is high:
   (A) C_3 Plants (B) C_4 Plants
   (C) CAM Plants (D) Both C_3 and C_4 Plants

10. In which of the following zone(s) of a deep lake light do not reach?
    (A) Limnetic (B) Littoral (C) Profundal and benthic (D) Disphotic

Space for Rough Work

11. Apical dominance can be overcome by:
(A) GA (B) Cytokinin (C) Ethylene (D) Auxin

12. Chrysophytes include:
(A) Diatoms (B) Desmids (C) Both (A) and (B) (D) Green Algae

13. Both husband and wife have normal vision though their fathers were colourblind. The probability of daughter becoming colourblind is:
(A) 25% (B) 0% (C) 50% (D) 75%

14. Sacred groves are useful in:
(A) Conserving rare and threatened species (B) Generating environmental awareness
(C) Year round flow of water in rivers (D) Preventing soil erosion

15. Meiosis can be observed in:
(A) Tapetal cells (B) Megaspores (C) Microspores (D) Spore mother cells

16. 'Golden rice' or 'Miracle rice' is transgenic rice rich in:
(A) Vitamin B and iron (B) Vitamin A and iron
(C) Vitamin A and Vitamin B (D) Iron

17. Identify the simple tissue from among the following:
(A) Parenchyma (B) Xylem (C) Epidermis (D) Phloem

18. The animal species controlling the ecosystem functioning is known as:
(A) Edge species (B) Pioneer species (C) Umbrella species (D) Keystone species

19. Coliphage $\phi \times 174$ virus contains:
(A) Single stranded RNA (B) Double stranded RNA
(C) Single stranded DNA (D) Double stranded DNA

20. Amino acids have both an amino group and a carboxyl group in their structure. Which amongst the following is an amino acid?
(A) Formic acid (B) Glycerol (C) Glycolic acid (D) Glycine

Space for Rough Work

21. For a plasmolysed cell which equation is correct:
(A) DPD = OP + TP (B) DPD = –TP (C) DPD = OP (D) DPD = OP – TP

22. When CO_2 is added to PEP, the first stable product synthesized is:
(A) Pyruvate (B) Glyceraldehyde-3-phosphate
(C) Phosphoglycerate (D) Oxaloacetate

23. Enzymes are functional properly at the temperature range of:
(A) 15–25°C (B) 20–30°C (C) 60–70°C (D) 30–50°C

24. Which of the following is an important biofertilizer in rice fields?
(A) Anabaena (B) Glomus (C) Rhizobium (D) Neurospora

25. The family Felidae of animals contain:
(A) Lion (B) Tiger and leopard (C) Cat (D) All of the above

26. In sickle cell anaemia glutamic acid is replaced by valine. Which one of the following triplets codes for valine?
(A) GGG (B) AAG (C) GAA (D) GUG

27. Plant piece used in tissue culture is called:
(A) Explant (B) Somaclone (C) Inoculant (D) Clone

28. Nucleosome contains:
(A) Only histone protein (B) Both DNA and histone
(C) Only DNA (D) Both DNA and RNA

29. 'River-popper' hypothesis was given by:
(A) David Tilman (B) Paul Ehrlich (C) Alexander Humboldt (D) E.P. Odum

30. The movement of pollen tube is called:
(A) Chemotropism (B) Thermotaxis (C) Thermonastic (D) Hydrotropism

Space for Rough Work

31. Water potential of pure water at standard temperature is equal to:
(A) 10 (B) 20 (C) Zero (D) None of these

32. BOD of waste water is estimated by measuring amount of:
(A) Total organic matter (B) Biodegradable organic matter
(C) Oxygen evolution (D) Oxygen consumption

33. Mineral present in cytochrome is:
(A) Fe (B) Cu (C) Mg (D) Mn

34. What is the direction of micropyle in anatropous ovule?
(A) Upward (B) Downward (C) Right (D) Left

35. Nucleus are absent in:
(A) Mature RBC (B) Mature sieve tube (C) Both (A) and (B) (D) All mature cells

36. The excretory organs in cockroach are:
(A) Green glands (B) Hepatic caecae (C) Metanephridia (D) Malpighian tubules

37. J-shape growth can be observed for:
(A) Algal bloom (B) Insect population (C) Both (A) and (B) (D) All plant species

38. An element present in middle lamella is:
(A) Calcium (B) Potassium (C) Sodium (D) Iron

39. An enterocoelomate invertebrate group is:
(A) Mollusca (B) Annelida (C) Arthropoda (D) Echinodermata

40. Cymose inflorescence is present in:
(A) Solanum (B) Sesbania (C) Trifolium (D) Brassica

Space for Rough Work

41. The most abundant chemical in living organisms could be:
(A Protein (B) Water (C) Sugar (D) Nucleic acid

42. In RNAi (*RNA interference*), genes are silenced using:
(A) ss DNA (B) ds DNA (C) ds RNA (D) ss RNA

43. The end product of oxidative phosphorylation is:
(A) NADH (B) Oxygen (C) ADP (D) $ATP + H_2O$

44. Which enzyme removes the RNA nucleotides from primer and adds equivalent DNA nucleotides?
(A) Ligase (B) DNA polymerase-I (C) Primase (D) DNA polymerase-II

45. Each statement in the key is called:
(A) Lead (B) Couplet
(C) Contrasting character (D) All of the above

46. One of the following is a very unique feature of the mammalian body:
(A) Rib cage (B) Homeothermy
(C) Presence of diaphragm (D) Four-chambered heart

47. In fungi, both male and female reproductive structures are present on the same thallus. This condition is:
(A) Homothallic (B) Heterothallic (C) Dioecious (D) Trioecious

48. Tendon connect a:
(A) Bone with bone (B) Bone with muscle
(C) Cartilage with muscle (D) Ligament with muscle

49. Find the incorrect match:
(A) Tap root – Potato
(B) Adventitious root – Sweet potato
(C) Prop root – Banyan tree
(D) Stilt root – Turnip

50. Maximum ozone depletion is caused by:
(A) CO_2 (B) CFC (C) SO_2 (D) CH_4

Space for Rough Work

51. Quantum yield of photosynthesis is:
(A) 33% (B) 9% (C) 12% (D) 8%

52. A population growing in a habit with limited resources shows four phases in the following sequence:
(A) Acceleration ⟶ Deceleration ⟶ Lag phase ⟶ Asymptote
(B) Asymptote ⟶ Acceleration ⟶ Deceleration ⟶ Lag phase
(C) Lag phase ⟶ Acceleration ⟶ Deceleration ⟶ Asymptote
(D) Acceleration ⟶ Lag phase ⟶ Deceleration ⟶ Asymptote

53. 'Species Plantarum' and 'Systema Naturae' were written by:
(A) Linnaeus (B) Wallace (C) Hooker (D) Prantl

54. Lindeman's energy transfer law states that only:
(A) 20% energy is transferred to higher trophic level
(B) 10% energy is transferred to higher trophic level
(C) 30% energy is transferred to higher trophic level
(D) 50% energy' is transferred to higher trophic level

55. Klinefelter's syndrome is:
(A) XO (B) XXX (C) XXY (D) XXXY

56. During which phase(s) of cell cycle, amount of DNA in a cell remains at 4C level if the initial amount is denoted as 2C?
(A) G_2 and M (B) G_0 and G_1 (C) G_1 and S (D) Only G_2

57. "The Haryana Kisan Welfare Club' is run by:
(A) Ramesh Chandra Dagar (B) Ahmed Khan (C) Swaminathan (D) Ramdeo Mishra

58. Which of the following has clover leaf shape?
(A) m-RNA (B) t-RNA (C) r-RNA (D) Sn-RNA

59. The photosynthetic pigments in a chloroplast is restricted to:
(A) Stroma (B) Outer membrane (C) Thylakoid (D) Inner membrane

60. Match the Column

COLUMN – I		COLUMN – II	
(a)	Ascomycetes	(i)	Club fungi
(b)	Basidiomycetes	(ii)	Sac fungi
(c)	Deuteromycetes	(iii)	Algae fungi
(d)	Phycomycetes	(iv)	Fungi imperfecti

(A) a = (i), b = (iv), c = (ii), d = (iii) (B) a = (iv), b = (iii), c = (i), d = (ii)
(C) a = (i), b = (iii), c = (iv), d = (ii) (D) a = (ii), b = (i), c = (iv), d = (iii)

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