

# SAMPLE PAPER - SCHOLARSHIP TEST

Dual / Integrated Program for One Year (DIPOY / IPOY)

Time Allowed: 1½ Hour

Maximum Marks: 300

Student's Name : \_\_\_\_\_

Roll No. :

Centre Name : \_\_\_\_\_

Contact No. : \_\_\_\_\_

## INSTRUCTIONS FOR MARKING ON ANSWER SHEET

1. Use only ball point pen to darken the appropriate circle.
2. Mark should be dark and completely fill the circle.
3. Darken **ONLY ONE CIRCLE** for each question .
4. Each question carries 4 marks and there is no negative marking for wrong answer.
5. Candidate should check the test paper carefully, in case of any discrepancy, the candidate should report immediately to the invigilator for replacement of the both i.e. the test booklet and answer-sheet.
6. Rough work must not be done on the answer sheet.

SIGNATURE OF THE CANDIDATE

SIGNATURE OF THE INVIGILATOR

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## PHYSICS

Choose the correct (✓) answer:

1. A physical quantity Q is calculated according to the expression

$$Q = \frac{A^3 B^3}{C\sqrt{D}}$$

If percentage errors in A, B, C, D are 2%, 1%, 3% and 4% respectively, what is the percentage error in Q?

- (1)  $\pm 8\%$  (2)  $\pm 10\%$   
 (3)  $\pm 12\%$  (4)  $\pm 14\%$
2. Which of the following expression is meaningless :

- (1)  $(\vec{a} \times \vec{b}) \times \vec{c}$  (2)  $(\vec{a} \cdot \vec{b}) \times (\vec{c} \cdot \vec{d})$   
 (3)  $(\vec{a} \times \vec{b}) \cdot (\vec{c} \times \vec{d})$  (4)  $(\vec{a}) \times (\vec{b} \times \vec{d})$

3. The acceleration a (in  $\text{ms}^{-2}$ ) of a body, starting from rest, varies with time t (in s) according to the relation  $a = 3t + 4$ . The velocity of the body at time  $t = 2\text{s}$  will be :

- (1)  $10\text{ms}^{-1}$  (2)  $12\text{ms}^{-1}$   
 (3)  $14\text{ms}^{-1}$  (4)  $16\text{ms}^{-1}$

4. The ratio of the speed of a projectile at the point of projection to the speed at the top of its trajectory is x. The angle of projection with the horizontal is :

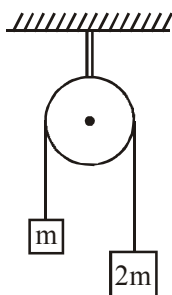
- (1)  $\sin^{-1}x$  (2)  $\cos^{-1}x$   
 (3)  $\sin^{-1}\left(\frac{1}{x}\right)$  (4)  $\cos^{-1}\left(\frac{1}{x}\right)$

5. The equation of motion of a projectile is  $y = 12x - \frac{3}{4}x^2$ .

Given that  $g = 10 \text{ ms}^{-2}$ , what is the range of the projectile?

- (1) 12m (2) 16m  
 (3) 20m (4) 24m

6. In the arrangement shown in the figure, the pulley has a mass 3m. Neglecting friction on the contact surface, the force exerted by the supporting rope AB on the ceiling is



- (1) 6mg (2) 3mg  
 (3) 4mg (4) None of these

7. When a planet moves around sun, is :

- (1) A real velocity is constant  
 (2) Linear velocity is constant  
 (3) Angular velocity is constant  
 (4) All the velocities are constant

8. The ratio of the radii of gyration of a circular disc and a circular ring of the same radius about a tangential axis in the plane is

- (1)  $\sqrt{3} : \sqrt{4}$  (2)  $\sqrt{6} : \sqrt{5}$   
 (3)  $\sqrt{5} : \sqrt{6}$  (4)  $\sqrt{4} : \sqrt{3}$

9. A particle is moving in a circular orbit with constant speed. Select wrong alternate :

- (1) Its momentum is conserved  
 (2) Its angular momentum is conserved  
 (3) It is moving with variable velocity  
 (4) It is moving with variable acceleration

10. Two bodies of masses m and M are placed a distance d apart. The gravitational potential at the position where the gravitational field due to them is zero is V,

- (1)  $V = -\frac{G}{d}(m + M)$  (2)  $V = -\frac{Gm}{d}$   
 (3)  $V = -\frac{GM}{d}$  (4)  $V = -\frac{G}{d}(\sqrt{m} + \sqrt{M})^2$

11. The 3rd of overtone of a closed organ pipe is equal to the 2nd harmonic of an open organ pipe. Then the ratio of their lengths is equal to

- (1)  $\frac{7}{4}$  (2)  $\frac{3}{5}$   
 (3)  $\frac{3}{2}$  (4)  $\frac{7}{6}$

12. A wall has two layers A and B each made of different materials. The layer A is 10 cm thick and B is 20cm thick. The thermal conductivity of A of thrice that of B. Under thermal equilibrium temperature difference across the wall is  $35^\circ\text{C}$ . The difference of temperature across of the layer A is :

- (1)  $30^\circ\text{C}$  (2)  $14^\circ\text{C}$   
 (3)  $8.75^\circ\text{C}$  (4)  $5^\circ\text{C}$

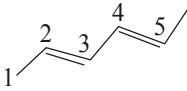
Space For Rough Work

13. A system is taken from state A to state B along two different paths 1 and 2. The work done of the system along these two paths is  $W_1$  and  $W_2$  respectively. The heat absorbed by the system along these two paths is  $Q_1$  and  $Q_2$  respectively. The internal energy at A and B is  $U_A$  and  $U_B$  respectively.
- $W_1 = W_2 = U_B - U_A$
  - $Q_1 = Q_2 = U_A - U_B$
  - $Q_1 + W_1 = Q_2 + W_2 = U_A + U_B$
  - $Q_1 - W_1 = Q_2 - W_2 = U_B - U_A$
14. A cylindrical tube, open at both ends, has fundamental frequency  $f$  in air. The tube is dipped vertically in water so that half of it is in water. The fundamental frequency of air column is now :
- $\frac{f}{2}$
  - $\frac{3f}{4}$
  - $f$
  - $2f$
15. The angle between  $\vec{A}$  and  $\vec{B}$  is  $\theta$ . The value of the triple product  $\vec{A} \cdot (\vec{B} \times \vec{A})$  is
- $A^2 B$
  - Zero
  - $A^2 B \sin \theta$
  - $A^2 B \cos \theta$
16. The vectors  $\vec{A}$  and  $\vec{B}$  are such that  $|\vec{A} + \vec{B}| = |\vec{A} - \vec{B}|$
- The angle between the two vectors is
- $60^\circ$
  - $75^\circ$
  - $45^\circ$
  - $90^\circ$
17. A shell is fired from a cannon, it explodes in mid air, its total
- Momentum increases
  - Momentum decreases
  - K.E. increases
  - K.E. Decreases
18. The centre of mass of a system of particles does not depend upon
- Masses of the particles
  - Forces acting on the particles
  - Position of the particles
  - Relative distances between the particles
19. The velocity of sound in any gas depends upon
- Wavelength of sound only
  - Density and elasticity of gas
  - Intensity of sound waves only
  - Amplitude and frequency of sound
20. A body executes S.H.M. with an amplitude A. At what displacement from the mean position is the potential energy of the body is one fourth of its total energy?
- $A/4$
  - $A/2$
  - $3A/4$
  - Some other fraction of A
21. The speed of a wave in a medium is 960 m/s. If 3600 waves are passing through a point in the medium in 1 min, then the wavelength of the wave is
- 8m
  - 12m
  - 16m
  - 20m
22. First law of thermodynamics is consequence of conservation of
- Work
  - Energy
  - Heat
  - All of these
23. The efficiency of a Carnot engine operating between the temperature of  $100^\circ\text{C}$  and  $-23^\circ\text{C}$  will be
- $\frac{100 + 23}{100}$
  - $\frac{100 - 23}{100}$
  - $\frac{373 + 250}{373}$
  - $\frac{373 - 250}{373}$
24. A black body has maximum wavelength  $\lambda_m$  at temperature 2000 K. Its corresponding wavelength at temperature 3000 K will be
- $\frac{3}{2} \lambda_m$
  - $\frac{2}{3} \lambda_m$
  - $\frac{4}{9} \lambda_m$
  - $\frac{9}{4} \lambda_m$
25. A particle of mass M is moving in a horizontal circle of radius R with uniform speed V. When it moves from one point to a diametrically opposite point, its
- Kinetic energy change by  $MV^2/4$
  - Momentum does not change
  - Momentum changes by  $2MV$
  - Kinetic energy changes by  $MV^2$

## CHEMISTRY

26. All the following substances react with water. The pair that gives the same gaseous product is  
 (1) K and  $\text{KO}_2$  (2) Na and  $\text{Na}_2\text{O}_2$   
 (3) Ca and  $\text{CaH}_2$  (4) Ba and  $\text{BaO}_2$
27. Chemical formula of plaster of Paris is  
 (1)  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$   
 (2)  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$   
 (3)  $(\text{CaSO}_4)_2 \cdot \text{H}_2\text{O}$   
 (4) All of these
28. Which of the following element expands on solidification?  
 (1) Ga (2) Al  
 (3) B (4) Si
29. Which of the following is purest allotrope of carbon?  
 (1) Diamond (2) Graphite  
 (3) Fullerene (4) Coke
30. If  $b$  is the excluded volume then available volume for  $N$  molecules in  $V$  litre container is  
 (1)  $(V - b)$  (2)  $\left(V - \frac{\text{No}}{N}b\right)$   
 (3)  $\left(V - \frac{N}{\text{No}}b\right)$  (4)  $(V - Nb)$   
 (No = Avogadro's no.)
31. 0.5 mole of each of  $\text{H}_2$ ,  $\text{SO}_2$  and  $\text{CH}_4$  are kept in a container. A hole was made in the container. After 3 hours, the order of partial pressures in the container will be  
 (1)  $P_{\text{SO}_2} > P_{\text{CH}_4} > P_{\text{H}_2}$  (2)  $P_{\text{H}_2} > P_{\text{SO}_2} > P_{\text{CH}_4}$   
 (3)  $P_{\text{CH}_4} > P_{\text{SO}_2} > P_{\text{H}_2}$  (4)  $P_{\text{CH}_4} > P_{\text{H}_2} > P_{\text{SO}_2}$
32. The  $\Delta G$  in the process of melting of ice at  $-15^\circ\text{C}$  would be  
 (1)  $\Delta G$  is -ve (2)  $\Delta G$  is +ve  
 (3)  $\Delta G = 0$  (4) All of these
33. On adding 0.5 L each of NaOH and HCl rise in temperature has found as  $4^\circ\text{C}$ , on adding 1 L of each rise in temperature must be  
 (1)  $8^\circ\text{C}$  (2)  $2^\circ\text{C}$   
 (3)  $3^\circ\text{C}$  (4)  $4^\circ\text{C}$
34. In a three litre vessel, 2 moles of  $\text{N}_2$  and 3 moles of  $\text{H}_2$  are taken. If at equilibrium  $x$  moles of  $\text{N}_2$  were obtained then the concentration of  $\text{NH}_3$  at equilibrium will be  
 (1)  $2 - x$  (2)  $4 - 2x$   
 (3)  $\frac{2x}{3}$  (4)  $\frac{4 - 2x}{3}$
35. The pH of  $10^{-3}$  M  $\text{Na}_2\text{SO}_4$  solution is  
 (1) 3 (2) 11  
 (3) 6 (4) 7
36. The mass of 90%  $\text{H}_2\text{SO}_4$  that would be required for neutralization of 60g g NaOH is  
 (1) 0.8167 g (2) 81.67 g  
 (3) 0.735 g (4) 73.5 g
37. 3 g of an oxide of a metal is converted to chloride completely and it yielded 5 g of metal chloride. The equivalent weight of metal is  
 (1) 33.25 (2) 3.325  
 (3) 12 (4) 20
38. The distance between 3rd and 2nd orbits in the hydrogen atom is  
 (1)  $2.116 \times 10^{-8}$  cm (2)  $2.646 \times 10^{-8}$  cm  
 (3)  $0.529 \times 10^{-8}$  cm (4)  $1.058 \times 10^{-8}$  cm
39. A particle 'A' moving with a certain velocity has a de Broglie wavelength of  $1 \text{ \AA}$ . If particle B has mass 25% of that of A and velocity 75% of that of A, then de Broglie wavelength of B will be approximately  
 (1)  $1 \text{ \AA}$  (2)  $5.3 \text{ \AA}$   
 (3)  $3 \text{ \AA}$  (4)  $0.2 \text{ \AA}$
40. The electronic configuration of some atoms are given  
 (A)  $1s^2 2s^2 2p^6 3s^2$  (B)  $1s^2 2s^2 2p^6 3s^1$   
 (C)  $1s^2 2s^2 2p^6 3s^2 3p^2$  (D)  $1s^2 2s^2 2p^6 3s^2 3p^3$   
 Which of these is expected to have the highest second ionisation potential?  
 (1) A (2) B  
 (3) C (4) D
41. Which of the following does not has nodal plane?  
 (1)  $\sigma^* 2s$  (2)  $\pi 2p_x$   
 (3)  $\sigma 2p_z$  (4)  $\pi^* 2p_y$

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42. Among the following, the molecule with highest dipole moment is
- (1)  $\text{CH}_3\text{Cl}$  (2)  $\text{CH}_2\text{Cl}_2$   
 (3)  $\text{CHCl}_3$  (4)  $\text{CCl}_4$
43. Which of the following is correct order of electronegativity of Xe in the given compounds?
- (1)  $\text{XeF}_6 < \text{XeF}_4 < \text{XeO}_2\text{F}_2 < \text{XeO}_3$   
 (2)  $\text{XeO}_3 < \text{XeO}_2\text{F}_2 < \text{XeF}_4 < \text{XeF}_6$   
 (3)  $\text{XeF}_4 < \text{XeO}_2\text{F}_2 < \text{XeO}_3 < \text{XeF}_6$   
 (4)  $\text{XeF}_4 < \text{XeF}_6 < \text{XeO}_2\text{F}_2 < \text{XeO}_3$
44. Which can be used for temporary bleaching?
- (1)  $\text{Cl}_2$  (2)  $\text{O}_3$   
 (3)  $\text{SO}_2$  (4)  $\text{H}_2\text{O}_2$
45. The name of the compound is
- 
- (1) (2Z, 4Z) -2, 4-hexadiene  
 (2) (2Z, 4E) -2, 4-hexadiene  
 (3) (2E, 4Z) -2, 4-hexadiene  
 (4) (2E, 4E) -2, 4-hexadiene
46. R-alanine is represented by
- (1)  $\begin{array}{c} \text{COOH} \\ | \\ \text{H} - \text{C} - \text{NH}_2 \\ | \\ \text{CH}_3 \end{array}$  (2)  $\begin{array}{c} \text{NH}_2 \\ | \\ \text{H}_3\text{C} - \text{C} - \text{H} \\ | \\ \text{COOH} \end{array}$
- (3)  $\begin{array}{c} \text{NH}_2 \\ | \\ \text{HOOC} - \text{C} - \text{CH}_3 \\ | \\ \text{H} \end{array}$  (4)  $\begin{array}{c} \text{COOH} \\ | \\ \text{CH}_3 - \text{C} - \text{NH}_2 \\ | \\ \text{H} \end{array}$
47. Which one of the following is most acidic in nature ?
- (1)  $\text{CH}_3\text{COOH}$   
 (2)  $\text{HOCH}_2\text{COOH}$   
 (3)  $\text{NC-CH}_2\text{COOH}$   
 (4)  $\text{NO}_2\text{-CH}_2\text{COOH}$
48. A fuel has the same knocking property as a mixture of 70% isooctane (2, 2, 4-trimethyl pentane) and 30% n-heptane by volume. The octane number of the fuel is
- (1) 100 (2) 70  
 (3) 30 (4) 40
49. The product of the following reaction
- $$\text{CH}_3 - \text{CH}_2 - \overset{\text{CH}_3}{\underset{|}{\text{C}}} = \text{CH}_2 \xrightarrow[\text{(ii) NaBH}_4/\text{OH}^-]{\text{(i) Hg(OAc)}_2 \cdot \text{H}_2\text{O}} \text{ is}$$
- (1)  $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{CH}_2 - \text{C} - \text{CH}_2 \\ | \quad | \\ \text{OH} \quad \text{HgOAc} \end{array}$
- (2)  $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{CH}_2 - \text{C} - \text{CH}_3 \\ | \\ \text{OH} \end{array}$
- (3)  $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{CH}_2 - \text{CH} - \text{CH}_2 \\ | \\ \text{OH} \end{array}$
- (4)  $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} - \text{CH}_2 - \text{OH} \\ | \\ \text{CH}_3 \end{array}$
50. Identify 'B'
- $$\text{C}_6\text{H}_5 - \text{CH} = \text{CH}_2 \xrightarrow{\text{Br}_2/\text{CCl}_4} [\text{A}]$$
- $$\xrightarrow[\text{(ii) CH}_3\text{-I}]{\text{(i) NaNH}_2\text{ (3.0 equivalent)}} [\text{B}]$$
- (1)  $\text{C}_6\text{H}_5 - \text{CH} = \text{CH}_2$   
 (2)  $\text{C}_6\text{H}_5 - \text{C} \equiv \text{CH}$   
 (3)  $\text{C}_6\text{H}_5 - \text{C} \equiv \text{C} - \text{CH}_3$   
 (4)  $\begin{array}{c} \text{C}_6\text{H}_5 - \text{C} = \text{CH} - \text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$

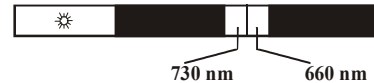
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**BIOLOGY**

51. Chickenpox is caused due to  
 (1) Varicella virus (2) Variola virus  
 (3) Rubella virus (4) Measles virus
52. A specialized prokaryotic cell with polar nodules  
 (1) Akinete (2) Heterocyst  
 (3) Hormocyst (4) Hormogonia
53. Rhizoids of *Riccia* are  
 (1) Unicellular, smooth  
 (2) Multicellular, smooth  
 (3) Unicellular, smooth or tuberculate  
 (4) Multicellular, smooth or tuberculate
54. The acceleration of ability to flower by low temperature treatment is called  
 (1) Chilling (2) Freezing  
 (3) Vernalization (4) Photoperiodism
55. When the root is swollen at the base due to storage of food and gradually tapers towards the tip, it is called as  
 (1) Fusiform (2) Napiform  
 (3) Conical (4) Tuberos
56. What is the eye of potato ?  
 (1) Apical bud  
 (2) Extra axillary bud  
 (3) Axillary bud  
 (4) Adventitious bud
57. Englemann (1882) observed that motile aerobic bacteria accumulated near areas of a filament of *Spirogyra* which were illuminated by red or blue light but they did not accumulate near a filament illuminated with green light. From this, he inferred that:  
 (1) Chlorophyll absorbs green light  
 (2) O<sub>2</sub> is released from CO<sub>2</sub> in the light reaction  
 (3) O<sub>2</sub> is released from H<sub>2</sub>O in the light reaction  
 (4) Red and blue light are more effective in photosynthesis
58. In C-4 plants, the bundle sheath cells:  
 (1) Have thin wall to facilitates gaseous exchange  
 (2) Have large intercellular spaces  
 (3) Are rich in PEP-carboxylase  
 (4) Have high density of chloroplasts
59. Which is physiologically inactive ?  
 (1) Sap wood (2) Heart wood  
 (3) Bark (4) All of these
60. The character that makes Papilionaceae distinct from Mimosaceae is  
 (1) Superior ovary  
 (2) Marginal placentation  
 (3) Cohesion of stamens  
 (4) Bacterial nodules in roots
61. Gray spots of oat are caused by deficiency of  
 (1) Cu (2) Zu  
 (3) Mn (4) Fe
62. Number of carbon atom in pyruvic acid is  
 (1) Two (2) Six  
 (3) Three (4) Five
63. Plants bend towards the light because  
 (1) They need light for photosynthesis  
 (2) They need light for respiration  
 (3) Light attracts them  
 (4) Cells on the shaded side elongated more
64. The instrument "Clinostat" is used to  
 (1) Demonstrate growth (2) Record growth  
 (3) Record movements (4) Neutralize gravity
65. The dry raisins swell up in water. This is due to:  
 (1) Endosmosis (2) Exosmosis  
 (3) Diffusion (4) Imbibition
66. Atrophy of the *zona glomerulosa* of adrenal cortex results in  
 (1) Addison's disease (2) Cushing's syndrome  
 (3) Gynaecomastia (4) Adrenal virilism
67. Which of the following activates the inactive Trypsinogen enzyme ?  
 (1) CCK (2) Secretin  
 (3) Chymotrypsin (4) None of the above
68. Which of the following is the true stomach in cattles?  
 (1) Rumen (2) Reticulum  
 (3) Omasum (4) Abomasum

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69. Which is the largest lymphoid organ of human body?  
 (1) Thymus (2) Spleen  
 (3) Tonsils (4) Peyer's patches
70. Which of the following is a typical mammalian feature of the bone ?  
 (1) Presence of Osteocytes  
 (2) Presence of Haversian system  
 (3) Presence of Periosteum  
 (4) Presence of Ossein protein
71. Identify the incorrect statement w.r.t. blood  
 (1) Normal blood glucose level in human blood = 80-100 mg/100 ml of blood after 12 hours of a normal meal  
 (2) Blood urea level = 18-38 mg/100 ml of blood plasma  
 (3) Monocytes and lymphocytes are granulocytes  
 (4) Lysozyme, immunoglobulins, properdin are defense compounds present in blood
72. Nissl's granules are modifications of :  
 (1) Golgi bodies (2) ER  
 (3) Vacuoles (4) Lysosomes
73. Surfactants present in our lung is made up of  
 (1) Cerebrosides (2) Gangliosides  
 (3) Glycolipids (4) Dipalmitoyl lecithin
74. The number of thin filaments around one thick filament in a skeletal muscle is  
 (1) One (2) Six  
 (3) Three (4) Four
75. Under following condition



- (1) SDP will flower but LDP will show vegetative growth  
 (2) LDP will flower but SDP will show vegetative growth  
 (3) Both SDP and LDP will show only vegetative growth  
 (4) Both SDP and LDP will flower



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**ANSWERS**

1. (4)	11. (1)	21. (3)	31. (1)	41. (3)	51. (1)	61. (3)	71. (3)
2. (2)	12. (4)	22. (2)	32. (2)	42. (1)	52. (2)	62. (3)	72. (2)
3. (3)	13. (4)	23. (4)	33. (4)	43. (1)	53. (3)	63. (4)	73. (4)
4. (4)	14. (3)	24. (2)	34. (4)	44. (3)	54. (3)	64. (4)	74. (2)
5. (2)	15. (2)	25. (3)	35. (4)	45. (4)	55. (3)	65. (4)	75. (2)
6. (4)	16. (4)	26. (3)	36. (2)	46. (1)	56. (3)	66. (1)	
7. (1)	17. (3)	27. (3)	37. (1)	47. (4)	57. (4)	67. (4)	
8. (3)	18. (2)	28. (1)	38. (2)	48. (2)	58. (4)	68. (4)	
9. (1)	19. (2)	29. (3)	39. (2)	49. (2)	59. (2)	69. (2)	
10. (4)	20. (2)	30. (3)	40. (2)	50. (3)	60. (3)	70. (2)	