POTENTIAL
IIT-JEE I AIPMT I AIIMS I NTSE
EDUCATING THE FUTURE DOCTORS & ENGINEERS

AITS-PT # 01 [CODE-A]
TARGET : AIPMT - 2016–17

Date : 23-10-2016

Duration : 3 hours
Max Marks : 720

Read the instruction carefully

IMPORTANT INSTRUCTIONS

1. Immediately fill the particulars on this page of the Test Booklet with Blue/Black Point Pen. Use of Pencil is strictly prohibited.
2. When you are directed, fill in the particulars of the Answer Sheet carefully.
3. The test is 3 hours duration.
4. The Test Booklet consists of **180** questions. The maximum marks are **720**.
5. There are three parts in the question paper **Biology** having **90** questions and **Physics** and **Chemistry** having **45** questions each.
6. For each question, you will be awarded **4** marks if you darken all the bubble(s) correspondind to the correct answer(s) and **zero** mark if no bubbles are darkened. In all other cases, **1 (one)** marks will be deducted.
7. There is only one correct response for each question. Filling up more than one response in any question will be treated as wrong response and marks for wrong response will be decucted accordingly as per instructions 6 above.

Filling the ORS:
   Use only Black ball point pen only for filling the ORS. Do not use Gel/Ink pen as it might smudge the ORS.

8. Write your Roll no. in the books given. Also darken the corresponding bubbles with Black ball point pen only. Also fill your roll no in the space provided.
9. **Fill your Paper Code as mentioned on the Test Paper.**
10. If student does not fill his/her roll no. and paper code correctly and properly, then his/her marks will not be displayed and 5 marks will be deducted (paper wise) from the total.
11. Since it is not possible to erase and correct pen filled bubble, you are advised to be extremely careful while darkening the bubble corresponding to your answer.
12. Neither try to erase/rub/scratch the option nor make the Cross(X) mark on the option once filled. Do not scribble, smudge, cut, tear, or wrinkle the ORS. Do not put any stray marks or whitener anywhere on the ORS.
13. If there is any discrepancy between the written data and the bubbled data in your ORS the bubbled data will be taken as final.

Name of the candidate

Roll Number

I have read all the instructions and shall abide by them

....
Signature of the candidate

I have verified all the information filled in by the candidate

....
Signature of the Invigilator

1. A vector perpendicular to $\hat{i} + \hat{j} + \hat{k}$ is

   (A) $\hat{i} - \hat{j} + \hat{k}$ (B) $\hat{i} - \hat{j} - \hat{k}$

   (C) $-\hat{i} - \hat{j} - \hat{k}$ (D) $3\hat{i} + 2\hat{j} - 5\hat{k}$

2. Out of the following set of forces, the resultant of which cannot be zero?
   (A) 10, 10, 10   (B) 10, 10, 20
   (C) 10, 20, 20   (D) 10, 20, 40

3. The ratio of maximum and minimum magnitudes of the resultant of two vectors $\vec{a}$ and $\vec{b}$ is 3:1.

   Now, $|\vec{a}|$ is equal to

   (A) $|\vec{b}|$ (B) $2|\vec{b}|$

   (C) $3|\vec{b}|$ (D) $4|\vec{b}|$

4. Two forces, each equal to F, act as shown in figure. Their resultant is
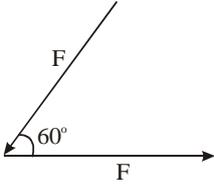
   (A) F/2   (B) F

   (C) $\sqrt{3}F$ (D) $\sqrt{5}F$

5. A student when discussing the properties of a medium (except vacuum) writes.
   Velocity of light in vacuum = Velocity of light in medium
   This formula is

   (A) Dimensionally correct
   (B) Dimensionally incorrect
   (C) Numerically incorrect
   (D) Both (A) and (C)

6. Suppose refractive index μ is given as

   $$\mu = A + \frac{B}{\lambda^2}$$

   where A and B are constants and λ is wavelength, then dimensions of B are same as that of

   (A) Wavelength   (B) Volume
   (C) Pressure   (D) Area

7. A physical quantity x is calculated from $x = ab^2 / \sqrt{c}$. Calculate the percentage error in measuring x when the percentage errors in measuring a, b, and c are 4%, 2%, and 3%, respectively.
   (A) 7%   (B) 9%
   (C) 11%   (D) 9.5%

8. The numerical value of the ratio of average velocity to average speed is
   (A) Always less than 1
   (B) Always equal to 1
   (C) Always more than 1
   (D) Equal to or less than 1

*Space for rough work*   Page. 2

9. The displacement x of a particle moving in one dimension under the action of a constant force is related to time t by the equation $t = \sqrt{x} + 3$, where x is in meters and t is in seconds. Find the displacement of the particle when its velocity is zero.

   (A) Zero   (B) 12 m

   (C) 6 m   (D) 18 m

10. A stone is dropped from the 25th storey of a multistoried building and it reaches the ground in 5s. In the first second, it passes through how many storeys of the building? ($g = 10$ ms^{-2})

    (A) 1   (B) 2

    (C) 3   (D) none of these

11. The variation of velocity of a particle moving along a straight line is shown in figure. The distance travelled by the particle in 12 s is
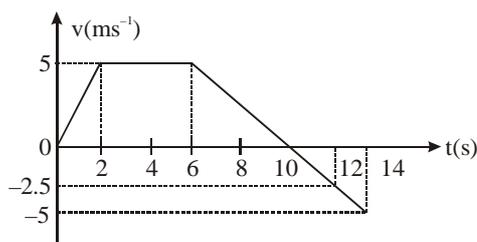
    (A) 37.5 m   (B) 32.5 m

    (C) 35.0 m   (D) None of these

12. Two bullets are fired horizontally with different velocity from the same height. Which will reach the ground first?

    (A) Slower one

    (B) Faster one

    (C) Both will reach simultaneously

    (D) Cannot be predicted

13. Three balls of same masses are projected with equal speeds at angle 15°, 45°, 75°, and their ranges are respectively R_1, R_2 and R_3, then

    (A) $R_1 > R_2 > R_3$ (B) $R_1 < R_2 < R_3$

    (C) $R_1 = R_2 = R_3$ (D) $R_1 = R_3 < R_2$

14. A body is projected horizontally with a velocity of 4 m/s from the top of a high tower. The velocity of the body after 0.7 s is nearly (take $g = 10$ m/s^2)

    (A) 10 m/s   (B) 8 m/s

    (C) 19.2 m/s   (D) 11 m/s

15. When a stone is projected which remains constant?

    (A) Angular momentum

    (B) Linear momentum

    (C) Vertical component of velocity

    (D) Horizontal component of velocity

16. An object is resting at the bottom of two strings which are inclined at an angle of 120° with each other. Each string can withstand a tension of 20 N. The maximum weight of the object that can be sustained without breaking the strings is

    (A) 10 N   (B) 20 N

    (C) $20\sqrt{2}$ N   (D) 40 N

17. A mass is hanging on a spring balance which is kept in a lift. The lift ascends with increasing speed. The spring balance will show in its reading
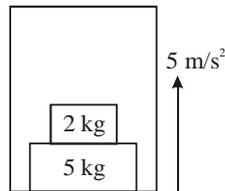
(A) increase

(B) decrease

(C) no change

(D) change will depend upon velocity

18. Three blocks of masses m_1, m_2 and m_3 are connected by, massless strings as shown on a frictionless table. They are pulled with a force $T_3 = 40\,N$. If $m_1 = 10\,kg$, $m_2 = 6\,kg$ and $m_3 = 4\,kg$, the tension T_2 will be
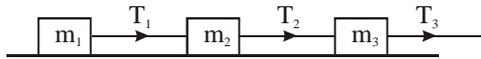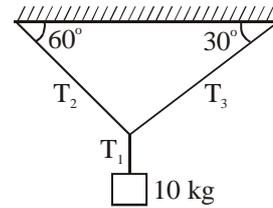

(A) 20 N   (B) 40 N

(C) 10 N   (D) 32 N

19. Find the force exerted by 5 kg block on floor of lift, as shown in figure. (Take $g = 10\,m/s^2$)
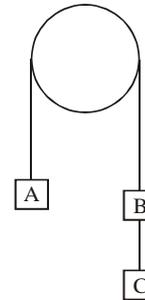

(A) 100 N   (B) 115 N

(C) 105 N   (D) 135 N

**20.** A block of mass 10 kg is suspended by three strings as shown in the figure. The tension T_2 is

(A) 100 N   (B) $\dfrac{100}{\sqrt{3}}\,N$

(C) $\sqrt{3} \times 100\,N$ (D) $50\sqrt{3}\,N$

21. Three equal weights A, B and C of mass 2 kg each are hanging on a string passing over a fixed pulley which is frictionless as shown in figure. The tension in the string connecting weight B and C is?


(A) zero   (B) 13 N

(C) 3.3 N   (D) 19.6 N

22. If the acceleration of block A is $5\,m/s^2$, then, acceleration of block B is
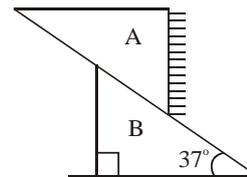
(A) 5 m/s^2 (B) 10 m/s^2

(C) zero   (D) 6.67 m/s^2

23. Two particle of mass m each, are tied at the ends of a light string of length 2a.

    The whole system is kept on a frictionless horizontal surface with the string held tight so that each mass is at distance a from the centre P as shown in the figure. Now, the mid-point of the string is pulled vertically upwards with a small, but constant force F. As a result, the particles move towards each other on the surface. The magnitude of acceleration when separation between them becomes 2x, is
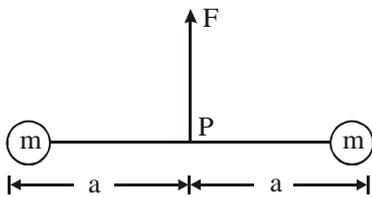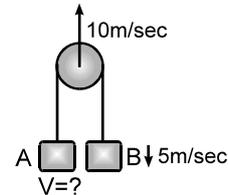

(A) $\dfrac{F}{2m}\dfrac{a}{\sqrt{a^2-x^2}}$ (B) $\dfrac{F}{2m}\dfrac{x}{\sqrt{a^2-x^2}}$

(C) $\dfrac{F}{2m}\dfrac{x}{a}$ (D) $\dfrac{F}{2m}\dfrac{\sqrt{a^2-x^2}}{x}$

24. Find $\vec{a}_B = ?$

(A) 2 m/s^2 ↓   (B) $\dfrac{1}{2}$ m/s^2 ↑

(C) $\dfrac{1}{2}$ m/s^2 ↓   (D) 1 m/s^2 ↓

25. The pulley moves up with a velocity of 10 m/sec. Two blocks are tied by a string which passes over a pulley. The velocity V will be. [Given : $v_B = 5$ m/s ↓]

(A V = 10 m/s   (B) V = 25 m/s

(C) V = 15 m/s   (D) V = 20 m/s

26. If the critical angle for the medium of a prism is C and the angle of prism is A, then there will be no emergent ray when :

(A) A < 2C   (B) A = 2C

(C) A > 2C   (D) A ≤ 2C

27. A certain prism is that to produce minimum deviation of 38°. It produces a deviation of 44° when the angle of incidence is either 42° or 62°. What is refractive index of material of prism?

(A) 1.51   (B) 1.33

(C) 1.62   (D) 1.732

28. If acceleration potential increases from 20 kV to 80 kV in an electron microscope, its resolving power R would change to :

(A) $\dfrac{R}{4}$ (B) 4R

(C) 2R

(D) $\dfrac{R}{2}$

29. A long-sighted person has a least-distance of distinct vision of 50 cm. He wants to reduce it to 25 cm. He should use a :

(A) concave lens of focal length 50 cm

(B) convex lens of focal length 25 cm

(C) convex lens of focal length 50 cm

(D) concave lens of focal length 25 cm.

30. In the displacement method, a convex lens is placed in between an object and a screen. If the magnification in the two positions are m_1 and m_2 and the displacement of the lens between two positions is x, then the focal length of the lens is :

(A) $\dfrac{x}{m_1 + m_2}$

(B) $\dfrac{x}{m_1 - m_2}$

(C) $\dfrac{x}{\left(m_1 + m_2\right)^2}$

(D) $\dfrac{x}{\left(m_1 - m_2\right)^2}$

31. Two plane mirrors are inclined to each other such that a ray of light incident on the first mirror and parallel to the second is reflected from the second mirror parallel to the first mirror. The angle between the two mirrors is :

(A) 30°

(B) 45°

(C) 60°

(D) 75°

32. A ray of light is incident on a surface of glass slab at an angle 45°. If the lateral shift produced per unit thickness is $\dfrac{1}{\sqrt{3}}$ m , the angle of refraction produced is :

(A) $\tan^{-1}\left(\dfrac{\sqrt{3}}{2}\right)$

(B) $\tan^{-1}\left(1 - \sqrt{\dfrac{2}{3}}\right)$

(C) $\sin^{-1}\left(1 - \sqrt{\dfrac{2}{3}}\right)$

(D) $\tan^{-1}\left(\sqrt{\dfrac{2}{\sqrt{3} - 1}}\right)$

33. The refracting angle of a prism is A and the refractive index is cot(A/2). The angle of minimum deviation is :

(A) 180° – 2A

(B) 180° – A

(C) 180° – 3A

(D) 180° – 4A

34. If $\hat{i}$ denotes a unit vector along incident light ray, $\hat{r}$ a unit vector along refracted ray a medium of refractive index μ and $\hat{n}$ unit vector normal to boundary of medium directed towards incident medium, then law of refraction is

(A) $\hat{i}.\hat{n} = \mu\left(\hat{r}.\hat{n}\right)$

(B) $\hat{i}\times\hat{n} = \mu\left(\hat{n}\times\hat{r}\right)$

(C) $\hat{i}\times\hat{n} = \mu\left(\hat{r}\times\hat{n}\right)$

(D) $\mu\left(\hat{r}\times\hat{n}\right) = \hat{r}\times\hat{n}$

35. Maximum lateral displacement of a ray of light incident on a slab of thickness t is

(A) $\dfrac{t}{2}$

(B) $\dfrac{t}{3}$

(C) $\dfrac{t}{4}$

(D) t

Space for rough work

36. Figure shows a mixture of blue, greeen and red coloured rays incident normally on a right angled prism. The critical angles of the material of the prism for red, green and blue are 46°, 44° and 43° respectively. The arrangement will separate
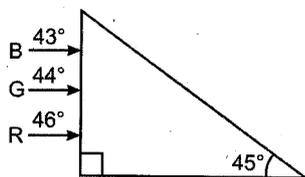
    (A) Green colour from red and blue

    (B) All the three colours

    (C) Red colour from blue and green

    (D) Blue colour from red and green.

37. The image formed by an objective of a compound microscope is :

    (A) virtual and diminished

    (B) real and diminished

    (C) real and enlarged

    (D) virtual and enlarged

38. An object is placed in front of a convex mirror of focal length f. Find the maximum and minimum distance of an object from the mirror such that the image formed is real magnified

    (A) 2f and ∞   (B) f and 2f

    (C) f and 0   (D) None of these

39. Two plane mirrors M_1 and M_2 parallel to each other and spaced 20 cm apart. An object O is placed between them at a distance 5 cm from the mirror as shown in the figure.
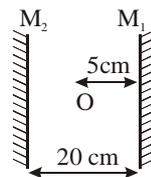
    The distance of first three images from the mirror. M_2 is :

    (A) 15 cm, 35 cm, 45 cm.

    (B) 15 cm, 25 cm, 55 cm.

    (C) 15 cm, 45 cm, 55 cm.

    (D) 15 cm, 20 cm, 35 cm.

40. A point object is placed at a distance of 20 cm from a thin plano-convex lens of focal length 15 cm, if the plane surface is silvered. The image will form at
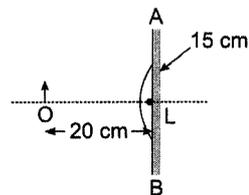
    (A) 60 cm left of AB   (B) 30 cm left of AB

    (C) 12 cm left of AB   (D) 60 cm right of AB

41. When the object is at distances u_1 and u_2 from a lens, a real image and virtual image are formed respectively having the same magnification. The focal length of the lens is :

    (A) $u_1 + \dfrac{u_2}{2}$ (B) $\dfrac{u_1 - u_2}{2}$

    (C) $\dfrac{u_1 + u_2}{2}$ (D) $u_1 + u_2$

Space for rough work

42. Two beams of red and violet colours are made to pass separately through a prism (angle of the prism is 60°). In the position of minimum deviation, the angle of refraction will be

(A) 30° for both the colours

(B) Greater for the violet colour

(C) Greater for the red colour

(D) Equal but not 30° for both the colours.

43. The focal length of a concave mirror is f and the distance from the object to the principle focus is x. The ratio of the size of the image to the size of the object is :

(A) $\dfrac{f + x}{f}$

(B) $\dfrac{f}{x}$

(C) $\sqrt{\dfrac{f}{x}}$

(D) $\dfrac{f^2}{x^2}$

44. The principal section of a glass prism is an isosceles triangle PQR with PQ = PR. The face PR is silvered. A ray incident normally on face PQ after two reflections, emerges from the base QR in a direction perpendicular to it. What is the ∠QPR of the prism?

(A) 36°   (B) 46°

(C) 60°   (D) 72°

45. A point object is placed at a distance of 30 cm from a convex mirror of focal length 30 cm. The image will form at

(A) Infinity

(B) focus

(C) Pole

(D) 15 cm behind the mirror

46. Which set contain no ionic species ?

(A) NH_4Cl, OF_2, H_2S (B) CO_2, CCl_4, Cl_2

(C) BF_3, AlF_3, TlF_3 (D) I_2, CaO, CH_3Cl

47. Which of the following options represent the change in the bond angle in given reaction?

$$BF_3 \longrightarrow BF_4^-$$

(A) $120°$ (B) $109°28'$

(C) $10°72'$ (D) $60°$

48. I_3^+ and I_3^- have same :

(A) geometry   (B) no. of lone pair(s)

(C) bond angle   (D) none of these

49. In which of the following molecule/ion their is a coordinate type π-bond is present ?

(A) CO (B) NH_4^+

(C) BF_4^- (D) All of these

50. Stability of the species Li_2, Li_2^- and Li_2^+ increases in the order of :

(A) $Li_2 < Li_2^- < Li_2^+$ (B) $Li_2^- < Li_2 < Li_2^+$

(C) $Li_2 < Li_2^+ < Li_2^-$ (D) $Li_2^- < Li_2^+ < Li_2$

51. Number of hybrid orbital of Xe which contain lone pair is/are maximum in which of the following molecule ?

(A) XeF_4 (B) XeO_3

(C) XeF_6 (D) XeF_2

52. State of hybridisation of sulphure, carbon-1 and carbon-2 in $F_3S \underset{(1)}{C} \underset{(2)}{C} F_3$ respectively are :

(A) sp^3, sp^3, sp^3 (B) sp^3, sp^2, sp^3

(C) sp^3d, sp, sp^3 (D) sp^3, sp, sp^3

53. The d-orbitals which are not involved in hybridisation of central atom in ICl_4^- :

(A) $d_{z^2}, d_{x^2-y^2}$ (B) $d_{x^2-y^2}, d_{xy}, d_{yz}, d_{zx}$

(C) $d_{z^2}, d_{xy}, d_{yz}, d_{xz}$ (D) d_{xy}, d_{xz}, d_{yz}

54. Which of the following alphabet have a five membered chain as a longest chain ?

A, E, F, H, I, K, M, T, V, W, X, Y, Z

(A) A, E, H   (B) E, M, W

(C) K, M, X   (D) F, W, Z

55. The structure shown

$$\underset{\underset{CH_2CH_3}{|}}{CH_3CH_2CHCH}CH_2CH_2\underset{\underset{CH_2CH_3}{|}}{\overset{\overset{CH_3}{|}}{CH}}CH_3$$

(A) $1°$, $2°$ and $3°$ carbon atoms

(B) $1°$ and $2°$ carbon atoms only

(C) $1°$ and $3°$ carbon atoms only

(D) $2°$ and $3°$ carbon atoms only

**56.** Which of the following name will be incorrect?
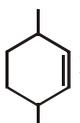
(A) 3, 6-Dimethyl cyclohexene
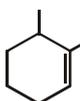
(B) 1, 6-Dimethyl cyclohexene
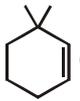
(C) 6, 6-Dimethyl cyclohexene

(D) 1, 5-Dimethyl cyclohexene

57. Correct IUPAC name of the given compounds is :
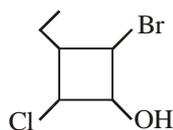
(A) 2-bromo-3-ethyl-4-chlorocyclobutanol

(B) 4-bromo-1-chloro-3-ethylcyclobutanol

(C) 2-bromo-4-chloro-3-ethyl cyclohydroxybutane

(D) 2-bromo-4-chloro-3-ethylcyclobutanol

58. The correct IUPAC name of compound :

$CH_3-CH_2-\underset{\underset{O}{||}}{C}-\underset{\underset{CN}{|}}{CH}-CHO$ is :
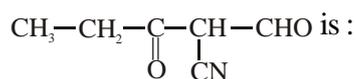
(A) 2-Cyano-3-oxopentanal

(B) 2-Formyl-3-oxopentanenitrile

(C) 2-Cyano-1, 3-pentanedione

(D) 1, 3-Dioxo-2-cyanopentane

59. What is the IUPAC name of the following compound ?
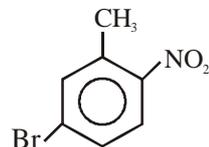
(A) o-nitro-m-bromotoluene

(B) 3-bromo-6-nitrotoluene

(C) m-bromo-o-nitrotoluene

(D) 5-bromo-2-nitrotoluene

60. Write the IUPAC name of the following compound :
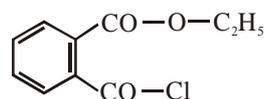
(A) ethyl-2-(chlorocarbony) benzoate

(B) ethyl-2-(chlorocarbonyl) hexanoate

(C) 2-(ethoxycarbonyl) benzoyl chloride

(D) none of these

61. Which of the following is heterocyclic compound?

(A)   (B)
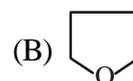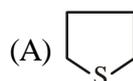
(C)   (D) All of these

62. The general formula $C_nH_{2n}O_2$ could be for open chain

(A) Dialdehydes

(B) Diketones

(C) Carboxylic acids

(D) Diols
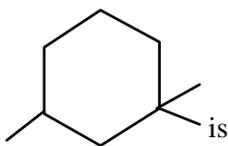
63. The IUPAC name of **HO**⟨structure⟩ is

(A) 3, 3-Dimethyl-1-hydroxyl cyclohexane

(B) 1, 1-Dimethyl-3-hydroxyl cyclohexane

(C) 3, 3-Dimethyl-1-cyclohexanol

(D) 1, 1-Dimethyl-3-cyclohexanol

65. The correct decreasing order of priority for the functional of organic compounds in the IUPAC system of nomenclature is

(A) $-CONH_2$, $-CHO$, $-SO_3H$, $-COOH$

(B) $-COOH$, $-SO_3H$, $-CONH_2$, $-CHO$

(C) $-SO_3H$, $-COOH$, $-CONH_2$, $-CHO$

(D) $-CHO$, $-COOH$, $-SO_3H$, $-CONH_2$

65. The hybridization of phosphorus in $POCl_3$ is the same as in

(A) P in PCl_3 (B) S in SF_4

(C) Cl in ClF_3 (D) B in BCl_3

66. Which of the following has largest bond angle ?

(A) H_2O_2 (B) F_2O

(C) Cl_2O (D) H_2O

67. The ONO bond angle is maximum in

(A) NO_3^- (B) NO_2^-

(C) NO (D) NO_2^+

68. Calculate number of electrons present in 9.5 g of PO_4^{3-}

(A) 6 (B) 5 N_A

(C) 0.1 N_A (D) 4.7 N_A

69. 3.011×10^{22} atoms of an element weight 1.15 gm. The atomic mass of the the element is

(A) 10 (B) 2.3

(C) 35.5 (D) 23

70. One atom of an element x weigh 6.643×10^{-23} g. Number of moles of atom is 20 kg is

(A) 4 (B) 40

(C) 100 (D) 500

71. Which of the following contains the largest mass of hydrogen atoms ?

(A) 5.0 moles $C_2H_2O_4$

(B) 1.1 moles $C_3H_8O_3$

(C) 1.5 moles $C_6H_8O_6$

(D) 4.0 moles $C_2H_4O_2$

72. Rearrange the following (I to IV) in the order of increasing masses

(I) 0.5 mole of O_3

(II) 0.5 gm atom of oxygen

(III) 3.011×10^{23} molecules of O_2

(IV) 5.6 litre of CO_2 at STP

Space for rough work

(A) II < IV < III < I

(B) II < I < IV < III

(C) IV < II < III < I

(D) I < II < III < IV

73. Caffiene has a molecular weight of 194. If it contains 28.9% by mass of nitrogen, number of atoms of nitrogen in one molecule of caffeine is

(A) 4   (B) 6

(C) 2   (D) 3

74. The vapour density of a mixture containing NO_2 and N_2O_4 is 27.6. The mole fraction of N_2O_4 in the mixture is

(A) 0.1   (B) 0.2

(C) 0.5   (D) 0.8

75. In an organic compound of molar mass 108 gm mol^{-1} C, H and N atoms are present in 9 : 1 : 3.5 by weight. Molecular formula can be

(A) $C_6H_8N_2$ (B) $C_7H_{10}N$

(C) $C_5H_6N_3$ (D) $C_4H_{18}N_3$

76. An element A is tetravalent and another element B is divalent. The formula of the compound formed from these elements will be

(A) A_2B (B) AB

(C) AB_2 (D) A_2B_3

77. Suppose two elements X and Y combine to form two compounds XY_2 and X_2Y_3 when 0.05 mole of XY_2 weight 5g while 3.011×10^{23} molecules of X_2Y_3 weight 85g. The atomic masses of X and Y are respectively

(A) 20, 30   (B) 30, 40

(C) 40, 30   (D) 80, 60

78. 44 g of a sample on complete combustion gives 88 gm CO_2 and 36 gm of H_2O. The molecular formula of the compound may be

(A) C_4H_6 (B) C_2H_6O

(C) C_2H_4O (D) C_3H_6O

79. Which statement is false for the balanced equation given below ?

$$CS_2 + 3O_2 \longrightarrow 2SO_2 + CO_2$$

(A) One mole of CS_2 will produce one mole of CO_2

(B) The reaction 16 g of oxygen produces 7.33 g of CO_2

(C) The reaction of one mole of O_2 will produce 2/3 mole of SO_2

(D) Six molecules of oxygen requires three molecules of CS_2

80. 50 mL of 20.8% (w/V) $BaCl_2$ (aq) and 100 mL of 9.8% (w/V) H_2SO_4 (aq) solutions are mixed. Molarity of Cl^- ions in the resulting solution is (At. wt. of Ba = 137)

(A) 0.333 M   (B) 0.666 M

(C) 0.1 M   (D) 1.33 M

81. Calculate the weight of lime (CaO) obtained by heating 200 kg of 95% pure lime stone (CaO_3)

    (A) 104.4 kg   (B) 105.4 kg

    (C) 212.8 kg   (D) 106.6 kg

82. Two oxides of a metal contain 27.6% and 30% of oxygen respectively. If the formula of the 1st oxide is M_3O_4, the formula of the 2nd oxide is

    (A) MO   (B) M_2O_3

    (C) MO_2 (D) M_3O_2

83. Given the abundance of isotopes ^{54}Fe, ^{56}Fe and ^{57}Fe are 5%, 90% and 5% respectively. The atomic mass of Fe is

    (A) 55.85   (B) 55.95

    (C) 55.75   (D) 56.05

84. Ratio of masses of oxygen and nitrogen in a particular gaseous mixture is 1 : 4. The ratio of number of their molecules is

    (A) 7 : 32   (B) 1 : 8

    (C) 3 : 16   (D) 1 : 4

85. 6.02×10^{20} molecules of urea are present in 100 mL of its solution. The concentration of urea solution is

    (A) 0.001 M   (B) 0.1 M

    (C) 0.02 M   (D) 0.01 M

86. A compound H_2X with molecular weight 80 g is dissolved in a solvent having density 0.4 g mL^{-1}. Assuming no change in volume upon dissolution, the molality of a 3.2 molar solution is

87. The density of a 3.60 M sulphuric acid solution that is 29% H_2SO_4 (molar mass = 98 g mol^{-1}) by mass, will be

    (A) 1.45   (B) 1.65

    (C) 1.88   (D) 1.22

88. What is the molality of the aqueous solution of urea if the mole fraction of urea is 0.1 ?

    (A) $\dfrac{1000}{9 \times 18}$ (B) $\dfrac{9 \times 1000}{18}$

    (C) $\dfrac{18 \times 1000}{9}$ (D) $\dfrac{3 \times 18}{1000}$

89. 29.2% (w/w) HCl stock solution has a density of 1.25 g mL^{-1}. The molecular weight of HCl is 36.5 g mol^{-1}. The volume (mL) of stock solution required to prepare a 200 mL solution of 0.4 M HCl is

    (A) 2   (B) 4

    (C) 6   (D) 8

90. Two solutions of a substance (non-electrolyte) are mixed in the following manner : 480 mL of 1.5 M first solution + 520 mL of 1.2 M second solution. What is the molarity of the final mixture ?

    (A) 1.20 M   (B) 1.50 M

    (C) 1.344 M   (D) 2.70 M

(Top of second column:)

(A) 4   (B) 6

(C) 8   (D) 10

91. CAM helps the plants in

(A) Secondary growth

(B) Disease resistance

(C) Reproduction

(D) Conserving water

92. In C_4-plants the bundle sheath cells

(A) Have thin walls to facilitate gaseous exchange

(B) Have large intercellular spaces

(C) Are rich in **PEP** carboxylase

(D) Have a high density of chloroplants

93. Example of water soluble plant pigment is

(A) Chlorophyll-*a*   (B) Chlorophyll-*b*

(C) Anthocyanin   (D) Xanthophyll

94. Which of the following statement is true with regard to the light reaction of photosynthesis ?

(A) In PS-II the reaction centre chlorophyII-*a* has an absorption peak at 700 nm hence, is called P_{700}

(B) In PS-I the reaction centre chlorophyII-*a* has an absorption maxima at 680 nm and is called P_{680}

(C) The splitting of water molecule is associated with PS-I

(D) Photosystems-I and II are involved in Z scheme

95. In which cells of leaf, pyruvate is converted to PEP in C_4 pathway ?

(A) Epidermal cells

(B) Mesophyll cells

(C) Bundle sheath cells

(D) Guard cells

96. PGA as the first carbon oxide fixation product was discovered in photosynthesis of

(A) Bryophyte   (B) Gymnosperm

(C) Angiosperm   (D) Alga

97. Which of the following statements regarding C_4- plants is false ?

(A) The primary CO_2 acceptor is a 5-carbon molecule

(B) The initial carboxylation reaction occurs in mesophyll

(C) The leaves that fix CO_2 have two cell types

(D) The mesophyll cells lack Rubisco enzyme

98. Oxygenic photosynthesis occurs in

(A) *Chromatium*   (B) *Oscillatoria*

(C) *Rhodospirillum*   (D) *Chlorobium*

99. Which of the following elements is an activator for both ribulose biophosphate carboxylase oxygenase and phosphoenol pyruvate carboxylase in photosynthetic carbon fixation ?

(A) Mg^{2+} (B) Zn^{2+}

(C) Ca^{2+} (D) SO_4^{2-}

100. In higher plants, the shape of the chloroplast is
    (A) Discoid   (B) Cup-shaped
    (C) Girdle-shaped   (D) Reticulate

101. The 1st product of CO_2 fixation in Hatch and Stack's pathway in plants is
    (A) Formation of oxalo acetate by carboxylation of phosphoenol pyruvate (PEP) in bundle sheath cells
    (B) Formation of oxalo acetate by the carboxylation of phosphoenol pyruvate (PEP) in mesophyll cells
    (C) Formation of phosphoglyceric $\overline{a}$ in the mesophyll cells
    (D) Formation of phosphoglyceric $\overline{a}$ in the bundle sheath cell

102. The enzyme responsible for primary carboxylation in C_3-plants is
    (A) Hexokinase
    (B) Succinic dehydrogenase
    (C) Pyruvate carboxylase
    (D) RuBP carboxylase oxygenase

103. The mineral involved in the photolysis of water are
    I   Manganese   II   Calcium
    III Magnesium   IV   Chloride
    (A) I and II only   (B) I, II and IV only
    (C) I, II and III only (D) III and IV only

104. The components of PS-I are located on the
    (A) Stroma   (B) Stroma thylakoid
    (C) Granum thylakoid

    (D) Outer surface of stromal and granal thylakoid

105. Which of the following is the formula of chlorophyll-*a* ?
    (A) $C_{55}H_{70}O_2N_4Mg$ (B) $C_{55}H_{72}O_5N_4Mg$
    (C) $C_{55}H_{70}O_5N_4Mg$ (D) $C_{55}H_{72}O_2N_4Mg$

106. In grana of chloroplast, the reaction $ADP + P_i = ATP$ during day shows
    (A) Oxidative phosphorylation
    (B) Photophosphorylation
    (C) Substrate level phosphorylation
    (D) Dephosphorylation

107. Photosynthesis cannot continue for long if during light reaction, only cyclic photophosphorylation takes place. This is because
    (A) Only ATP is formed, $NADPH^+ + H^+$ is not formed
    (B) Photosystem-I stops getting excited at a wavelength of light beyond 680 nm
    (C) There is unidirectional cyclic movement of the electrons
    (D) There is no evolution of oxygen

108. Which one of the following is not true about the light reactions of photosynthesis ?
    (A) Light energy provides energy for the photolysis of water through excitation of the reaction centre of PS II
    (B) The flow of electrons from water to NADP in non cyclic electron transport produces ATP

(C) P680 and P700 are the reaction centres of PS I and PS II respectively

(D) NADPH is not produced in cyclic electron transport in light reaction

109. Consider the following statements.

I. The portion of the spectrum between 300-500 nm is also referred to as Photosynthetically Active Radiation (PAR).

II. Magnesium, calcium and chloride ions play prominent roles in the photolysis of water

III. In cyclic photophosphorylation, oxygen is not released (as there is not photolysis of water) and NADPH is also not produced.

(A) I is true; but II and III are false

(B) I and II are false ; but III is true

(C) II is true; but I and III are false

(D) I and II are true; but III is false

110. DCMU

(A) Inhibits PS-I

(B) Inhibits PS-II

(C) Destroy chloroplast

(D) Inhibits oxidative phosphorylation

111.
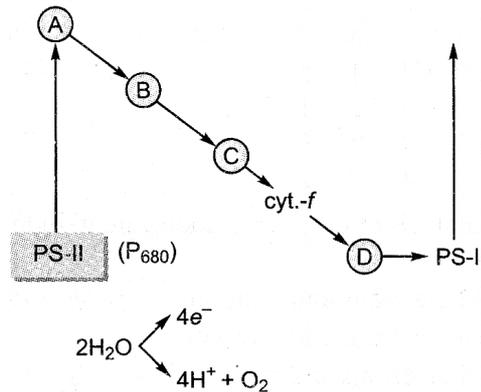
In the above schematic diagram, which is plastocyanin ?

(A) C   (B) D

(C) A   (D) B

112. Photolysis of each water molecule in light reaction will yield

(A) 2 electrons and 4 protons

(B) 4 electrons and 4 protons

(C) 4 electrons and 3 protons

(D) 2 electrons and 2 protons

113. In chloroplasts, chlorophyll is present in the

(A) Outer membrane (B) Inner membrane

(C) Thylakoids   (D) Stroma

114. Plants adapted to low light intensity have

(A) Larger photosynthetic unit size than the sun plants

(B) Higher rate of carbon dioxide fixation than the sun plants

(C) More extended root system

(D) Leaves modified to spines

115. The first step in dark reaction of photosynthesis is

(A) Formation of ATP

(B) Ionization of water

(C) Attachment of carbon dioxide to a pentose sugar

(D) Excitement of electron of chlorophyll by a photon of light

116. In photorespiration, what is the role of peroxisome ?

(A) Hepls in oxidation of glycolate

(B) Helps in oxygenation of glycolate

(C) Helps in synthesis of PGA

(D) Helps in reduction of glyoxylate

117. Maximum CO_2 fixation is done by

(A) Green plants   (B) Phytoplanktons

(C) Zooplanktons   (D) Bacteria

118. Basic features of kranz anatomy of C_4 plant is presence of

(A) Chloroplast in bundle sheath cell

(B) Chloroplast in mesophyll and epidermal cell

(C) Typical granal chloroplast in bundle sheath cells and rudimentary chloroplast in mesophyll cells

(D) Rudimentary chloroplasts in bundle sheath cells and typical granal chloroplast in mesophyll cell

119. The synthesis of one molecule of glucose during Calvin cycle requires

(A) 12 molecules of ATP and 18 molecules of $NADPH_2$

(B) 6 molecules of ATP and 12 molecules of $NADPH_2$

(C) 18 molecules of ATP and 12 molecules of $NADPH_2$

(D) 12 molecules each of ATP and $NADPH_2$

120. Study the following column and choose the correct option.

Column I	Column II
A. Oxygen evolving complex	1. Potassium ferric oxalate
B. Proton gradient	2. High oxygen concentration
C. Hill reagent	3. ATP synthesis
D. Photorespiration	4. Pheophytin
	5. Photolysis of water

	A	B	C	D
(A)	5	3	1	2
(B)	1	2	4	5
(C)	5	1	4	2
(D)	3	4	5	1

121. Compensation point refers to

(A) Little photosynthesis

(B) Beginning of photosynthesis

(C) Rate of photosynthesis equals to the rate of respiration

(D) None of the above

122. In the given chart of photophosphorylation. What does 'A' represent ?
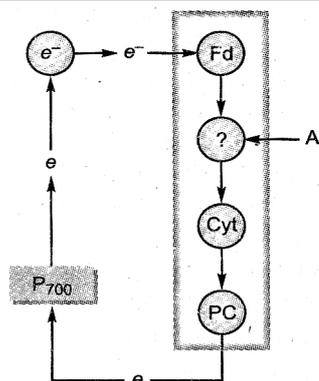
(A) PC   (B) FRS

(C) PQ   (D) Cyt - a_3

123. A student sets up an experiment on photosynthesis as follow : He takes soda water in a glass tumbler and add chlorophyll extracts into the contents and keeps the tumbler exposed sunlight hoping that he has provided necessary ingredient for photosynthesis to proceed (*viz* CO_2, H_2O, chlorophyll and light)

(A) Photosynthesis will take place and glucose will produced

(B) Photosynthesis will take place and starch will be produced which will turn the mixture turbid

(C) Photosynthesis will not take place because CO_2 dissolved in soda water escapes into the atmosphere

(D) Photosynthesis will not take place because intact chloroplasts are needed for the process.

124. Photophosphorylation differs from oxidative phosphorylation in requiring input of energy in the form of

(A) Light   (B) Heat

(C) AMP   (D) NAD

125. The mechanism of ATP formation both in chloroplast and mitochondria is explained by

(A) Relay pump theory of Godlewski

(B) Cholodny-Went's model

(C) Chemiosmotic theory

(D) Munch's mass-flow hypothesis

126. **Assertion :** Cyclic pathway of photosynthesis first appeard in some eubacterial species.

Reason : Oxygen started accumulating in the atmosphere after the non cyclic pathway of photosynthesis evolved.

(A) Both assertion and reason are correct and reason is the correct explanation of assertion

(B) Both assertion and reason are true but reason is not correct explanation of assertion

(C) Assertion is true but reason is false

(D) Both assertion and reason are false

127. Who proved that source of oxygen during photosynthesis is water ?

(A) Van Niel   (B) Robin Hill

(C) Arnon   (D) Emerson

128. Quantasomes occur on the surface of

(A) Cristae

(B) Plasmalemma

(C) Nuclear envelope

(D) Thylakoids

129. As compared to a C_3-plant, how many additonal molecules of ATP are needed for net production of one molecule of hexose sugar by C_4- plants ?

(A) 2   (B) 6

(C) 0   (D) 12

130. How many molecules of glycine is required to release one CO_2 molecule in photorespiration ?

(A) One   (B) Two

(C) Three   (D) Four

131. Number of carboxylation occurs in Calvin cycle is

(A) Zero   (B) One

(C) Two   (D) Three

132. Bacterial photosynthesis involves

(A) Both PS-I and PS-II

(B) Either PS-I or PS-II

(C) PS-I only

(D) PS-II only

133. Grana is ill developed or absent in the chloroplast of

(A) Stem of *Hydrila*

(B) Leaf of sunflower

(C) Bundle sheath of sugarcane leaf

(D) Mesophyll of Grasses.

134. The C_4-plants are different from the C_3-plants with reference to the

(A) Types of pigments involved in photosynthesis

(B) The number of NADPH that are consumed in preparing sugar

(C) Types of end product of photosynthesis

(D) The substance that accepts carbon dioxide in carbon assimilation and first stable product.

135. Which of the following is used during discovery of Calvin cycle ?

(A) *Spirogyra*   (B) *Volvox*

(C) *Chlamydomonas*   (D) *Chlorella*

136. The most common carbohydrate monomer is

(A) maltose   (B) lactose

(C) glucose   (D) galactose

137. Reducing sugars have

(A) free aldehyde

(B) bound aldehyde

(C) free aldehyde or ketone

(D) bound ketone

138. Levulose present in honey is

(A) disaccharide   (B) glucose

(C) fructose   (D) pentose

139. Raffinose is a

(A) monosaccharide (B) disaccharide

(C) trisaccharide   (D) tetrasaccharide

140. Which one is an essential fatty acid ?

(A) Linoleic acid   (B) Linolenic acid

(C) Arachidonic acid (D) All of these

141. In contact with water, phospholipids produce

(A) monolayer   (B) bilayer

(C) trilayer   (D) emulsion

142. Bees wax consist of

(A) mericyl palmitate

(B) mericyl stearate

(C) cetyl palmitate

(D) cetyl stearate

143. Number of semi-indispensable amino acids is

(A) 4   (B) 3

(C) 2   (D) 1

144. A functional but non-protein amino acid is

(A) ornithine

(B) citrulline

(C) diamino pimellic acid

(D) All of these

145. Number of pyrimidines found in nucleotides is

(A) 3   (B) 2

(C) 1   (D) Numerous

146. Phosphate bonds present in ATP are

(A) 1   (B) 2

(C) 3   (D) 4

147. A mucopolysaccharide is

(A) slime, phycocolloid and pectin

(B) mucin, callose and heparin

(C) hemicellulose, pectin and mucin

(D) hyaluronic acid, chondroitin sulphate and mucin

148. Iodine gives colour

(A) purple with amylose

(B) bluish with amylopectin

(C) bluish with black amylose and purple with amylopectin

(D) red with amylose and blue with amylopectin

149. A polysaccharide employed in tissue culture is

(A) cellulose   (B) starch

(C) glycogen   (D) agar-agar

150. Haemoglobin is

(A) monomeric protein

(B) oligomeric protein

(C) chromoprotein

(D) Both (B) and (C)

151. Most abudant proteins in the human body is

(A) haemoglobin   (B) keratin

(C) collagen   (D) immunoglobulin

152. The milk sugar is known as

(A) lactose   (B) sucrose

(C) galactose   (D) raffinose

153. An antifertility steroid is

(A) cortisol   (B) progesterol

(C) diosgenin   (D) oestrogen

154. The correct statement about peptide bond

(A) It is a C – C bond

(B) It is planar

(C) It is found in fatty acids

(D) It has rotational freedom

Space for rough work

155. Cerebrosides are

(A) simple lipids

(B) lipids, which joined with galactose

(C) lipids with phosphates

(D) steroids

156. The protein present in the matrix of connective tissue is

(A) collagen   (B) albumin

(C) protamines   (D) globulin

157. Two fatty acid monomers are joined by

(A) ester bond

(B) peptic bond

(C) phosphodiester bond

(D) hydrogen bond

158. *Dahlia* tubers store a polymer of fructose called

(A) glycogen   (B) mucin

(C) inulin   (D) agar

159. Choose the correct statement

(A) All amino acids are synthesized in the body

(B) Some amino acids are synthesized in the body

(C) No amino acid is synthesized in the body

(D) Variety of amino acid does not depend upon side chain

160. Hyaluronic acid is present in

(A) amniotic fluid

(B) plasma

(C) vitreous humour of eye

(D) cerebrospinal fluid

161. Choose the correct statement

(A) All known α-amino acids possess an asymmetric C-atom

(B) Certain antibiotics contain some amino acids in D-isomer form

(C) If an amino acid has more than one asymmetric C-atoms, all of its isomers shall be biologically active

(D) None of the above

162. Which one of the following glycosidic is found in maltose ?

(A) β-1, 4   (B) α-4, 1

(C) β-4, 1   (D) α-1, 4

163. The unsaturated hydrocarbons are made saturated by the process of

(A) hydrogenation   (B) dehydrogenation

(C) hybridization   (D) polymerization

164. Lipids are

(A) water soluble

(B) water insoluble

(C) lightly soluble in water

(D) none of these

165. One strand of DNA has sequence of nucleotide 3′ ATTCGCTAT 5′ then other strand of DNA has

(A) 3′ TAAGCGATA 5′

(B) 3′ TAGCACGTA 5′

Space for rough work

(C) 5′ TAGCACGTA 3′

(D) 5′ TAAGCGATA 3′

166. Choose the type of enzyme involved in the following reaction

$$S - G + S' \rightarrow S + S' - G$$
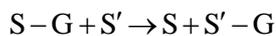
(A) dehydrogenase   (B) transferase

(C) hydrolase   (D) lyase

167. Given below is the chemical formula of

$$CH_3(CH_2)_{14} - \overset{\overset{O}{\|}}{C} - OH$$
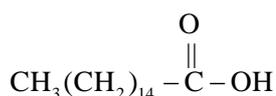
(A) palmitic acid   (B) stearic acid

(C) glycerol   (D) galactose

168. What is the function of some enzymes in a seed during germination ?

(A) To breakdown insoluble food into soluble substances

(B) To increase the rate of photosynthesis

(C) To increase water absorption

(D) To make starch for storage

169. The activity of an enzyme declines

(A) above the optimum temperature

(B) below the optimum temperature

(C) Both (A) and (B)

(D) below the minimum and above the maximum temperature

170. Cyanide kills an organism by inhibiting

(A) hexokinase

(B) cytochrome oxidase

(C) succinate dehydrogenase

(D) histidine decarboxylase

171. Ribosome is RNA

(A) without sugar

(B) without phosphate

(C) having enzyme activity

(D) with extra phosphate

172. In feedback inhibition, a metabolic pathway is switched off by

(A) competitive inhibition

(B) denaturation

(C) accumulation of end product

(D) allosteric inhibition

173. Glutamate pyruvate transaminase enzyme is an example of

(A) oxidoreductases (B) transferases

(C) lyases   (D) ligases

174. Which of the following statements correctly describes allosteric enzymes ?

(A) They are not usually controlled by feedback inhibition

(B) The regulatory site may be catalytic site
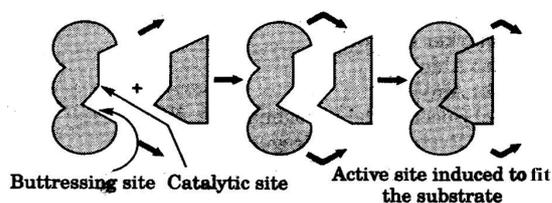
(C) Michaelis-Menten kinetics describe their activity

(D) Effectors may enahnce or inhibit substrate binding

175. An example of isoenzyme is

(A) α-amylase   (B) succhine dehydrogenase

(C) carboxypeptidase (D) All of these

Space for rough work

176. Which model of an enzyme action is seen in the given figure ?

Buttressing site Catalytic site   Active site induced to fit the substrate

(A) Lock and key model

(B) Enzyme-substrate complex model

(C) Both (A) and (B)

(D) Induced fit model

177. Which one of the following statements regarding enzyme inhibition is correct ?

(A) Competitive inhibition is seen, when a substrate competes with an enzyme for binding to an inhibitot protein

(B) Competitive inhibition is seen, when the substrate and the inhibitor compete for the active site on the enzyme

(C) Non-competitive inhibition of an enzyme can be overcome by adding large amount of substrate

(D) Non-competive inhibitors often bind to the enzyme irreversibly

178. Expand ELISA

(A) Enzyme Linked Immunosorbent Assay

(B) Enzyme Linked Ion Sorbent Assay

(C) Enzyme Linked Inductive Assay

(D) None of the above

179. Which enzyme joins DNA fragments ?

(A) DNA ligase   (B) DNA polymerase

(C) DNA gyrase   (D) Topoisomerase

180. An example of feedback inhibition is

(A) cyanide action on cytochrome

(B) sulpha drug on folic acid synthesizer bacteria

(C) allosteric inhibition of hexokinase by glucose 6-phosphate

(D) reaction between succinic dehydrogenase and succinate