CLASS – X (PCM)
SAMPLE PAPER
Concept Scholarship cum Admission Test

Time Limit: 1hr.   Maximum Marks: 180

INSTRUCTION:
- Paper consists of Physics, Chemistry and Maths containing 45 questions.
- Each question has FOUR options. ONLY ONE of these four options is the correct answer.
- For each question, choose the option corresponding to the correct answer in OMR sheet.
- Answer to each question will be evaluated according to the following marking scheme:
  - Full marks: +4 for every correct answer.
  - Zero marks: 0 if none of the options is chosen. (i.e., the answer is unanswered)
  - Negative marks: -1 for every incorrect answer.
- Don't write anything on the question paper except on the rough space given.
- Use only black or blue ballpoint pen.

1. If $\frac{3+2\sqrt{3}}{3-\sqrt{3}} = a + \sqrt{3}b$, then find the value of $\sqrt{a+b}$, where a and b are rational numbers, is

   a. 5
   b. 8
   c. 2
   d. 16

2. If α & β are the zeroes of a polynomial $3t^2 - 6t + 4$, find the value of
$\frac{\alpha}{\beta} + \frac{\beta}{\alpha} + 2(\frac{1}{\alpha} + \frac{1}{\beta}) + 3\alpha\beta$

   a. 5
   b. 8
   c. 10/3
   d. ½

3. If α & β are the roots of the quadratic equation $4x^2 - 20x = p^2$, what is the difference between α & β ?

a) $\sqrt{25 + p^2}$

b) $\sqrt{25 - p^2}$

c) $5 + p$

d) $5 - p$

4. Which of the following options is incorrect?
   a) The number of terms in the A.P. 3, 6, 9, 12, ..., 111 is 37.
   b) If the first three numbers of an A. P. are $x - 1, \; x + 1 \; and \; 2x + 3$, then the value of $x = 0$
   c) The sum of first 'n' natural number is $\left[\frac{n(n+1)}{2}\right]^2$.
   d) None of these.

5. Which of the following options is incorrect?
   a) If the points are collinear, then the area of the triangle formed by the points is zero.
   b) If the vertices of ΔABC are $(x, y), \; (x_1, 0) \; and \; (0, y_1), \; such \; that \; \frac{x}{x_1} + \frac{y}{y_1} = 1$, then the three points are collinear.
   c) The distance between the points $\left(6 \cos 45^0, \; 0\right) \& \left(0, \; 6 \sin 45^0\right) is \; 1$.
   d) The coordinates of the centroid of triangle formed by the points $(x, y), \; (0, y_1) \& (x_1, \; 0) \; is \left(\frac{x+x_1}{3}, \; \frac{y+y_1}{3}\right)$.

6. If α & β are complementary angles and $18 \sin^2\alpha - 12 \sin\alpha = -2, \; then \; \sin\beta \; is$

a) $\frac{2\sqrt{2}}{3}$

b) $\frac{\sqrt{14}}{4}$

c) $\frac{5\sqrt{2}}{6}$

d) $\frac{2\sqrt{10}}{7}$

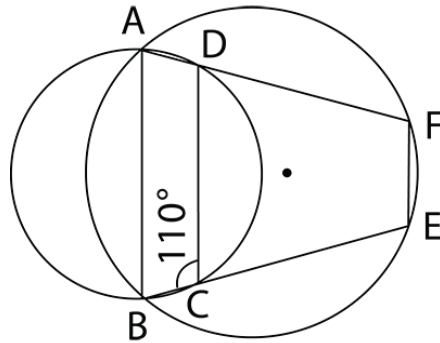7. If the diameter of the sphere is decreased by 25 %, then by what percent the curved surface area will be decreased?

a) $33\frac{3}{4}$ %

b) 75 %

c) 25 %

d) $43\frac{3}{4}$ %

8. The value of $\sqrt{6 + 2\sqrt{3} + 2\sqrt{2} + 2\sqrt{6}} - \dfrac{1}{\sqrt{5-2\sqrt{6}}}$ is

    a) 2
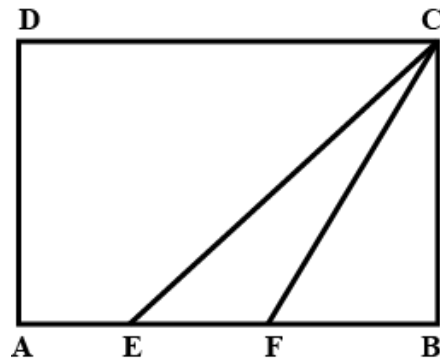
    b) -1

    c) $\sqrt{3} + \sqrt{2}$

    d) 1

9. In the given figure ABCD and ABEF are two cyclic quadrilaterals.
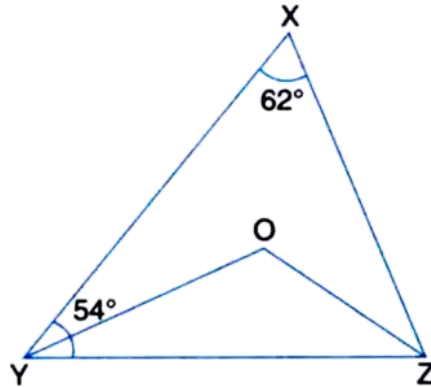
   If $\angle BCD = 110^{0}$, then $\angle BEF =$

    a) 55^{0}

    b) 70^{0}

    c) 90^{0}

    d) 110^{0}

10. In the figure ABCD is a rectangle with AE = EF = FB, the ratio of the areas of triangle CEF and that of rectangle ABCD is

    a) 1 : 6

    b) 1 : 8

    c) 1 : 9

    d) 1 : 10

11. In the given figure, $\angle X = 62^0$, $\angle XYZ = 54^0$. If YO and ZO are bisectors of $\angle XYZ$ and $\angle XZY$, find $\angle OZY$ and $\angle YOZ$.

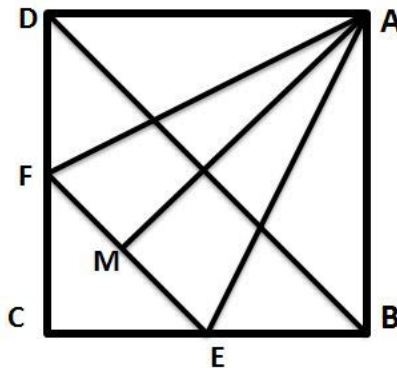a) 27^0, 121^0

b) 64^0, 32^0

c) 64^0, 121^0

d) 29.5^0, 121^0

12. In a triangle, if $\angle A = 2\angle B = 6\angle B$, then find the value of $\frac{\angle A + 2\angle B}{3\angle C}$.

a) 4^0

b) 3^0

c) 6^0

d) 8^0

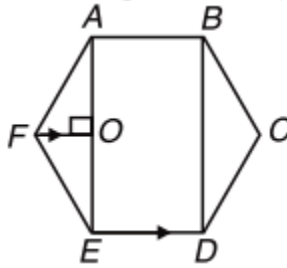13. In the given figure ABCD is a square and EF is parallel to diagonal BD and EM=FM, then which of the following is correct?
i) DF=BE   ii) AM bisects $\angle$BAD

a) Only (i)

b) Only (ii)

c) Both (i) & (ii)

d) Neither (i) nor (ii)

14. In the given figure, ABCDEF is a regular hexagon and $\angle AOF = 90^0$. FO is parallel to ED. What is the ratio of the area of triangle AOF to that of the hexagon ABCDEF?

a) $\frac{1}{12}$

b) $\frac{1}{6}$

c) $\frac{1}{24}$

d) $\frac{1}{8}$

15. If the area of the three adjacent faces of a cuboid are x, y & z respectively, then the volume of the cuboid is

a) $\sqrt{xyz}$

b) $x + y + z$

c) x^2yz

d) $xy + z$

16. A small ball is dropped from a balloon moving vertically up at a speed 10 m/s when the balloon is at a height 15 m from the ground. Neglect air friction and take $g = 10m/s^2$. Which of the following is not suitable to the present situation?
   a) The ball reaches the ground
   b) The ball covers a distance of 25 m.
   c) The magnitude of average velocity of the ball is 8.33 m/s.
   d) The ball moves up at a speed 10 m/s at an instant when it is dropped from the balloon.

17. Pick the fundamental law of motion.
   a) Newton's first law of motion.
   b) Newton's second law of motion.
   c) Newton's third law of motion.
   d) All laws of motion.

18. The Unit of $\frac{G}{g}$ is

   a) $kg\, m^{-1}$

   b) $kg\, m^{-2}$

   c) $m^2 kg^{-1}$

   d) $m\, kg^{-1}$

19. A planet of volume V and mass m has gravitational acceleration g on its surface. If it expands to 8 times its original volume, what will be the acceleration due to gravity?

   a) 4 g

   b) 2 g

   c) g/4

   d) g/8

20. A body weighs x g in air, y g in liquid and z g in water. The ratio of relative density of liquid and the body is

   a) x - y : x

   b) x - y : z

   c) y - z : x

   d) z - y : y

21. A ball is projected vertically upwards with an initial velocity. Which of the following graphs best represents the K.E. of the ball as a function of time from the instant of projection till it reaches the point of projection?

   a)

   b)

   c)

   d)
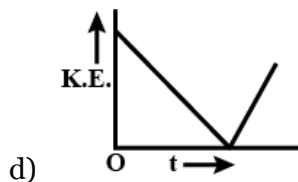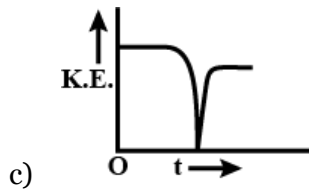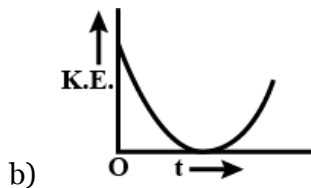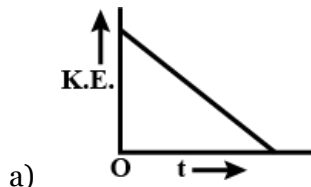
22. Which of the following is carried by waves from one place to another?
    a) Mass
    b) Velocity
    c) Wavelength
    d) Energy

23. At what distance from a concave mirror of focal length 10 cm must an object be placed in order that an image double its size may be obtained?
    a) Either 5 cm or 15 cm
    b) At 10 cm
    c) 5 cm
    d) 15 cm only

24. Two electric bulbs, one of 200 volt - 40 watt and the other of 200 volt - 100 watt are connected in a house wiring circuit
    a) They have equal currents through them
    b) The resistance of the filaments of both the bulb is the same
    c) The resistance of the filament of 40 W bulb is more than that of 100 Watt bulb
    d) The resistance of the 100 W bulb is more than the 40-watt bulb

25. A 1000 W heating unit is designed to operate from a 200 V line. By what percentage will its heat output drop if the line voltage drops by 40 V?
    a) 26 %
    b) 36 %
    c) 40 %
    d) 44 %

26. 1 horsepower is equal to
    a) 700 W
    b) 726 W
    c) 736 W
    d) 746 W

27. Who invented the electric generator?
    a) Oersted
    b) Coulomb
    c) Rutherford
    d) Michael Faraday

28. The direction of magnetic field around a straight conductor carrying current can be determined by
    a) Fleming's left hand rule
    b) Lenz's law
    c) Right hand thumb rule
    d) Fleming's right hand rule

29. Which of the following can produce a virtual image?
   a) Plane mirror
   b) Concave mirror
   c) Convex mirror
   d) All of these

30. How will the image formed by a convex lens be affected if the upper half of the lens is wrapped with a black paper?
   a) The size of the image is reduced to one-half.
   b) The upper half of the image will be absent.
   c) The brightness of the image is reduced.
   d) There will be no effect.

31. A metal M has its Chloride formula MCl3 and the equivalent weight of metal is 9. Atomic weight of element is
   a) 9
   b) 18
   c) 27
   d) 3

32. The atomic number of an element X is 12. What is the formula of its azide?
   a) X_2N_3
   b) $X(N_3)_2$
   c) X_3N_2
   d) XN_3

33. When the same amount of zinc is treated separately with excess of dil. H2SO4 and excess of NaOH, what is the ratio of volumes of H2 evolved?
   a) 1: 1
   b) 1: 2
   c) 2: 1
   d) 9: 4

34. Which of the following statements about isotopes of an element is not correct?
   a) Isotopes have the same proton number.
   b) Isotopes have the same chemical properties.
   c) Isotopes have the same nucleon number.
   d) Atoms of the isotopes of the element have the same number of electrons.

35. What is the ratio of the number of neutrons present in potassium atoms and magnesium atoms with mass numbers 39 and 24?
   a) 19: 12
   b) 5: 3
   c) 5: 6
   d) 4: 3

36. Consider the following statements:
A. Atoms of an element may have more or less neutrons or electrons than other atoms of the same element.
B. β-Particles are fast moving electrons carrying negative charge.
Which of these statement(s) is/are correct?
   a) A only
   b) B only
   c) Both A and B
   d) Neither A nor B

37. Which of the following is the correct reactivity series of the following metals.
   a) Zn > Al > Fe > K
   b) K > Al > Zn > Fe
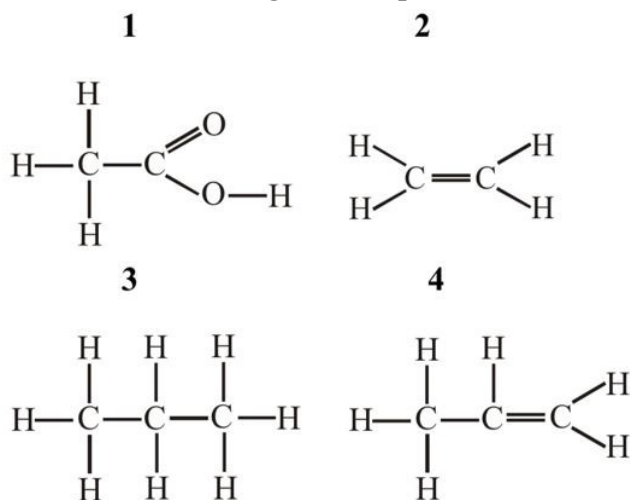   c) K > Zn > Al < Fe
   d) K > Zn > Fe > Al

38. Which of the following gasses is called 'marsh gas'
   a) Hydrogen
   b) Methane
   c) Ethene
   d) Ethyne

39. Which of the following can be used to distinguish between ethane and ethene?
   a) A lighted splinter
   b) Aqueous bromine
   c) Litmus solution
   d) Lime water

40. The structures of four organic compounds are shown below.

Which compounds decolourise bromine water?
   a) 1 and 2 only
   b) 1, 2 and 4 only
   c) 2 and 4 only
   d) 3 and 4 only

41. Which of the following is not a representative element?
   a) Fe
   b) K
   c) Ba
   d) N

42. Which of the following statements are correct?
A. Methane belongs to the homologous series of alkanes
B. Vanaspati ghee is obtained by the hydrogenation of vegetable oil
C. Covalent compounds have generally low melting and boiling points than ionic compounds
D. Methane undergoes substitution reaction
   a) A and B
   b) A and C
   c) A, B and C
   d) All of these

43. For which of the following sulfides autoreduction is not applicable
   a) CuS
   b) PbS
   c) HgS
   d) MnS

44. How much chlorine is present in bleaching powder?
   a) 32%
   b) 36%
   c) 35%
   d) 38%

45. X is formed by the partial replacement of hydroxyl groups of a diacidic base by an acidic radical. The number of ionizable hydroxyl groups in X is
   a) 0
   b) 1
   c) 2
   d) 3