MET 2020 Question Paper with Solutions

Time Allowed :3 Hours	Maximum Marks :800	Total Questions :200

General Instructions

Read the following instructions very carefully and strictly follow them:

1. The paper is divided into four sections: Physics(50), Chemistry(50), Mathematics(70), and English & General Aptitude(30).
2. All questions are multiple-choice questions with four options.
3. Each question carries equal marks.
4. Answers must be marked on the OMR sheet provided.
5. Use of unfair means or electronic devices is prohibited.

PART I - PHYSICS

1. A body of mass m rises to a height $h = \frac{R}{5}$ from the earth's surface, where R is the earth's radius. If g is acceleration due to gravity at the earth's surface, then the increase in potential energy is:
(A) mgh
(B) $\frac{4}{5}mgh$
(C) $\frac{5}{6}mgh$
(D) $\frac{6}{7}mgh$

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2. The energy required to break the covalent bond in a semiconductor is:
(A) always 1 eV
(B) equal to the forbidden energy gap of semiconductor
(C) equal to Fermi energy
(D) much less than Fermi energy

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3. When a glass prism of refracting angle $60°$ is immersed in a liquid its angle of minimum deviation is $30°$. The critical angle of glass with respect to the liquid medium is:
(A) $45°$
(B) $42°$
(C) $50°$
(D) $52°$

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4. Faraday constant:
(A) depends on the amount of the electrolyte
(B) depends on the current in the electrolyte
(C) is a universal constant
(D) depends on the amount of charge passed through the electrolyte

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5. A comb is run through wet hair on a rainy day, then:
(A) it will attract large number of small bits of paper
(B) it will not go through the hair
(C) it will not attract small bits of paper
(D) None of the above

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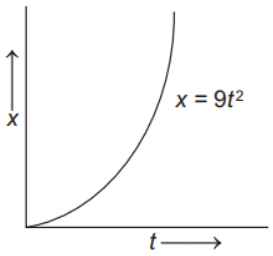
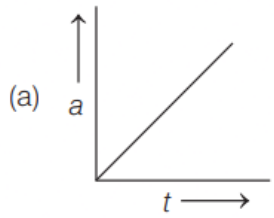
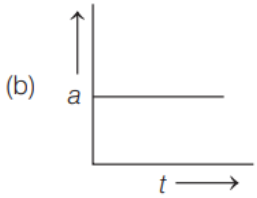
6. The displacement-time graph of a particle moving along a straight line is shown in the figure. The acceleration-time graph of this particle is:



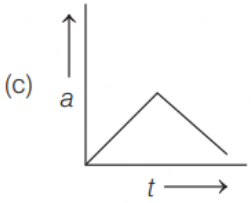
(A) Increasing linearly with time



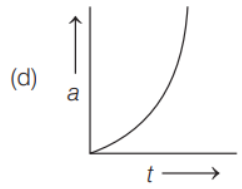
(B) Constant acceleration



(C) First increases then decreases



(D) Increasing non-linearly with time



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7. The maximum kinetic energy of photoelectrons coming out of a metal surface is $10\,\text{eV}$. The minimum voltage required to stop the emission of electrons from this metal surface is:
(A) $10\,V$
(B) $5\,V$
(C) $-5\,V$
(D) $-10\,V$

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8. Thermal radiation exist in which part of electromagnetic spectrum?
(A) Ultraviolet
(B) Infrared
(C) Visible
(D) Violet

---

9. A rod of length L is composed of two equal parts: half wood (mass m_w) and half brass (mass m_b). The moment of inertia about an axis through its centre and perpendicular to the rod is:
(A) $\frac{(m_w+m_b)L^2}{6}$
(B) $\frac{(m_w+m_b)L^2}{2}$
(C) $\frac{(m_w+m_b)L^2}{12}$
(D) $\frac{(m_w+m_b)L^2}{3}$

---

10. A particle, doing simple harmonic motion, at a distance $3\,cm$ from mean position has acceleration $12\,cm/s^2$. What is its time period?
(A) $0.5\,s$
(B) $1\,s$
(C) $2\,s$
(D) $3.14\,s$

---

11. A step up transformer has turn ratio $10 : 1$. A cell of emf $2\,V$ is fed to the primary, then the secondary voltage developed is:
(A) $20\,V$
(B) $10\,V$
(C) $2\,V$
(D) zero

---

12. A man at a distance $11\,km$ from two pillars wants to see them separately. What will be the approximate distance between the pillars?
(A) $3\,m$
(B) $1\,m$
(C) $0.25\,m$
(D) $0.5\,m$

---

13. Dimensions of Stefan's constant is:
(A) $[ML^{-1}T^{-3}\theta^{-4}]$
(B) $[MT^{-3}\theta^{-4}]$
(C) $[M^2T^{-3}\theta^{-4}]$
(D) $[M^2T^{-2}\theta^{-4}]$

---

14. Time period of oscillation of mass m suspended from a spring is T. What is the time period when the spring is cut in half and the same mass is suspended from one of the halves?
(A) $\frac{T}{2}$
(B) $\frac{T}{\sqrt{2}}$
(C) $\sqrt{2}T$
(D) $2T$

---

15. An electric current of $2\,A$ passes through a wire of resistance $25\,\Omega$. How much heat will be generated in $1\,min$?
(A) $6 \times 10^3\,J$
(B) $3.6 \times 10^3\,J$
(C) $0.6 \times 10^3\,J$
(D) $0.36 \times 10^3\,J$

---

16. A mass m hanging from a spring is doing simple harmonic motion with frequency f. If the mass is increased by 4 times, then frequency will be:
(A) $2f$
(B) $\frac{f}{2}$

(C) $4f$
(D) $\frac{f}{4}$

---

17. Internal energy of a gas remains unchanged in:
I. an isothermal process
II. an adiabatic process
III. a reversible process
IV. a cyclic process
(A) I and IV
(B) I, III and IV
(C) III and IV
(D) II and III

---

18. An electric charge in uniform motion produces:
(A) only electric field
(B) only magnetic field
(C) Both electric and magnetic field
(D) Neither electric nor magnetic field

---

19. If λ is the incident wavelength and λ_0 is the threshold wavelength for a metal surface, photoelectric effect takes place only if:
(A) $\lambda \leq \lambda_0$
(B) $\lambda \geq \lambda_0$
(C) $\lambda \geq 2\lambda_0$
(D) None of these

---

20. The mass number of an atom is 15 and its atomic number is 7. Now, this atom absorbs an α-particle and emits a proton. What will be the mass number of changed atom?
(A) 16
(B) 18
(C) 17
(D) 15

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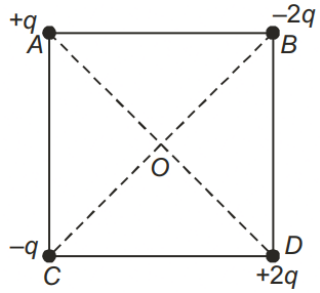
21. What is the direction of the electric field at the centre O of the square in the figure shown below? Given that, $q = 10\,\text{nC}$ and the side of the square is $5\,\text{cm}$.



(A) at 45° to OA upward
(B) at 135° to OA towards BD
(C) no direction, because $E = 0$
(D) None of the above

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22. Which equation is valid for adiabatic process?
(A) $TV^{\gamma-1} = \text{constant}$
(B) $pV^{\gamma} = \text{constant}$
(C) $T^{\gamma}V^{\gamma-1} = \text{constant}$
(D) $\frac{p^{1-\gamma}}{T^{\gamma}} = \text{constant}$

---

23. Which of the following relation is correct? (v_{rms}: root mean square velocity, $\bar{v}$: mean velocity and v_{mp}: most probable velocity)
(A) $v_{\text{rms}} > \bar{v} < v_{\text{mp}}$
(B) $v_{\text{rms}} < \bar{v} > v_{\text{mp}}$
(C) $v_{\text{rms}} > \bar{v} > v_{\text{mp}}$
(D) None of these

---

24. The effect of reverse bias in a junction diode on its potential barrier is:
(A) increases
(B) decreases
(C) remains same
(D) None of these

---

25. During an experiment, an ideal gas is found to obey an additional law $Vp^2 =$ constant. The gas is initially at temperature T and volume V. The temperature of the gas when it expands to a volume $2V$ is:
(A) $2T$
(B) $4T$
(C) $6T$
(D) $5T$

---

26. In which of the following process, convection does not take place primarily?
(A) Sea and land breeze
(B) Boiling of water
(C) Warming of glass bulb due to filament
(D) Heating air around furnace

---

27. The horizontal component of earth's magnetic field at a place is $0.4 \times 10^{-4}\,T$. If the angle of dip is $45°$, the value of total intensity is:
(A) $0.5 \times 10^{-4}\,T$
(B) $0.4 \times 10^{-4}\,T$
(C) $0.5 \times 10^{-6}\,T$
(D) $0.4 \times 10^{-6}\,T$

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28. If an observer moves towards a stationary source, then the apparent frequency is given by:
(A) $f' = f_0\left(\frac{v+v_o}{v}\right)$
(B) $f' = f_0\left(\frac{v-v_o}{v}\right)$
(C) $f' = f_0\left(\frac{v}{v+v_o}\right)$
(D) $f' = f_0\left(\frac{v}{v-v_o}\right)$

---

29. Two coils have mutual inductance of $1.5\,H$. If current in primary coil is suddenly raised to $5\,A$ in one millisecond, the induced emf in the secondary coil is:
(A) $75\,V$
(B) $750\,V$
(C) $7500\,V$
(D) $75000\,V$

---

30. The formula for magnetic field of a certain component is given by

$$B = \frac{\mu_0 N i}{2\pi r}$$

where, N = total number of turns, i = current, r = radius. The component is:
(A) ring
(B) solenoid
(C) toroid
(D) None of these

---

31. A convex lens of focal length $0.12\,m$ produces an image which is three times the size of the object. The distance between the object and the lens for a real image is:

(A) $0.16\,m$
(B) $-0.16\,m$
(C) $1.6\,m$
(D) $-1.6\,m$

---

32. An object is moving in a circle at constant speed v. The magnitude of the rate of change of momentum of the object is:
(A) zero
(B) proportional to v^2
(C) proportional to v^3
(D) proportional to v

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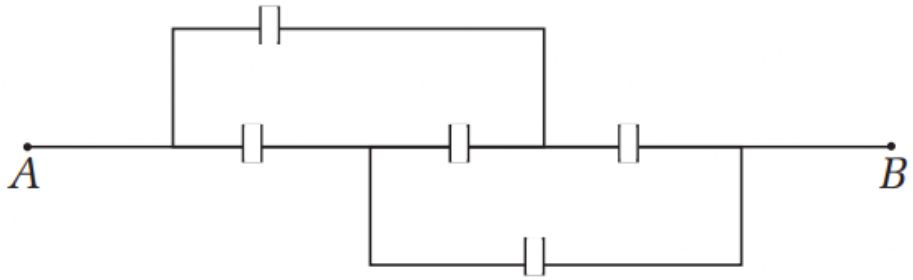
33. Five equal capacitors each with capacitance C are connected as shown in the figure. Then, the equivalent capacitance between A and B is:



(A) $5C$
(B) $\frac{C}{5}$
(C) $3C$
(D) C

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34. The time period of a freely suspended magnet is $4\,s$. If it is broken in length into two equal parts and one part is suspended in the same way, then the time period will be:
(A) $4\,s$
(B) $2\,s$
(C) $0.5\,s$
(D) $0.25\,s$

---

35. A spring of force constant k is cut into two pieces such that one piece is double the length of other. Then, the long piece will have a force constant of:
(A) $\frac{2}{3}k$
(B) $\frac{3}{2}k$
(C) $3k$
(D) $6k$

36. Half-life period of a radioactive substance is $10\,\text{min}$. Then amount of substance decayed in $40\,\text{min}$ will be:
(A) 25%
(B) 50%
(C) 75%
(D) None of these

---

37. Two identical containers A and B with frictionless pistons contain the same ideal gas at the same temperature and volume V. The masses are m_A and m_B. On isothermal expansion to $2V$, pressure changes are Δp and $1.5\Delta p$ respectively. The relation between masses is:
(A) $\frac{m_A}{m_B} = \frac{4}{9}$
(B) $\frac{m_A}{m_B} = \frac{2}{3}$
(C) $\frac{m_A}{m_B} = \frac{3}{2}$
(D) $\frac{m_A}{m_B} = \frac{9}{4}$

---

38. If one mole of monoatomic gas ($\gamma = \frac{5}{3}$) is mixed with one mole diatomic gas ($\gamma = \frac{7}{5}$), the value of γ for the mixture is:
(A) 1.40
(B) 1.50
(C) 1.53
(D) 3.07

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39. A solid sphere of mass $2\,kg$ rolls on a horizontal surface at $10\,m/s$ and then rolls up a 30° incline. The maximum height reached is:
(A) $10\,m$
(B) $4.9\,m$
(C) $14.2\,m$
(D) $7.1\,m$

---

40. How much deep inside the earth (radius R) should a man go, so that his weight becomes one-fourth of that on the earth's surface?
(A) $\frac{R}{2}$
(B) $\frac{3R}{4}$
(C) $\frac{R}{4}$
(D) $\frac{R}{3}$

---

41. Four projectiles are thrown with the same initial speed at angles $27°, 36°, 43°, 51°$ with the horizontal. The range of projectiles will be the largest for the projectile fired at angle:
(A) $27°$
(B) $36°$
(C) $43°$
(D) $51°$

---

42. A wire of resistance $5\,\Omega$ is drawn out so that its length is increased to twice its original length, its new resistance is:
(A) $45\,\Omega$
(B) $54\,\Omega$
(C) $20\,\Omega$
(D) $5\,\Omega$

---

43. The magnifying power of a telescope is m. If the focal length of the eye piece is doubled, then its magnifying power becomes:
(A) $2m$
(B) $3m$
(C) $\frac{m}{2}$
(D) $\frac{m}{4}$

---

44. On a heater coil it is written $250\,V, 500\,W$. What is the resistance of this coil?
(A) $62.5\,\Omega$
(B) $100\,\Omega$
(C) $200\,\Omega$
(D) $125\,\Omega$

---

45. When a dielectric slab is introduced between the plates of a capacitor connected to a battery, then:
(A) charge on capacitor increases
(B) potential difference across the capacitor increases
(C) energy stored increases
(D) capacity remains the same

---

46. A concave lens is kept in contact with a convex lens of focal length $20\,cm$. The combination works as a convex lens of focal length $50\,cm$. The power of concave lens is:
(A) $P = -3.0\,D$
(B) $P = +3.0\,D$

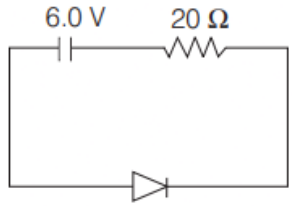
(C) $P = -0.3\,D$
(D) $P = +0.3\,D$

---

47. The critical angle for glass-water interface (if $\mu_g = \frac{3}{2}, \mu_w = \frac{4}{3}$) is:
(A) $\sin^{-1}\left(\frac{8}{9}\right)$
(B) $\sin^{-1}\left(\frac{9}{8}\right)$
(C) $\sin^{-1}\left(\frac{3}{2}\right)$
(D) None of these

---

48. What is the current through the circuit and the potential difference across the diode shown in the figure. The drift current for the diode is $30\,\mu A$.



(A) $30\,\mu A$, $5.99\,V$
(B) $30\,\mu A$, $5\,V$
(C) $20\,\mu A$, $6\,V$
(D) $20\,\mu A$, $5.99\,V$

---

49. A man who wears glasses of power $3\,D$ must hold a newspaper at least $25\,cm$ away to see clearly. How far away would the newspaper have to be if he took off the glasses?
(A) $10\,cm$
(B) $25\,cm$
(C) $1\,m$
(D) $-1\,m$

---

50. The force per unit length between two parallel current carrying straight conductors separated by $2d$ is given by the formula:
(A) $\frac{\mu_0 i_1 i_2}{4\pi d}$
(B) $\frac{\mu_0 i_1 i_2}{8\pi d}$
(C) $\frac{\mu_0 i_1 i_2}{2\pi d}$
(D) None of these

PART II - CHEMISTRY

1. Which of the following is not a basic amino acid?
(A) Leucine
(B) Lysine
(C) Arginine
(D) Histidine

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2. In qualitative analysis, NH_4Cl is added before NH_4OH:
(A) to increase $[OH^-]$ concentration
(B) for making HCl
(C) to decrease $[OH^-]$ concentration
(D) statement is wrong

---

3. Certain electric current for half an hour collects $11.2\,L$ of hydrogen at NTP. Same current passed for one hour deposits how much silver?
(A) $216\,g$
(B) $108\,g$
(C) $47\,g$
(D) $60\,g$

---

4. Which of the following complexes is an outer orbital complex?
(A) $[Co(NH_3)_6]^{3+}$
(B) $[Fe(CN)_6]^{4-}$
(C) $[Ni(NH_3)_6]^{2+}$
(D) $[Mn(CN)_6]^{4-}$

---

5. Which is true for a cyclic process?
(A) $\Delta E = 0$
(B) $\Delta E = q - W$
(C) $q = W$
(D) All of these

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6. In the Cannizzaro reaction, the slowest step is:
(A) attack of OH^- on carbonyl
(B) hydride ion transfer
(C) proton abstraction from acid
(D) deprotonation of alcohol

---

7. The rate of a reaction doubles when the initial concentration of the reactant is made fourfold. If the initial concentration is made 400 fold, then the rate will become:
(A) 400 times
(B) 200 times
(C) 40 times
(D) 20 times

---

8. Which compound is present in diesel?
(A) Cetane
(B) $TiCl_4$
(C) Cyclopentadienyl manganese carbonyl
(D) Iso octane

---

9. Which of the following is an organometallic compound?
(A) Lithium acetate
(B) Methyl lithium
(C) Lithium dimethyl amide
(D) Lithium methoxide

---

10. If in the reaction $N_2O_4 \rightleftharpoons 2NO_2$, α is the degree of dissociation of N_2O_4, then total number of moles at equilibrium is:
(A) $1 - \alpha$
(B) $1 + \alpha$
(C) $1 + 2\alpha$
(D) $1 + \frac{\alpha}{2}$

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11. In the given reaction sequence involving $CHCl_3$, the end product C is used as:
(A) explosive
(B) hypnotic
(C) tear gas
(D) analgesic

---

12. Which statement is false for white phosphorus (P_4)?
(A) It has six P–P single bonds
(B) It has four P–P single bonds
(C) It has four lone pairs of electrons
(D) It has P–P–P angle 60°

---

13. Natural rubber is a polymer of isoprene. During polymerisation:
(A) 1,4 addition takes place
(B) 1,2 addition takes place
(C) 1,3 addition takes place
(D) both double bonds convert into single bonds

---

14. Match List I (species) with List II (hybridisation) and select the correct code given below

List I	**List II**
A. XeF_4	(i) dsp^2
B. H_2O	(ii) sp^3
C. PCl_5	(iii) sp^3d^2
D. $[Pt(NH_3)_4]^{2+}$	(iv) sp^3d

Codes:

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

---

15. A new carbon-carbon bond formation is possible in:
I. Cannizzaro reaction II. Friedel-Crafts reaction III. Clemmensen reduction IV. Reimer-Tiemann reaction
(A) I, II and III
(B) II, III and IV
(C) I and III
(D) II and IV

---

16. Which of the following compound is formed during Perkin's reaction?
(A) Resorcinol
(B) Cinnamic acid
(C) Benzaldehyde
(D) Benzoin

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17. The ratio of de-Broglie wavelengths for electrons accelerated through $200\,V$ **and** $50\,V$ **is:**
(A) 1 : 2
(B) 2 : 1
(C) 3 : 10
(D) 10 : 3

18. Malachite decomposes to give $A + CO_2 + H_2O$ and compound A on reduction with carbon gives $CO + B$. Here, A and B are:
(A) CuO, Cu
(B) Cu_2O, CuO
(C) Cu_2O, Cu
(D) $CuCO_3$, Cu

---

19. Match List I with List II and choose the correct answer from the codes given below

List I	**List II**
A. $NaNO_3$	*(i) Baking soda*
B. $Na(NH_4)HPO_4$	*(ii) Chile saltpetre*
C. $NaHCO_3$	*(iii) Microcosmic salt*
D. $Na_2CO_3 \cdot 10H_2O$	*(iv) Washing soda*

Codes:

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

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20. When MnO_2 is heated with PbO_2 and conc. HNO_3, pink colour is obtained due to formation of:
(A) $KMnO_4$
(B) $HMnO_4$
(C) $Pb(MnO_4)_2$
(D) $PbMnO_4$

---

21. Which is mismatched for NaCl crystal?
(A) $\frac{r^+}{r^-} = 0.414$ to 0.732
(B) Coordination number = 6 : 6
(C) Edge of unit cell = $r^+ + r^-$
(D) Crystal structure = fcc

---

22. Which of the following ions has the highest magnetic moment?
(A) Zn^{2+}
(B) Ti^{3+}
(C) Sc^{3+}
(D) Mn^{2+}

23. Correct order for solubility of alkaline earth metal fluorides in water is:
(A) $MgF_2 > CaF_2 > SrF_2 > BaF_2$
(B) $MgF_2 < CaF_2 < SrF_2 < BaF_2$
(C) $MgF_2 < CaF_2 < SrF_2 > BaF_2$
(D) $BaF_2 > MgF_2 > SrF_2 > CaF_2$

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24. An organic compound A contains 20% C, 46.66% N and 6.66% H. It gives NH_3 gas on heating with NaOH. A can be:
(A) CH_3CONH_2
(B) $C_6H_5CONH_2$
(C) NH_2CONH_2
(D) $CH_3NHCONH_2$

---

25. In equilibrium $KI + I_2 \rightleftharpoons KI_3$, if concentrations of KI and I_2 are doubled and tripled respectively, the concentration of KI_3 becomes:
(A) two fold
(B) three fold
(C) five fold
(D) six fold

---

26. Identify disaccharides A, B and C respectively:
(A) lactose, sucrose, maltose
(B) sucrose, maltose, lactose
(C) sucrose, lactose, maltose
(D) maltose, sucrose, lactose

---

27. n/p ratio during positron decay:
(A) increases
(B) decreases
(C) remains constant
(D) All of these

---

28. Number of carbon atoms in kerosene is:
(A) $C_{17} - C_{20}$
(B) $C_{12} - C_{16}$
(C) $C_{20} - C_{25}$
(D) $C_{25} - C_{30}$

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29. Which of the following polymers can be used for lubrication and as an insulator?
(A) SBR
(B) PVC
(C) PTFE
(D) PAN

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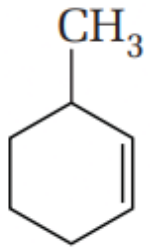
30. The IUPAC name of the given compound is:



(A) 3-methyl cyclohexene
(B) 1-methyl cyclohex-2-ene
(C) 6-methyl cyclohexene
(D) 1-methyl cyclohex-5-ene

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31. The correct representation of a complex ion is:
(A) $[Co(H_2O)(NH_3)_4Cl]^{2+}$
(B) $[CoCl(H_2O)(NH_3)_4]^{2+}$
(C) $[Co(NH_3)_4Cl(H_2O)]^{2+}$
(D) $[Co(NH_3)_4(H_2O)Cl]^{2+}$

---

32. Which element has maximum first ionisation potential?
(A) Cs
(B) F
(C) Na
(D) He

---

33. In which of the following $\Delta E = \Delta H$?
(A) $N_2O_4(g) \rightarrow 2NO_2(g)$
(B) $2SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$
(C) $H_2(g) + I_2(g) \rightarrow 2HI(g)$
(D) $H_2(g) + \frac{1}{2}O_2(g) \rightarrow H_2O(l)$

---

34. Calcination is used in metallurgy for removal of:

(A) water and sulphide
(B) water and CO_2
(C) CO_2 and H_2S
(D) H_2O and H_2S

---

35. What is the value of x in the complex ion $[Ni(CN)_4]^x$?
(A) +2
(B) −2
(C) 0
(D) +4

---

36. The activation energy of a reaction is zero. The rate constant of this reaction:
(A) increases with an increase of temperature
(B) decreases with an increase of temperature
(C) decreases with decrease of temperature
(D) is independent of temperature

---

37. Which of the following does not exist?
(A) Only II
(B) Only III
(C) II and IV
(D) I, III and IV

---

38. Which of the following notations shows the product incorrectly?
(A) ${}^{10}_{5}B(n,\alpha)^{7}_{3}Li$
(B) ${}^{242}_{96}Cm(\alpha,2n)^{243}_{97}Bk$
(C) ${}^{14}_{7}N(n,p)^{14}_{6}C$
(D) ${}^{28}_{14}Si(d,\gamma)^{30}_{15}P$

---

39. Acidic dichromate ion reacts with hydrogen peroxide to give deep blue colour. This is due to formation of:
(A) $CrO(O_2)_2$
(B) CrO_5
(C) Both (A) and (B)
(D) None of these

---

40. In blast furnace, the highest temperature is in:
(A) reduction zone
(B) slag zone

(C) fusion zone
(D) combustion zone

---

41. The reagent which distinguishes formic acid and acetic acid is:
(A) 2,4-dinitrophenyl hydrazine
(B) $HgCl_2$
(C) C_2H_5ONa
(D) Hg_2Cl_2

---

42. Which of the following is correct about fluorine?
(A) (I) and (II) are correct
(B) (I) is correct, (II) is false
(C) (I) is false, (II) is correct
(D) (I) and (II) are false

---

43. Liquid hydrocarbon is converted into mixture of gaseous hydrocarbons by:
(A) cracking
(B) oxidation
(C) hydrolysis
(D) distillation under reduced pressure

---

44. Match List-I with List-II and select the correct answer from the given codes.

List I (Reaction)	**List II (Reagent/Catalyst)**
A. Cannizzaro reaction	1. $SnCl_2/HCl$
B. Stephen's reaction	2. $NaOH$
C. Clemmensen reduction	3. $Zn/Hg - conc.\ HCl$
D. Rosenmund's method	4. $Pd/BaSO_4$, boiling xylene

Codes:

	A	B	C	D
(a)	1	2	3	4
(b)	2	1	3	4
(c)	4	3	2	1
(d)	1	4	2	3

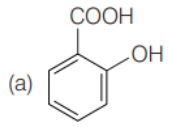
---

45. The correct order of ionic radius of nitrogen family is:
(A) $N^{3-} < P^{3-} < As^{3-} < Sb^{3-} < Bi^{3-}$
(B) $N^{3-} < P^{3-} < Sb^{3-}$
(C) $P^{3-} > As^{3-} = Bi^{3-}$
(D) $N^{3-} > Bi^{3-} > Sb^{3-}$

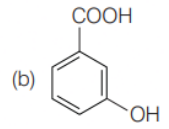
46. Which of the following statement is false?
(A) Chlorophyll is responsible for synthesis of carbohydrates
(B) Haemoglobin forms oxyhaemoglobin in presence of oxygen
(C) Acetyl salicylic acid is aspirin
(D) Vitamin B_{12} contains Mg^{2+} ion

---

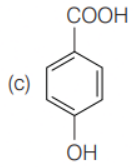
47. Among the following, compound with the lowest pK_a value is:
(A) o-hydroxy benzoic acid



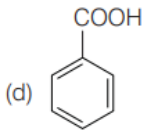
(B) m-hydroxy benzoic acid



(C) p-hydroxy benzoic acid



(D) benzoic acid



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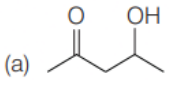
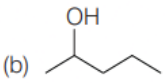
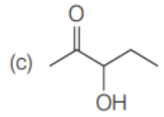
48. Which one of the following will most readily be dehydrated in acidic solution?
(A) Secondary alcohol with carbonyl nearby



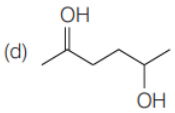
(B) Secondary alcohol



(C) Tertiary alcohol



(D) Diol



---

49. Paracetamol is a:
(A) antipyretic
(B) antiseptic
(C) antibiotic
(D) anaesthetic

---

50. $K_2[HgI_4]$ **detects the following ion:**
(A) Cl^-
(B) NO_2^-
(C) NO_3^-
(D) NH_4^+

PART III - MATHEMATICS

1. If A **and** B **are two such events that** $P(A \cup B) = P(A \cap B)$**, then which of the following is true?**
(A) $P(A) + P(B) = 0$
(B) $P(A) + P(B) = P(A)P(B|A)$
(C) $P(A) + P(B) = 2P(A)P(B|A)$
(D) None of the above

---

2. Equation of tangent to the circle $x^2 + y^2 - 2x - 2y + 1 = 0$ **perpendicular to** $y = x$ **is:**
(A) $x + y \pm 1 = 0$
(B) $x + y = \pm 2\sqrt{3}$
(C) $x - y \pm 3 = 0$
(D) $x - y \pm 1 = 0$

---

3. If point D divides base BC of $\triangle ABC$ in ratio $m:n$, then value of $mBD^2+nCD^2+(m+n)AD^2$ is:
(A) mAC^2+nAB^2
(B) $(m+n)(AC^2+AB^2)$
(C) nAC^2+mAB^2
(D) None of these

---

4. Find α given the conditions:
(A) $\frac{\pi}{12}$
(B) $\frac{\pi}{4}$
(C) $\frac{\pi}{3}$
(D) $\frac{\pi}{6}$

---

5. Evaluate $\lim_{x\to 0} f(x)$
(A) 1
(B) -1
(C) 0
(D) Does not exist

---

6. The angle between the lines is:
(A) 30°
(B) 60°
(C) 45°
(D) 90°

---

7. Equation of a plane passing through $(-1,1,1)$ and $(1,1,-1)$ and perpendicular to $x+y+z=5$ is:
(A) $2x+3y-3z+3=0$
(B) $x+y+z-5=0$
(C) $2x+2y-3z+3=0$
(D) $x+y+z-3=0$

---

8. If $f'(x)>0$ and $g(x)=f(\tan x)-x$, then $g(x)$ is increasing in:
(A) $\left(0,\frac{\pi}{4}\right)$
(B) $\left(\frac{\pi}{6},\frac{\pi}{3}\right)$
(C) $\left(0,\frac{\pi}{3}\right)$
(D) $\left(\frac{\pi}{4},\frac{\pi}{2}\right)$

9. Probability of getting sum 7 or 9 when two dice are thrown is:
(A) $\frac{5}{18}$
(B) $\frac{1}{6}$
(C) $\frac{1}{9}$
(D) None of these

---

10. What is a compiler?
(A) Application software
(B) System software
(C) Utility software
(D) All of these

---

11. Find $f(x)$:
(A) $x^{3/2} + \frac{1}{3}x^{3/2}$
(B) $-x^{3/2} + \frac{4}{3}x^{3/2}$
(C) $-\frac{1}{x}$
(D) $-1 + \frac{2}{x^2}$

---

12. Find $A + B$
(A) 10
(B) $\frac{1}{2}$
(C) 1
(D) $-\frac{1}{2}$

---

13. Find coefficient of x^4 in $(1 + x)^3(1 + x^3 + x^4)^{10}$
(A) 210
(B) 100
(C) 310
(D) 110

---

14. The locus of centre of circles which cut orthogonally the circle $x^2+y^2-4x+8 = 0$ and touch the line $x + 1 = 0$, is:
(A) $y^2 + x + 6y + 7 = 0$
(B) $x^2 + y^2 + 2x + 3 = 0$
(C) $x^2 + y^2 + 3x + 4 = 0$
(D) None of these

---

15. Find $f'(x)$ at $x = (2n+1)\frac{\pi}{2}$
(A) $(-1)^n$
(B) $(-1)^{n+1}$
(C) 3
(D) 9

---

16. Condition for line $lx + my + n = 0$ to be a normal to $\frac{x^2}{25} + \frac{y^2}{9} = 1$:
(A) $l^2 + m^2 + n^2 = 256$
(B) $9l^2 + 25m^2 = 256n^2$
(C) $l^2 + m^2 - n^2 = 256$
(D) None of these

---

17. The least value of a, for which the function

$$\frac{4}{\sin x} + \frac{1}{1 - \sin x} = a$$

has at least one solution in the interval $\left(0, \frac{\pi}{2}\right)$, is:
(A) 9
(B) 4
(C) 5
(D) 1

---

18. If one regression coefficient is less than unity, then the other will be:
(A) less than unity
(B) equal to unity
(C) greater than unity
(D) All of these

---

19. Three concurrent edges of a parallelepiped are given by

$$\vec{a} = 2\hat{i} - 3\hat{j} + \hat{k}, \quad \vec{b} = \hat{i} - \hat{j} + 2\hat{k}, \quad \vec{c} = 2\hat{i} + \hat{j} - \hat{k}.$$

The volume of the parallelepiped is:
(A) 14
(B) 20
(C) 25
(D) 60

---

20. Roots of equation $x^3 - x + 6 = 0$ lie in the interval:
(A) $(2, 3)$
(B) $(3, 4)$

(C) $(3, 5)$
(D) $(4, 6)$

---

21. If

$$\lim_{x\to 0} \frac{\sin(\sin x) - \sin x}{ax^3 + bx^5 + c} = -\frac{1}{12},$$

then
(A) $a = 2, b \in \mathbb{R}, c = 0$
(B) $a = -2, b \in \mathbb{R}, c = 0$
(C) $a = 1, b \in \mathbb{R}, c = 0$
(D) $a = -1, b \in \mathbb{R}, c = 0$

---

22. According to Newton-Raphson method, the value of $\sqrt{12}$ correct to three decimal places is:
(A) 3.463
(B) 3.462
(C) 3.467
(D) None of these

---

23. If $\left(\frac{3-i}{2+i}\right)^2 = A + iB$, where A and B are real numbers, find A, B:
(A) $A = -4, B = 2$
(B) $A = 2, B = -4$
(C) $A = 2, B = 4$
(D) None of these

---

24. The radical centre of the system of circles

$$x^2 + y^2 + 4x + 7 = 0,$$

$$2(x^2 + y^2) + 3x + 5y + 9 = 0$$

and

$$x^2 + y^2 + y = 0$$

is:
(A) $(-2, -1)$
(B) $(1, -2)$
(C) $(-1, -2)$
(D) None of these

---

25. The curve, for which the area of the triangle formed by X-axis, the tangent at any point P and line OP is equal to a^2, is given by:

(A) $y = x - Cx^2$
(B) $x = Cy \pm \frac{a^2}{y}$
(C) $y = Cx \pm \frac{a^2}{x}$
(D) None of thes

---

26. Solution of the equation

$$\cos^2 x \frac{dy}{dx} - (\tan 2x)\, y = \cos^4 x, \quad |x| < \frac{\pi}{4},$$

where $y\left(\frac{\pi}{6}\right) = \frac{3\sqrt{3}}{8}$, **is given by:**
(A) $y \frac{\tan 2x}{1-\tan^2 x} = 0$
(B) $y(1 - \tan^2 x) = C$
(C) $y = \sin 2x + C$
(D) $y = \frac{1}{2} \cdot \frac{\sin 2x}{1-\tan^2 x}$

---

27. If $1, \omega, \omega^2$ **are cube roots of unity, find the value of**

$$(1 - \omega + \omega^2)(1 + \omega - \omega^2)$$

(A) 4
(B) 0
(C) 2
(D) 3

---

28. The equation of the curve through $(1, 0)$**, whose slope is** $\frac{y-1}{x^2+x}$**, is:**
(A) $2x(y - 1) + x + 1 = 0$
(B) $(x + 1)(y - 1) + 2x = 0$
(C) $x(y - 1)(x + 1) + 2 = 0$
(D) $x(y + 1) + y(x + 1) = 0$

---

29. Number of points where $f(x) = [\sin x + \cos x]$ **is not continuous in** $(0, 2\pi)$ **is:**
(A) 3
(B) 4
(C) 5
(D) 6

---

30. Evaluate:

$$\cot^{-1}\left(\frac{\sqrt{1 + \sin x} + \sqrt{1 - \sin x}}{\sqrt{1 + \sin x} - \sqrt{1 - \sin x}}\right)$$

(A) $\frac{x}{3}$
(B) $\frac{x}{4}$
(C) 1
(D) $\frac{x}{2}$

---

31. Find angles of triangle with vertices $A(-1,3,2), B(2,3,5), C(3,5,-2)$:
(A) $\angle A = 90°, \angle B = 30°, \angle C = 60°$
(B) $\angle A = \angle B = \angle C = 60°$
(C) $\angle A = \angle B = 45°, \angle C = 90°$
(D) None of these

---

32. Evaluate:

$$\lim_{x \to 0} \frac{\int_0^{x^2} \sin \sqrt{t}\, dt}{x^3}$$

(A) $\frac{2}{3}$
(B) $\frac{1}{3}$
(C) 0
(D) ∞

---

33. If $\vec{a}, \vec{b}, \vec{c}$ are three non-coplanar vectors, then $[\vec{a} \times \vec{b}, \vec{b} \times \vec{c}, \vec{c} \times \vec{a}]$ is equal to:
(A) $[\vec{a}\ \vec{b}\ \vec{c}]^3$
(B) $[\vec{a}\ \vec{b}\ \vec{c}]^2$
(C) 0
(D) None of these

---

34. If geometric mean and harmonic mean of two numbers are 16 and $\frac{64}{5}$ respectively, then $a : b$ is:
(A) 4 : 1
(B) 3 : 2
(C) 2 : 3
(D) 1 : 4

---

35. If sum of four numbers in GP is 60 and AM of first and last is 18, then the numbers are:
(A) $3, 9, 27, 81$
(B) $4, 8, 16, 32$
(C) $2, 6, 18, 54$
(D) None of these

36. The sum of real solutions of equation $|x^2 - 5x + 1| = 20$ is:
(A) 5
(B) 24
(C) 0
(D) None of these

---

37. The quadratic equation whose roots are $\frac{1}{3+\sqrt{2}}$ and $\frac{1}{3-\sqrt{2}}$, will be:
(A) $7x^2 - 6x + 1 = 0$
(B) $6x^2 - 7x + 1 = 0$
(C) $x^2 - 6x + 7 = 0$
(D) $x^2 - 7x + 6 = 0$

---

38. Who said, "Number of transistors per square inch on integrated circuits double every year. . . "?
(A) Alan Turing
(B) John von Neumann
(C) Herbert Simon
(D) Gordon Moore

---

39. The number of unit vectors perpendicular to $\vec{a} = \hat{i} + \hat{j}$ and $\vec{b} = \hat{j} + \hat{k}$ is:
(A) infinite
(B) one
(C) two
(D) three

---

40. By trapezoidal rule, approximate value of $\int_0^1 \frac{dx}{1+x^2}$ is:
(A) 1.3128
(B) 1.4108
(C) 1.4218
(D) None of these

---

41. The radius of a cylinder is increasing at $2\,m/s$ and height is decreasing at $3\,m/s$. When $r = 3\,m, h = 5\,m$, rate of change of volume is:
(A) $87\pi\,m^3/s$
(B) $33\pi\,m^3/s$
(C) $27\pi\,m^3/s$
(D) $15\pi\,m^3/s$

42. Point on line $y = x + 2$ nearest to circle $x^2 + y^2 + 16x - 32y + 50 = 0$ is:
(A) $\left(\frac{9}{2}, 2\right)$
(B) $\left(\frac{9}{2}, -2\right)$
(C) $\left(-\frac{9}{2}, 2\right)$
(D) $\left(-\frac{9}{2}, -2\right)$

---

43. Locus of extremities of latus rectum of ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$:
(A) $x^2 \pm ay = a^2$
(B) $y^2 \pm bx = a^2$
(C) $x^2 \pm by = a^2$
(D) $y^2 \pm ax = b^2$

---

44. The solution of differential equation $(y \log x - 1)dx = x\, dy$ is:
(A) $y(\log x + Cx) = 1$
(B) $\log\left(\frac{x}{e} + Cx\right) = y$
(C) $(\log Cx^2 + e^{2x})y = x$
(D) None of these

---

45. If m things are distributed among a men and b women, then the chance that the number of things received by men is odd is:
(A) $\frac{(b-a)^m - (b+a)^m}{2(b+a)^m}$
(B) $\frac{(b+a)^m - (b-a)^m}{2(b+a)^m}$
(C) $\frac{(b+a)^m - (b-a)^m}{(b+a)^m}$
(D) None of these

---

46. The solution of the differential equation $\sqrt{a+x}\frac{dy}{dx} + xy = 0$ is:
(A) $y = Ce^{\frac{2}{3}(2a-x)\sqrt{x+a}}$
(B) $y = Ce^{\frac{2}{3}(a-x)\sqrt{x+a}}$
(C) $y = Ce^{\frac{2}{3}(2a+x)\sqrt{x+a}}$
(D) $y = Ce^{-\frac{2}{3}(2a-x)\sqrt{x+a}}$

---

47. The values of a, if $f(x)$ is increasing for all x, are in:
(A) $[0, \infty)$
(B) $(-\infty, 0]$
(C) $(-\infty, \infty)$
(D) $(1, \infty)$

48. By Newton-Raphson method, the positive root of $x^4 - x - 10 = 0$ is:
(A) 1.871
(B) 1.868
(C) 1.856
(D) None of these

---

49. In $\triangle ABC$, if $3a = b + c$, then value of $\cot\frac{B}{2}\cot\frac{C}{2}$ is:
(A) 1
(B) 2
(C) 3
(D) $\frac{1}{2}$

---

50. If $\sin^{-1}\left(\cot^{-1}(x)\right) = \frac{\pi}{2}$, then value of x is:
(A) 0
(B) $\frac{1}{\sqrt{2}}$
(C) $\frac{1}{\sqrt{2}}$
(D) $\frac{\sqrt{3}}{2}$

---

51. The value of $\int_0^{\sqrt{\pi/2}} \cos(e^{x^2})\, 2xe^{x^2}\, dx$ is:
(A) 1
(B) $1 + \sin 1$
(C) $1 - \sin 1$
(D) $(\sin 1) - 1$

---

52. API stands for:
(A) Access Programming Interface
(B) Android Programming Interface
(C) Application Programming Interface
(D) None of the above

---

53. If $z = i\log(2 - \sqrt{3})$, then the value of $\cos z$ will be:
(A) i
(B) $2i$
(C) 1
(D) 2

---

54. $\lim_{x\to 2} \dfrac{2-\sqrt{2+x}}{(4-x)^{1/3}}$ **is equal to:**
(A) $2 \cdot 3^{-1/2}$
(B) $3 \cdot 2^{-4/3}$
(C) $-3 \cdot 2^{-4/3}$
(D) None of these

---

55. The three lines of a triangle are given by $(x^2 - y^2)(2x + 3y - 6) = 0$**. If point** $(-2, \lambda)$ **lies inside and** $(\mu, 1)$ **lies outside, then:**
(A) $\lambda \in (1, \frac{10}{3}), \mu \in (-3, 5)$
(B) $\lambda \in (2, \frac{10}{3}), \mu \in (-1, 1)$
(C) $\lambda \in (-1, \frac{9}{2}), \mu \in (-2, \frac{10}{3})$
(D) None of these

---

56. System software : Utility software ::
(A) Operating system : Anti-virus
(B) Anti-virus : Operating system
(C) Anti-virus : MS Office
(D) MS Office : Anti-virus

---

57. The number of common tangents to two circles $x^2+y^2 = 4$ **and** $x^2+y^2-8x+12 = 0$ **is:**
(A) 1
(B) 2
(C) 3
(D) 4

---

58. If $2a + 3b + 6c = 0$**, then equation** $ax^2 + bx + c = 0$ **has at least one real root in:**
(A) $(0, 1)$
(B) $\left(0, \frac{1}{2}\right)$
(C) $\left(\frac{1}{4}, \frac{1}{2}\right)$
(D) None of these

---

59. If for all $x, y \in \mathbb{N}$**, there exists a function** $f(x)$ **satisfying** $f(x + y) = f(x)f(y)$ **such that** $f(1) = 3$ **and** $\sum_{x=1}^{n} f(x) = 120$**, then value of** n **is:**
(A) 4
(B) 5
(C) 6
(D) None of these

60. If $f(x) = \begin{cases} \sin\left(\frac{\pi x}{2}\right), & x < 1 \\ 3 - 2x, & x \geq 1 \end{cases}$ **, then** $f(x)$ **has:**
(A) local minimum at $x = 1$
(B) local maximum at $x = 1$
(C) Both local maximum and local minimum at $x = 1$
(D) None of the above

---

61. The general solution of the differential equation $\frac{dy}{dx} = y \tan x - y^2 \sec x$ **is:**
(A) $\tan x = (C + \sec x)y$
(B) $\sec y = (C + \tan y)x$
(C) $\sec x = (C + \tan x)y$
(D) $\tan y = (C + \sec x)x$

---

62. The values of a **such that** $(x, a) \times (0, 0, 0)$ **and** $(\hat{i}+\hat{j}+3\hat{k}) \times (3\hat{i}-3\hat{j}+\hat{k})+(-4\hat{i}+5\hat{j})z = \lambda(\hat{i} + \hat{j} + z)$ **are collinear are:**
(A) $0, 1$
(B) $1, -1$
(C) $1, -1$
(D) $-2, 0$

---

63. In $\triangle ABC$**, if** $\cot A \cdot \cot B$ **and** $\cot C$ **are in A.P., then** a^2, b^2, c^2 **are in:**
(A) HP
(B) AP
(C) GP
(D) None of these

---

64. By Simpson's $1/3$ **rule, the approximate value of** $\int_0^1 e^{-x^2} dx$ **using four intervals is:**
(A) 0.377
(B) 0.447
(C) 0.447
(D) None of these

---

65. A die is rolled three times. The probability of getting a larger even number is:
(A) $\frac{5}{216}$
(B) $\frac{5}{36}$

(C) $\frac{1}{6}$
(D) $\frac{5}{36}$

---

66. If $f(x) = \log_6(6 - |x^2 + x - 6|)$, then domain of $f(x)$ has how many integral values?
(A) 5
(B) 4
(C) Infinite
(D) None of these

---

67. The graph of equation $y^2 - z^2 = 0$ in three-dimensional space is:
(A) YZ-plane
(B) Z-axis
(C) Y-axis
(D) X-axis

---

68. If $z_1 = 1 + i,\ z_2 = -2 + 3i,\ z_3 = \frac{ai}{3}$ are collinear, where $r^2 = -1$, then value of a is:
(A) -1
(B) 3
(C) 4
(D) 5

---

69. If a, b, c are in HP, then for any n, which one is true?
(A) $a^n + c^n < 2b^n$
(B) $a^n + c^n > 2b^n$
(C) $a^{-n} + c^{-n} = 2b^{-n}$
(D) None of these

---

70. The value of $\tan\left[2\tan^{-1}(1) - \frac{\pi}{4}\right]$ is:
(A) $\frac{17}{7}$
(B) $-\frac{17}{7}$
(C) $\frac{7}{17}$
(D) $-\frac{7}{17}$

PART IV - ENGLISH AND GENERAL APTITUDE

Directions (Q. Nos. 1-5) Read the given passage carefully and answer the questions that follow by selecting the most appropriate option.

No one knows when or by whom rockets were invented. In all probability the rocket was not suddenly invented but evolved gradually over a long period of time, perhaps in different parts of the world at the same time. Some historians of rocketry, notably Willy Ley, trace the development of rockets to the 13th century China, a land noted in ancient times for its fire work display. In the year 1232 AD when the Mongols laid siege to the city of Kai-Feng Fu, the capital of Honan province, the Chinese defenders used weapons that were described as "arrows of flying fire". There is no explicit statement that these arrows were rockets, but some students have concluded that they were because the record does not mentioned bows or other means of shooting the arrows. In the same battle, we read, the defenders dropped from the walls of the city a kind of bomb described as "heaven-shaking thunder". From these meagre references some students have concluded that the Chinese, by the year 1232 had discovered gunpowder and had learned to use it to make explosive bombs as well as propulsive charges for rockets.

1. The passage gives primarily a history of
(A) the bravery of the Chinese
(B) the invention of rockets
(C) the attack on China by the Mongols
(D) the battle against the Chinese wall

---

2. According to this passage, rockets were invented by
(A) Willy Ley
(B) unknown people
(C) the Mongols
(D) the ruler of Honan province

---

3. According to this passage, rockets were
(A) a gift of God to the Chinese
(B) invented in the twentieth century
(C) invented in 1232 AD
(D) developed over many centuries

---

4. The phrase 'arrows of flying fire'
(A) means some ancient phenomenon in the skies
(B) refers to lightning and thunder
(C) is another name for rockets
(D) is assumed to refer to rockets

---

5. The bombs have been referred to as "heaven shaking thunder" because they
(A) contain gunpowder
(B) make thunderous noise

(C) are propelled by rockets
(D) seem to fall from heaven

---

6. The lawyer has plenty of ..... .
(A) criminals
(B) buyers
(C) customers
(D) clients

---

7. "I have brought the book. It's ..... !"
(A) mine
(B) my
(C) me
(D) myself

---

8. "The project is good, but there is ..... missing"
(A) everything
(B) anything
(C) something
(D) nothing

Directions (Q. Nos. 9-12) In the following questions, select the antonym of the given words.

9. Stingy (Antonym)
(A) Clean
(B) Tight
(C) Generous
(D) Cheap

---

10. Barren (Antonym)
(A) Fertile
(B) Rich
(C) Prosperous
(D) Positive

---

11. Virtue (Antonym)

(A) Vice
(B) Failure
(C) Fault
(D) Offence

---

12. Nervous (Antonym)
(A) Flawless
(B) Immature
(C) Smooth
(D) Composed

---

13. Savour
(A) Taste
(B) Protector
(C) Sour
(D) Flavour

---

14. Rivalled
(A) Hatred
(B) Revised
(C) Competed
(D) Contradicted

---

15. Trimming
(A) Skimming
(B) Arranging
(C) Planning
(D) Cutting

Directions (Q. Nos. 16-20) In each of the following questions, there is a certain relationship between two given words on side of (::) and one word is given on another side (::) while another word is to be found from the given alternatives, having the same relation with this word as the words of the given pair bear. Choose the correct alternative.

16. Donkey : Brays :: Wolf : ?
(A) Bellows
(B) Howls
(C) Whimpers
(D) Roars

17. Astronauts : Space :: Argonauts : ?
(A) Fire
(B) Ship
(C) Treasure
(D) Sea

---

18. Orthopaedic : Bones :: Dermatologist : ?
(A) Feet
(B) Skin
(C) Heart
(D) Lungs

---

19. Basilica : Church :: Dormer : ?
(A) Window
(B) Chapel
(C) Movie
(D) Servant

---

20. Although : Nevertheless :: Though : ?
(A) Therefore
(B) Yet
(C) However
(D) Simultaneously

Directions (Q. Nos. 21-23) In each of the following questions, a group of four words are given. Choose the word which is odd.

21. Find the odd word.
(A) Sun
(B) Mercury
(C) Mars
(D) Venus

---

22. Find the odd word.
(A) Strength
(B) Hesitant
(C) Daring
(D) Brave

23. Find the odd word.
(A) Marigold
(B) Tulip
(C) Lotus
(D) Rose

---

24. Position of P from right in alphabet:
(A) 12
(B) 13
(C) 10
(D) 11

---

25. 14th to right of 6th letter from left:
(A) R
(B) P
(C) W
(D) T

---

26. Alphabet reversed, 13th left of 3rd from right:
(A) P
(B) N
(C) R
(D) Q

---

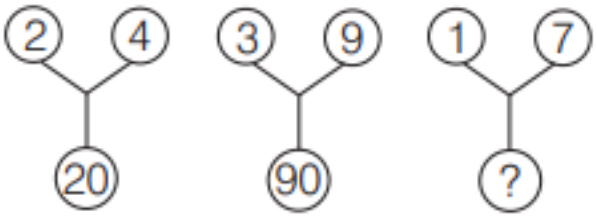
27. 23, 28, 34, 41, 49, ?
(A) 57
(B) 59
(C) 56
(D) 58

---

28. 11, 13, 17, 19, 23, 25, ?
(A) 29
(B) 27
(C) 31
(D) 37

Directions (Q. Nos. 29-30) In each of the following questions, a set of figures carrying certain characters is given. Assuming that the characters in each set follow a similar pattern, find the missing character in each case.

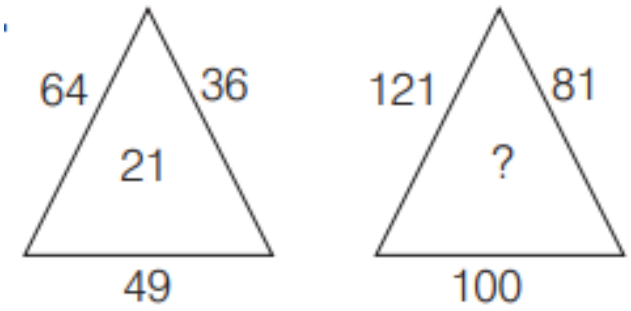
29. Find the missing number in the given pattern:



(A) 160
(B) 100
(C) 50
(D) 75

---

30. Find the missing number in the triangle:



(A) 40
(B) 30
(C) 20
(D) 10
