GLOBAL TALENT SEARCH EXAMINATIONS
(GTSE)

CLASS -XII

Max Marks: 240

PHYSICS & CHEMISTRY

General Instructions: (*Read Instructions carefully*)

1. All questions are compulsory. First 15 minutes for reading instructions.
2. This paper contains **60 objective type questions**. Each question or incomplete sentence is followed by four suggested answers or completions. Select the one that is the most appropriate in each case and darken the correct alternative on the given answer-column, with a pencil or pen.
3. For each correct answer **4 marks** will be awarded and **1 mark** will be deducted for each incorrect answer.
4. No extra sheet will be provided.
5. Use of calculators & mobile is not permitted in examination hall.
6. Use of unfair means shall invite cancellation of the test

Name of the Student : _____

Roll No. : | | | | | | | | |

Centre : _____

Invigilator's Signature : _____

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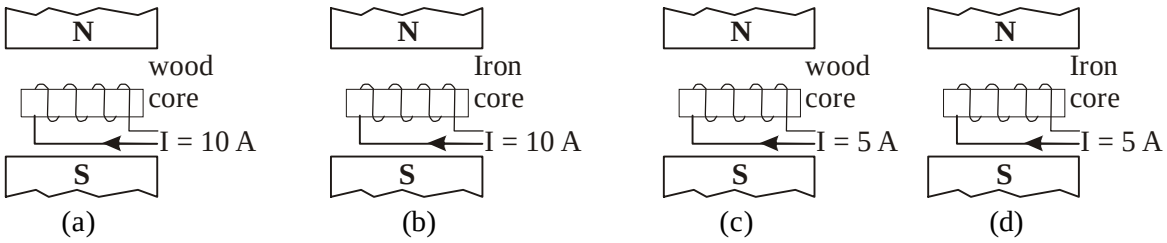
PHYSICS

1. A student uses identical field magnets and coils of wire, as well as additional components, to make the electric motors shown in the diagrams below. Which combination of core and current through the coil of wire will produce the greatest torque on the motor's armature?



2. In a mass spectrometer, the strength of the magnetic field is 1.0×10^{-1} tesla. Upon entering the chamber of the spectrometer, a positive ion traveling at 2.0×10^{6} m/s perpendicular to the magnetic field experiences a magnetic force having a magnitude of 3.2×10^{-14} newton. The charge on this positive ion is

(a) 6.4×10^{-21} C (b) 6.4×10^{-9} C (c) 1.6×10^{-19} C (d) 1.6×10^{-9} C

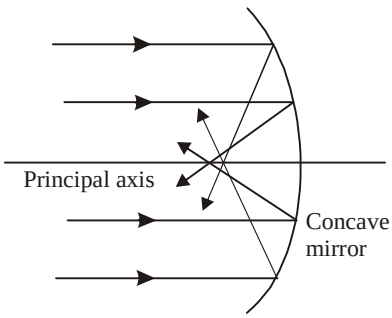
3. An operating electric motor has a back electromotive force because, in addition to acting as a motor, it acts as

(a) a split-ring commutator (b) a transformer
(c) an induction coil (d) a generator

4. The diagram below shows parallel monochromatic incident light rays being reflected from a concave mirror.

The mirror fails to produce a sharp focal point as a result of

(a) dispersion
(b) diffuse reflection
(c) spherical aberration
(d) chromatic aberration



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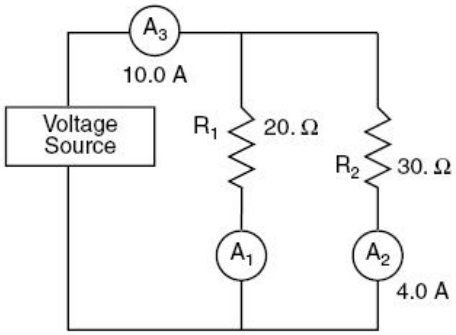
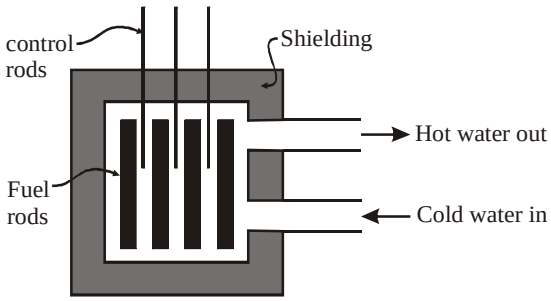
5. In the given diagram, two resistors and three ammeters connected to a voltage source. The potential difference across the source and the reading of ammeter A_1 will be:



(a) 440 V, 10 A (b) 220 V, 3 A

(c) 120 V, 6 A (d) 60 V, 4 A

Base your answers to questions 6 through 8 on the diagram below, which shows a nuclear reactor designed to obtain energy in the form of heat from anuclear fission reaction.



6. In the fission reaction $^{235}_{92}\text{U} + {}^{1}_{0}\text{n} = F_1 + F_2 + 3\,{}^{1}_{0}\text{n}$ + heat, the fission fragments F_1 and F_2 might be

(a) $^{141}_{56}\text{Ba}$ and $^{92}_{36}\text{Kr}$ (b) $^{131}_{51}\text{Sb}$ and $^{41}_{99}\text{Nb}$ (c) $^{141}_{56}\text{Ba}$ and $^{93}_{36}\text{Kr}$ (d) $^{131}_{51}\text{Sb}$ and $^{40}_{99}\text{Nb}$

7. What is the total energy produced by converting 1.0 kilogram of $^{235}_{92}\text{U}$ to energy in the reactor?

(a) 9.0×10^{16} J (b) 9.0×10^{8} J (c) 2.4×10^{16} J (d) 3.0×10^{8} J

8. One of the radioactive waste products of the reactor has a half-life of 250 years. What fraction of a given sample of this product will remain after 1,000 years?

(a) 1/2 (b) 1/8 (c) 1/4 (d) 1/16

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9. The water in the reactor acts both as a heat transfer agent and a moderator. In its capacity as a moderator, the water

(a) accelerates the neutrons to higher speeds so that they can interact with nuclei more energetically

(b) slows the neutrons to increase the probability of nuclear interaction

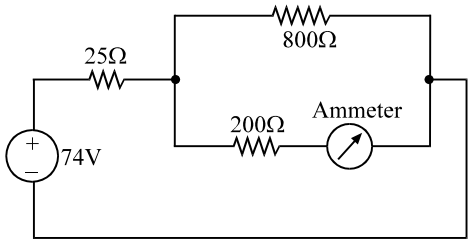
(c) prevents a chain reaction from occurring

(d) absorbs neutrons and slows the nuclear reaction

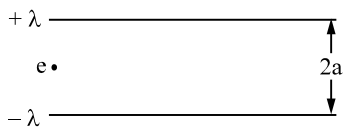
10. The ammeter in the circuit in figure has a resistance of 24 Ω. What is the percent error in the reading of this ammeter ?

(a) 2 % (b) 4 %

(c) 6 % (d) none of these



11. Two long parallel straight wires are kept on a table at a separation 2*a*. The wires carry linear charge density +λ and –λ respectively. Imagine that an electron is kept at the mid point of the wires as shown. The acceleration attained by the electron will be



(a) $\frac{\lambda e}{2\pi m \in_0 a}$ vertically downward (b) $\frac{\lambda e}{2\pi \in_0 ma}$ vertically upward

(c) $\frac{\lambda e}{2\pi m \in_0 a}$ horizontally towards left (d) $\frac{\lambda e}{\pi \in_0 ma}$ vertically upward

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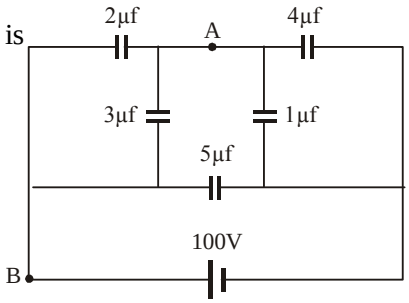
12. The potential difference between A and B of the adjacent network is



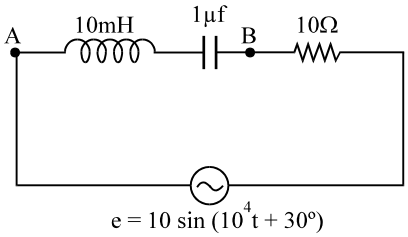
(a) zero

(b) 30 V

(c) 70 V

(d) 50 V

13. In a series L, C, R circuit shown below a voltage $v = 10 \sin (10^4 t + 30^o)$ is applied. What is the voltage across the inductor ?



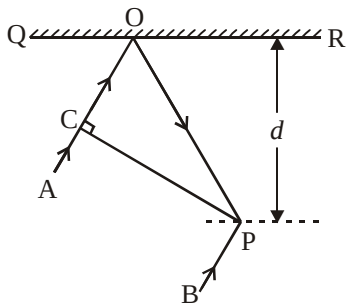
(a) 10 V (b) zero

(c) 100 V (d) none of these

14. The maximum velocity of an electron emitted by light of wavelength λ incident on the surface of metal of work function ϕ is: (where *h* is Planck's constant, *m* is the mass of the electron and *c* is the velocity of light)

(a) $\left[\frac{2(hc+\lambda\phi)}{m\lambda}\right]^{1/2}$ (b) $\frac{2(hc+\lambda\phi)}{m}$ (c) $\left[\frac{2(hc-\lambda\phi)}{m\lambda}\right]^{1/2}$ (d) $\frac{2(hc-\lambda\phi)}{m}$

15. In the adjacent diagram, CP represents a wave front and AO and BP, the corresponding two rays. Find the condition on θ for constructive interference at P between the ray BP and reflected ray OP (where angle of incidence on mirror QR is θ).



(a) $\cos\theta = \frac{3\lambda}{2d}$

(b) $\cos\theta = \frac{\lambda}{4d}$

(c) $\sec\theta - \cos\theta = \frac{\lambda}{d}$

(d) $\sec\theta - \cos\theta = \frac{4\lambda}{d}$

- : Rough Space : -

16. In Young's double slit arrangement, water is filled in the space between screen and slits. Then
(a) fringe pattern shifts upwards but fringe width remains unchanged
(b) fringe width decreases and central bright fringe shifts upwards
(c) fringe width increases and central bright fringe does not shift
(d) fringe width decreases and central bright fringe does not shift.

17. A thin rod of length $f/3$ lies along the axis of a concave mirror of focal length f. One end of its image touches an end of the rod. The length of the image is:

(a) $\frac{5f}{2}$ (b) $2f$ (c) $\frac{f}{4}$ (d) $\frac{f}{2}$

18. Two identical metal plates are given positive charges Q_1 and Q_2 ($< Q_1$) respectively. If they are now brought close together to form a parallel plate capacitor with capacitance C, the potential difference between them is

(a) $\frac{(Q_1 + Q_2)}{2C}$ (b) $\frac{Q_1 + Q_2}{C}$ (c) $\frac{Q_1 - Q_2}{C}$ (d) $\frac{Q_1 - Q_2}{2C}$

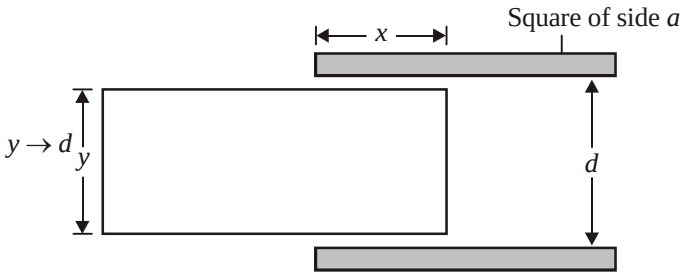
19. A hydrogen like atom of atomic number Z is an excited state of quantum number $2n$. It can emit a mixiumum energy photon of 204 eV. It makes a transition to quantum state n, a photon of energy 40.8 eV is emitted, then

(a) $Z = 2$ (b) $Z = 5$ (c) $n = 1$ (d) $n = 2$

20. Which statement is wrong for binding energy per nucleon?
(a) Maximum for middle order element.
(b) Minimum for lighter element
(c) Binding energy per nucleon suddenly increases for some mass number called magic number
(d) Binding energy per nucleon is minimum for middle order elements.

- : Rough Space : -

21. Each plate of a parallel plate capacitor is a square of side a. The plates are kept at a separation $d(d << a)$, air being the dielectric medium between the plates. The capacitor is connected to a battery. A block of length a, width a and thickness $y \approx d$ is inserted a distance x into the capacitor as shown. Assuming dielectric constant of material is K. Electric energy stored in the capacitor, as a function of x, can be expressed as



(a) $\frac{\varepsilon_0 a\, v^2}{2d}(a + x(K + 1))$

(b) $\frac{\varepsilon_0 a\, v^2}{2d}(a + x(K - 1))$

(c) $\frac{\varepsilon_0 a\, v^2}{2d}(x + a(K - 1))$

(d) $\frac{\varepsilon_0 a\, v^2}{2d}(x + a(K + 1))$

22. A particle of mass m and charge q moves with a constant velocity v along the positive x-direction. It enters a region containing a uniform magnetic field **B** directed along the negative z-direction, extending from $x = a$ to $x = b$. The minimum value of the v required so that the particle can just enter the region $x > b$ is

(a) qbB/m (b) $qB(b - a)/m$ (c) qaB/m (d) $q(b + a)B/2m$

23. A diffraction pattern is obtained using a beam of red light. What happens if the red light is replaced by the blue light?

(a) no change

(b) Diffraction bands become narrower and crowded together

(c) Bands become broader and farther apart

(d) Bands disappear

- : Rough Space : -

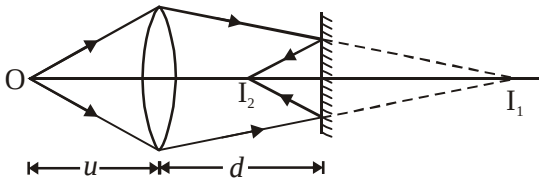
24. An object is located at a distance u to the left of a converging lens $2f > u > f$. A plane mirror is placed to the right of lens at a distance d, $d > f$. Then, which of the following statements is incorrect.

(a) Final image formed by the system is virtual

(b) Image formed by the lens acts as a virtual object for mirror

(c) If a screen is put at I_2, no image will be formed on it

(d) Enlarged image is formed at I_2.



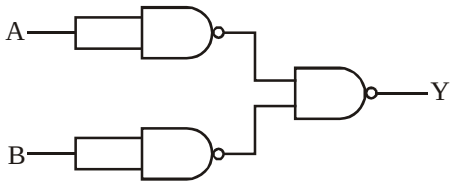
25. The given combination represents the following gate

(a) XOR

(b) NOR

(c) NAND

(d) OR



26. Match the column-I with column-II

A.	$\oint \vec{E}.d\vec{S} = \frac{q}{\varepsilon_0}$	(p)	Ampere's law
B.	$\oint \vec{B}.d\vec{S} = 0$	(q)	Faraday's law
C.	$\oint \vec{E}.d\vec{l} = \frac{d}{dt}\int \vec{B}.d\vec{S}$	(r)	Gauss's law in Electrostatics
D.	$\oint \vec{B}.d\vec{l} = \mu_0\varepsilon_0 \frac{d}{dt}\int \vec{E}.d\vec{S} + \mu_0 I$	(s)	Magnetic monopole does not exist

(a) A-(r); B-(q); C-(p); D-(s)

(b) A-(r); B-(p); C-(q); D-(s)

(c) A-(r); B-(s); C-(q); D-(p)

(d) A-(r); B-(s); C-(p); D-(q)

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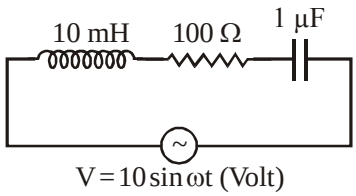
27. Referring to the given circuit, match column-I with column-II



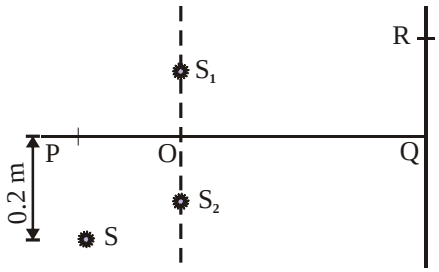
	Column-I		**Column-II**
A.	For ω = 8000 rad/s	(p)	Peak current in the circuit is less than 0.1 A
B.	For ω = 10000 rad/s	(q)	Voltage across the combination and the current are in same phase
C.	For ω = 10500 rad/s	(r)	Voltage across the combination leads the current
D.	For ω = 10000 rad/s, if R = 50 Ω instead of 100 Ω	(s)	Current through the circuit leads the voltage across it

(a) A-(p); B-(q),(r); C-(p),(s); D-(s) (b) A-(p),(s); B-(q); C-(p),(r); D-(q)

(c) A-(r),(s); B-(q); C-(p),(r); D-(p) (d) A-(q); B-(q),(r); C-(s); D-(p),(q)

Comprehension (Q. No. 28 to Q. No. 30)

In Young's double slit experiment, the distance between the slits S_1 and S_2 is 0.5 mm. POQ is the line perpendicular to the line S_1 S_2 and passing through O, the middle point of S_1 and S_2. A monochromatic light source is kept at 20 cm below P and 1 m from the slits. The distance between the slits and the screen is 1 m.



28. The central bright fringe is found to be at R. Then QR is

(a) 0.1 m (b) 0.2 m (c) 0.3 m (d) 0.4 m

29. If one of the slits (say S_1) is covered by a transparent slab I of refractive index $\mu_1 = 1.5$ and thickness $t_1 = 1$ mm, then the new position of central maxima is R´. Then R´Q is

(a) 1.1 m (b) 1.2 m (c) 1.3 m (d) 1.4 m

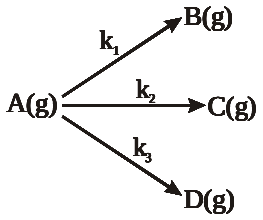
30. The other slit S_2 is also covered by a slab II of thickness 1 mm and refractive index μ_2 due to which the central bright fringe is found to be at Q. Then the refractive index of the slab II is

(a) 1.4 (b) 1.5 (c) 1.6 (d) 1.55

- : Rough Space : -

CHEMISTRY

31. A gaseous compound A reacts by three independent first order processes (as shown in figure) with rate constant 2×10^{-3}, 3×10^{-3} and 1.93×10^{-3} sec^{-1} for products B, C and D respectively. If initially pure A was taken in a closed container with P = 8 atm, then the partial pressure of B (in atm) after 100 sec form start of experiment



(a) 0.288 (b) 0.577 (c) 1.154 (d) none of these

32. For reaction A $\longrightarrow$ B the rate constant $k_1 = A_1 e^{-Ea_1/(RT)}$ and for the reaction X $\longrightarrow$ Y, the rate constant $k_2 = A_2 e^{-Ea_2/(RT)}$. If $A_1 = 10$, $A_2 = 1000$ and $E_{a_1} = 600$ cal/mol, $E_{a_2} = 1800$ cal/mol, then the temperature at which $k_1 = k_2$ is (Given: R = 2cal/K-mol).

(a) 1200 K (b) 1200×4.606 K (c) $\frac{1200}{4.606}$ K (d) $\frac{600}{4.606}$ K

33. Calculate the emf (in V) of the cell

$$\underset{0.1\text{bar}}{\text{Pt} \mid \text{H}_2(\text{g}) \mid} \underset{0.1\text{M}}{\text{BOH(aq)}} \parallel \underset{0.1\text{M}}{\text{HA(aq)}} \mid \underset{1\text{bar}}{\text{H}_2(\text{g}) \mid \text{Pt}}$$

Given: $K_a(HA) = 10^{-7}$, $K_b(BOH) = 10^{-5}$

(a) 0.39 V (b) 0.30 V (c) 0.93 V (d) none of these

34. Given the following molar conductivities at 25°C; HCl –426 Ω^{-1} cm^2 mol^{-1}; NaCl – 126Ω^{-1} cm^2 mol^{-1}, NaC (sodium crotonate), 83Ω^{-1} cm^2 mol^{-1}. What is the ionization constant of crotonic acid? If the conductivity of a 0.001 M crotonic acid solution is 3.83×10^{-5} Ω^{-1} cm^{-1}?

(a) 10^{-5} (b) 1.11×10^{-5} (c) 1.11×10^{-3} (d) 0.01

- : Rough Space : -

35. A 0.10 M solution of a monoprotic acid (d = 1.01 g/cm^3) is 5% ionized. What is the freezing point of the solution? The mol. wt. of the acid is 300 and K_f (H_2O) = 1.86C/m.

(a) – 0.186°C (b) – 0.190°C (c) – 0.199°C (d) none of these

36. Ratio of $\frac{\Delta T_b}{K_b}$ of 10g AB_2 and 14g A_2B per 100g of solvent in their respective, solution (AB_2 and A_2B both are non-electrolytes) is 1 mol/kg in both cases. Hence, atomic wt. of A and B are respectively

(a) 100, 40 (b) 60, 20 (c) 20, 60 (d) none of these

37. When heated above 916°C, iron changes its bcc crystalline form to fcc without the change in the radius of atom. The ratio of density of the crystal before heating and after heating is

(a) 1.069 (b) 0.918 (c) 0.725 (d) 0.231

38. The packing efficiency of a simple cubic crystal with an interestitial atom exactly fitting at the body centre is

(a) 0.48 (b) 0.52 (c) 0.73 (d) 0.91

39. Under the influence of an electric field, the particles in a sol migrate towards cathode. The coagulation of the same sol is studied using NaCl, Na_2SO_4 and Na_3PO_4 solutions. Their coagulating values will be in maximum for

(a) NaCl (b) Na_2SO_4 (c) Na_3PO_4 (d) same for all

40. What is the magnetic moment (spin only) and hybridisation of the brown ring complex $[Fe(H_2O)_5NO]SO_4$?

(a) $\sqrt{3}$ BM, sp^3d^2 (b) $\sqrt{3}$ BM, $d^2 sp^3$ (c) $\sqrt{15}$ BM, $sp^3 d^2$ (d) $\sqrt{15}$ BM, $d^2 sp^3$

41. Choose incorrect stability order

(a) $[Cu(NH_3)_4]^{2+} < [Cu(en)_2]^{2+} < [Cu(trien)]^{2+}$ (b) $[Fe(H_2O)_6]^{3+} < [Fe(NO_2)_6]^{3+} < [Fe(NH_3)_6]^{3+}$

(c) $[Co(H_2O)_6]^{3+} < [Rh(H_2O)_6]^{3+} < [Ir(H_2O)_6]^{3+}$ (d) $[Cr(NH_3)_6]^{1+} < [Cr(NH_3)_6]^{2+} < [Cr(NH_3)_6]^{3+}$

- : Rough Space : -

42. A metal M and its compound can give the following observable changes in a consequence of reactions

$$M \xrightarrow[HNO_3]{\text{dilute}} \boxed{\begin{matrix}\text{Colurless}\\ \text{solutions}\end{matrix}} \xrightarrow[NaOH]{\text{aqueous}} \boxed{\begin{matrix}\text{White}\\ \text{precipitate}\end{matrix}} \xrightarrow[NaOH]{\text{excess}} \boxed{\begin{matrix}\text{Colurless}\\ \text{solutions}\end{matrix}} \xrightarrow{H_2S\ (aq)} \boxed{\begin{matrix}\text{White}\\ \text{precipitate}\end{matrix}}$$

(a) Mg (b) Pb (c) Zn (d) Sn

43. Which two sets of reactants best represent the amphoteric character of $Zn(OH)_2$?

Set-I: $Zn(OH)_2(s)$ and $OH^-(aq)$ Set-II: $Zn(OH)_2(s)$ and $H_2O(l)$

Set-III: $Zn(OH)_2(s)$ and $H^+(aq)$ Set-IV: $Zn(OH)_2(s)$ and $NH_3(aq)$

(a) I and II (b) I and III (c) II and IV (d) III and IV

44. $(X) + K_2CO_3 + Air \xrightarrow{heat} (Y)$; $(Y) + Cl_2 \rightarrow (Z)$ Pink

Which of the following is correct?

(a) X = black, MnO_2, Y= blue, K_2CrO_4, Z = $KMnO_4$

(b) X = green, Cr_2O_3, Y= yellow, K_2CrO_4, Z = $K_2Cr_2O_7$

(c) X = black, MnO_2, Y = green, K_2MnO_4, Z = $KMnO_4$

(d) X = black, Bi_2O_3, Y= colourless, $KBiO_2$, Z = $KBiO_3$

45. Which of the following complex compound(s) is/are paramagnetic and low spin?

I. $K_3[Fe(CN_6)]$ II. $[Ni(CO)_4]^0$ III. $[Cr(NH_3)_6]^{3+}$ IV. $[Mn(CN)_6]^{4-}$

Choose the correct code:

(a) I only (b) II and III (c) I and IV (d) IV only

46. Which of the following is not optically active?

(a) $[Co(en)_3]^{3+}$ (b) $[Cr(Ox)_3]^{3-}$

(c) cis-$[CoCl_2(en)_2]^+$ (d) trans-$[CoCl_2(en)_2]^+$

- : Rough Space : -

47. Which of the following on heating produces NO_2?

(a) $NaNO_3$ (b) $AgNO_3$ (c) NH_4NO_3 (d) NH_4NO_2

48. Which of the correct sequence in the following properties. For the correct order mark (T) and for the incorrect order mark (F):

(a) Acidity order: $SiF_4 < SiCl_4 < SiBr_4 < SiI_4$

(b) Melting point: $NH_3 > SbH_3 > AsH_3 > PH_3$

(c) Boiling point: $NH_3 > SbH_3 > AsH_3 > PH_3$

(d) Dipole moment order: $NH_3 > SbH_3 > AsH_3 > PH_3$

(a) FTFT (b) TFTF (c) FFTT (d) FFTF

49. $A + H_2O \rightarrow B + HCl$; $B + H_2O \rightarrow C + HCl$

Compound (A), (B) and (C) will be respectively

(a) PCl_5, $POCl_3$, H_3PO_3 (b) PCl_5, $POCl_3$, H_3PO_4

(c) $SOCl_2$, $POCl_3$, H_3PO_4 (d) PCl_3, $POCl_3$, H_3PO_4

50. $Cl_2(g) + Ba(OH)_2 \rightarrow X(aq). + BaCl_2 + H_2O$

$X + H_2SO_4 \rightarrow Y + BaSO_4$

$Y \xrightarrow[\Delta, 36° k]{\Delta} Z + H_2O + O_2$

Y and Z are respectively

(a) $HClO_4$, ClO_2 (b) $HClO_3$, ClO_2 (c) $HClO_3$, ClO_6 (d) $HClO_4$, Cl_2O_7

51. XeF_6 dissolves in anhydrous HF to give a good conducting solution which contains

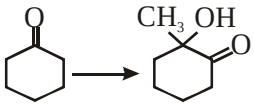
(a) H^+ and XeF_7^- ion (b) HF_2^- and XeF_5^+ ions

(c) $HXeF_6^+$ and F^- ions (d) none of these

- : Rough Space : -

52. CrO_4^{2-} (yellow) changes to $Cr_2O_7^{2-}$ (orange) in pH = *x* and vice-versa in pH = *y*. Hence, *x* and *y* are

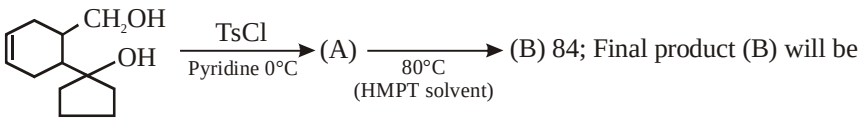
(a) 6, 8 (b) 6, 5 (c) 8, 6 (d) 7, 7

53. 

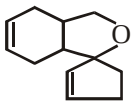
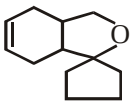
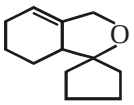
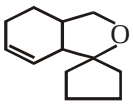
(1) CH_3MgBr/H^+ (2) $KMnO_4$ (cold) (3) CrO_3 (4) H^+/Δ

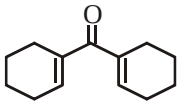
For the above conversion the correct order of reagents used is

(a) $1 \rightarrow 2 \rightarrow 3 \rightarrow 4$ (b) $1 \rightarrow 4 \rightarrow 3 \rightarrow 2$ (c) $1 \rightarrow 4 \rightarrow 2 \rightarrow 3$ (d) $2 \rightarrow 3 \rightarrow 4 \rightarrow 1$

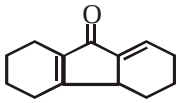
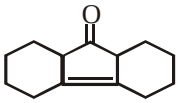
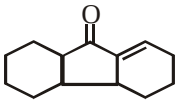
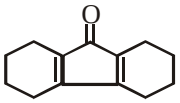
54. 

(B) 84; Final product (B) will be

(a)  (b)  (c)  (d) 

55. 

(A), Product (A) is

(a)  (b)  (c)  (d) 

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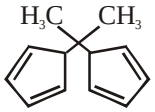
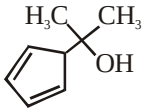
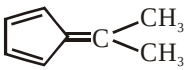
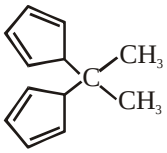
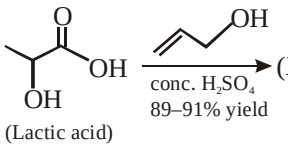
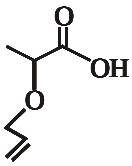
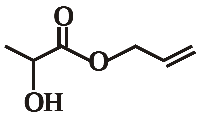
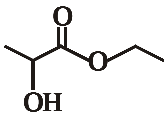
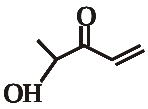
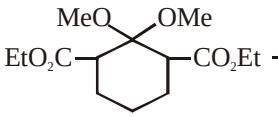
56. In the reaction  + CH_3COCH_3 $\xrightarrow[\text{Heat}]{\text{EtONa/EtOH}}$ X, the product (X) is

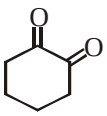
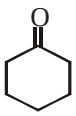
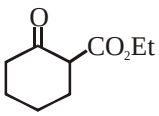
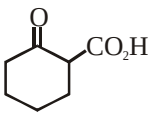
(a)  (b)  (c)  (d) 

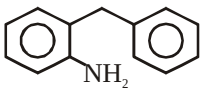
57.  (X) + H_2O. Product (X) of the reaction is

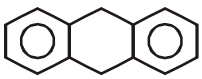
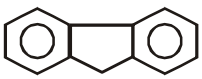
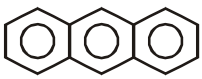
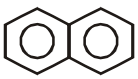
(Lactic acid)

(a)  (b)  (c)  (d) 

58.  (A), Product (A) obtained is

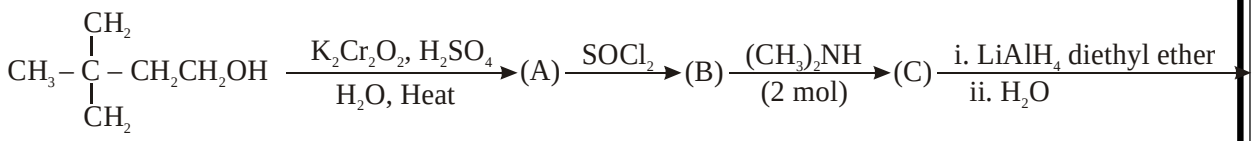
(a)  (b)  (c)  (d) 

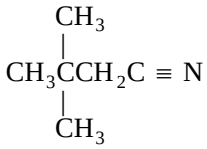
59.  (A); Product of this reaction is:

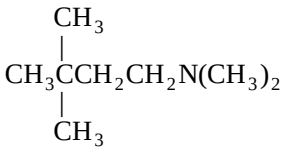
(a)  (b)  (c)  (d) 

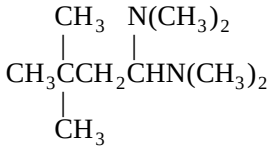
- : Rough Space : -

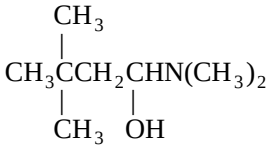
60. Identify product (D) in the following reaction sequence.



(a) 

(b) 

(c) 

(d) 

- : Rough Space : -

Physics Class-XII Answers

1. (b)	2. (d)	3. (c)	4. (c)	5. (c)
6. (a)	7. (a)	8. (d)	9. (c)	10. (d)
11. (b)	12. (d)	13. (c)	14. (c)	15. (b)
16. (d)	17. (d)	18. (d)	19. (d)	20. (d)
21. (b)	22. (b)	23. (b)	24. (a)	25. (d)
26. (c)	27. (b)	28. (b)	29. (b)	30. (c)

Chemistry Class-XII Answers

31. (c)	32. (c)	33. (a)	34. (b)	35. (c)
36. (b)	37. (b)	38. (c)	39. (a)	40. (c)
41. (b)	42. (c)	43. (b)	44. (c)	45. (c)
46. (d)	47. (b)	48. (a)	49. (b)	50. (b)
51. (b)	52. (a)	53. (c)	54. (b)	55. (c)
56. (b)	57. (b)	58. (b)	59. (b)	60. (b)

- : Rough Space : -