



# VIDYAPEETH

An IIT Alumni Body

IIT Academy

Premier Institute For IIT JEE (Main & Advanced)/KVPY/OLYMPIAD/NTSE

## SAMPLE PAPER

Time : 3 :00 hours.

(Class 11<sup>th</sup>)

Maximum Marks : 360

### INSTRUCTIONS

DO NOT BREAK THE SEAL WITHOUT BEING INSTRUCTED TO DO SO BY THE INVIGILATOR

1. Immediately fill in the particulars on this page of the Test Booklet with **Black Ball Point Pen**. Use of pencil is strictly prohibited.
2. The Answer Sheet is kept inside this Test Booklet. When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particular carefully.
3. The test is of **3 hours** duration.
4. The Test Booklet consists of **90** questions. The maximum marks are **360**.
5. There are three parts in the question paper A, B, C consisting of **Physic, Chemistry** and **Mathematics** having total 30 questions in each part of equal weightage. Each question is allotted **4 (four) marks** for correct response.
6. *Candidates will be awarded marks as stated above in Instructions No. 5 for correct response of each question.  $\frac{1}{4}$  (one fourth) marks will be deducted for indicating incorrect response of each question. No deduction from the total score will be made if no response is indicated for an item in the answer sheet.*
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 deducted accordingly as per instructions 6 above.
8. No candidate is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, any electronic device, etc., except the Admit Card inside the examination room/hall.
9. Rough work is to be done on the space provided for this purpose in the Test Booklet only. This space is given at the bottom of each page and in one page at the end of the booklet.
10. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator on duty in the Room/Hall. **However, the candidates are allowed to take away this Test Booklet with them.**
11. The CODE for this Booklet **A**. Make sure that the CODE printed on the Answer Sheet is the same as that on this booklet. In case of discrepancy, the candidate should immediately report the matter to the Invigilator for replacement of both the Test Booklet and the Answer Sheet.
12. **Do not fold or make any stray marks on the Answer Sheet.**

Name of the Candidate (in Capital letters) : \_\_\_\_\_

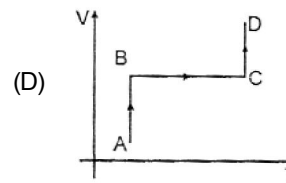
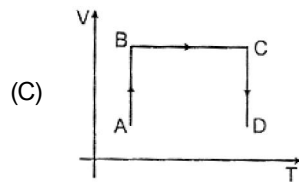
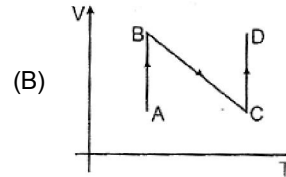
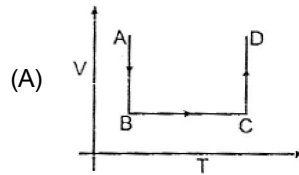
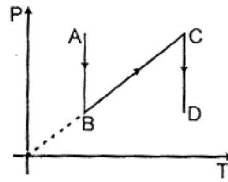
Roll Number : in figures :        in words : \_\_\_\_\_

Name of Examination Centre (in Capital letters) : \_\_\_\_\_

Candidate's Signature : \_\_\_\_\_ Invigilator's Signature : \_\_\_\_\_

## PART - I PHYSICS

Q.1 P-T diagram is shown below then choose the corresponding V-T diagram



Q.2 Which of the following will have maximum total kinetic energy at temperature 300 K.

(A) 1 kg, H<sub>2</sub>

(B) 1 kg, He

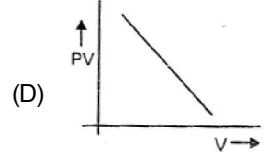
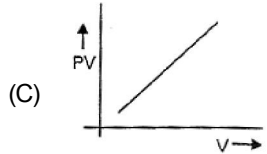
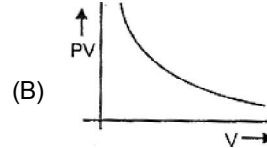
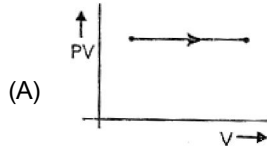
(C)  $\frac{1}{2}$  kgH<sub>2</sub> +  $\frac{1}{2}$  kgHe

(D)  $\frac{1}{4}$  kgH<sub>2</sub> +  $\frac{3}{4}$  kgHe

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Q.3 For an adiabatic process graph between PV & V for a sample of ideal gas will be :

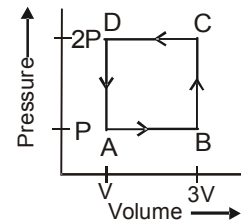


Q.4 Four particles have velocities 1, 0, 2, 3 m/s. The root mean square velocity of the particles is: (in m/s)

- (A) 3.5                                      (B)  $\sqrt{3.5}$                                       (C) 1.5                                      (D)  $\sqrt{\frac{14}{3}}$

Q.5 A thermodynamic system is taken through the cycle ABCD as shown in figure. Heat rejected by the gas during the cycle is :

- (A) 2 PV                                      (B) 4 PV  
(C)  $\frac{1}{2}PV$                                       (D) PV



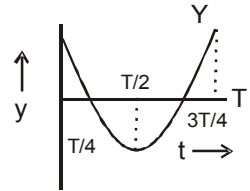
Q.6 The change in internal energy of two moles of a gas during adiabatic expansion is found to be -100 joule. The work done during the process is -

- (A) 100 joule                                      (B) -100 joule  
(C) zero                                      (D) 200 joule

**Space for rough works**



Q.12 The graph in the figure shows how the displacement of a particle describing S.H.M. varies with time. Which one of the following statements is not true ?



- (A) The force is zero at time  $\frac{3T}{4}$   
 (B) The velocity is maximum at time  $T/2$   
 (C) The acceleration is maximum at time  $T$  (D) The P.E. = total energy at time  $T/2$

Q.13 For a particle executing SHM, which of the following statements does not hold good ?

- (A) The total energy of the particle always remains the same  
 (B) The restoring force is always directed towards a fixed point  
 (C) The restoring force is maximum at the extreme positions  
 (D) The velocity of the particle is minimum at the centre of motion of the particle

Q.14 The total energy of the body executing S.H.M. is  $E$ . Then the kinetic energy when the displacement is half of the amplitude, is

- (A)  $\frac{E}{2}$  (B)  $\frac{E}{4}$  (C)  $\frac{3E}{4}$  (D)  $\frac{\sqrt{3}}{4}E$

Q.15 A linear harmonic oscillator of force constant  $2 \times 10^6$  N/m and amplitude 0.01 m has a total mechanical energy of 160 joules. Its -

- (A) Maximum potential energy is 100 J (B) Maximum K.E. is 100 J  
 (C) Maximum P.E. is 40 J (D) Minimum P.E. is zero

Q.16 A particle executing S.H.M of amplitude 4 cm and  $T = 4$  sec. The time taken by it to move from positive extreme position to half the amplitude is -

- (A) 1 sec (B)  $\frac{1}{3}$  sec (C)  $\frac{2}{3}$  sec (D)  $\frac{\sqrt{3}}{2}$  sec

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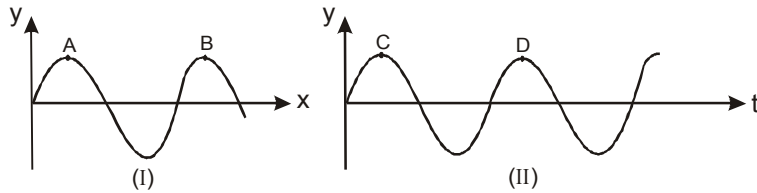
- Q.17 One mass  $m$  is suspended from a spring. Time period of oscillation is  $T$ . Now if spring is divided into  $n$  pieces & these are joined in parallel order then time period of oscillation if same mass is suspended.
- (A)  $n^2T$  (B)  $nT$  (C)  $\frac{T}{n}$  (D)  $\frac{T}{n^2}$
- Q.18 Two objects A and B of equal mass are suspended from two springs of spring constants  $k_A$  and  $k_B$  if the objects oscillate vertically in such a manner that their maximum kinetic energies are equal, then the ratio of their amplitudes is
- (A)  $\frac{K_B}{K_A}$  (B)  $\sqrt{\frac{K_B}{K_A}}$  (C)  $\frac{K_A}{K_B}$  (D)  $\sqrt{\frac{K_A}{K_B}}$
- Q.19 If Length of simple pendulum is increased by 6% then percentage change in time-period will be
- (A) 3% (B) 9% (C) 6% (D) 1/9%
- Q.20 The amplitude of a damped harmonic oscillator become halved in 1 minute. After three minutes the amplitude will become  $1/x$  of initial amplitude where  $x$  is -
- (A) 8 (B) 2 (C) 3 (D) 4
- Q.21 Two particles of medium disturbed by the wave propagation are at  $x_1 = 0$  and  $x_2 = 1$  cm. The respective displacement (in cm) of the particles can be given by the equations :  
 $y_1 = 2\sin 3\pi t$ ,  $y_2 = 2\sin(3\pi t - \pi/8)$  The wave velocity is :
- (A) 16 cm/sec (B) 24 cm/sec (C) 12 cm/sec (D) 8 cm/sec.
- Q.22 A string is stretched by a force of 40N . The mass of 10 m length of this string is 0.01kg. The speed of transverse waves in this string will be -
- (A) 400 m/s (B) 40 m/s (C) 200 m/s (D) 80 m/s

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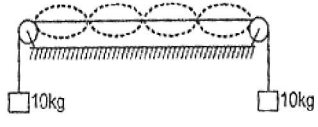
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- Q.23 The same progressive wave is represented by two graphs I and II. Graph I shows how the displacement 'y' varies with the distance x along the wave at a given time. Graph II shows how y varies with time t at a give point on the wave. The ratio of measurements AB to CD, marked on the curves, represents



- (A) Wave number k  
(B) Wave speed V.  
(C) Frequency v.  
(D) Angular frequency  $\omega$ .
- Q.24 A travelling wave  $y = A \sin(kx - \omega t + \theta)$  passes from a heavier string to a lighter string. The reflected wave has amplitude 0.5 A. The junction of the strings is at  $x = 0$ . The equation of the reflected wave is :
- (A)  $y' = 0.5A \sin(kx + \omega t + \theta)$   
(B)  $y' = -0.5A \sin(kx + \omega t + \theta)$   
(C)  $y' = -0.5A \sin(kx - \omega t - \theta)$   
(D)  $y' = -0.5A \sin(kx + \omega t - \theta)$
- Q.25 Which of the following travelling wave will produce standing wave, with node at  $x = 0$ , when superimposed on  $y = \sin(\omega t - kx)$
- (A)  $A \sin(\omega t + kx)$       (B)  $A \sin(\omega t + kx + \pi)$       (C)  $A \cos(\omega t + kx)$       (D)  $A \cos(\omega t + kx + \pi)$
- Q.26 A standing wave pattern is formed on a string. One of the waves is given by equation  $y_1 = a \cos(\omega t - kx + \pi/3)$  then the equation of the other wave such that at  $x = 0$  a node is formed.
- (A)  $y_2 = a \sin(\omega t + kx + \frac{\pi}{3})$   
(B)  $y_2 = a \cos(\omega t + kx + \frac{\pi}{3})$   
(C)  $y_2 = a \cos(\omega t + kx + \frac{2\pi}{3})$   
(D)  $y_2 = a \cos(\omega t + kx + \frac{4\pi}{3})$

**Space for rough works**

- Q.27 Consider following statements and choose the correct option;  
 $S_1$  : A standing wave pattern is formed in a string. The power transfer through a point (other than node and antinode) is zero always.  
 $S_2$  : If the equation of transverse wave is  $y = 5 \sin 2\pi \left[ \frac{t}{0.04} - \frac{x}{40} \right]$ , where distance is in cm and time in second, then the wavelength will be 40 cm.  
 $S_3$  : The phase difference between two points separated by 1 m in a wave of frequency 120 Hz is  $90^\circ$ . The velocity of the wave is 480 m/s.
- (A) F T T                      (B) T T F                      (C) T F T                      (D) F F F
- Q.28 Two small boats are 10m apart on a lake. Each pops up and down with a period of 4.0 seconds due to wave motion on the surface of water. When one boat is at its highest point, the other boat is at its lowest point. Both boats are always within a single cycle of the waves. The speed on the waves in m/s is :
- (A) 2 m/s                      (B) 2.5 m/s                      (C) 10 m/s                      (D) 5 m/s
- Q.29 Three waves of equal frequency having amplitudes  $10\mu\text{m}$ ,  $4\mu\text{m}$  and  $7\mu\text{m}$  arrive at a given point with a successive phase difference of  $\pi/2$ . The amplitude of the resulting wave in  $\mu\text{m}$  is
- (A) 10                      (B) 5                      (C) 15                      (D) 20
- Q.30 The length of the wire shown in figure between the pulleys is 1.5 m and its mass is 15 g. What is the frequency of vibration with which the wire vibrates in four loops leaving the middle point of the middle point of the wire between the pulleys at rest ?
- 
- (g  $10 \text{ m/s}^2$ )
- (A)  $\frac{100}{3}$  Hz                      (B)  $\frac{200}{3}$  Hz                      (C)  $\frac{400}{3}$  Hz                      (D)  $\frac{500}{3}$  Hz

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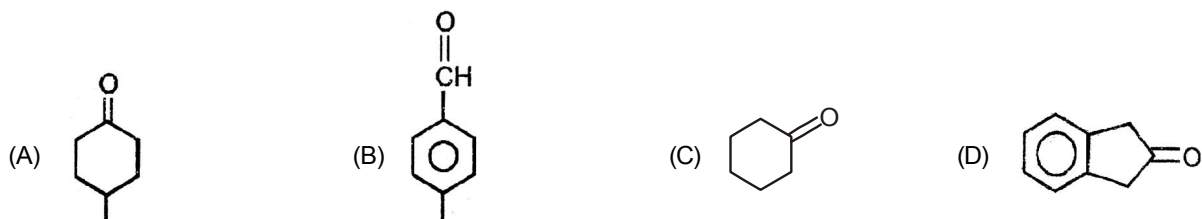
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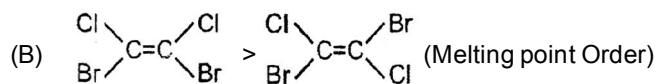
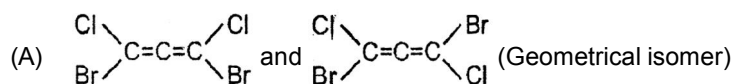


## PART - II CHEMISTRY

Q.31 Which of the following carbonyl compounds will give more than one oxime products on reaction with  $\text{NH}_2 - \text{OH}$ ?



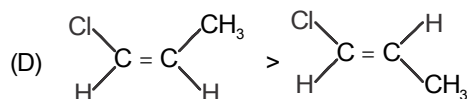
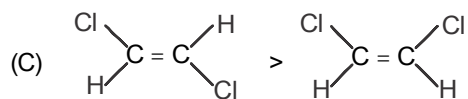
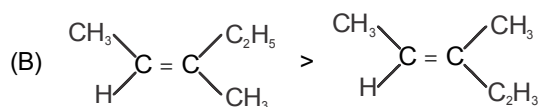
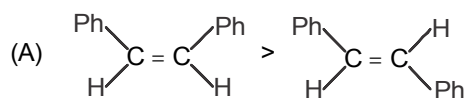
Q.32 Select the correct options :



(C)  $\text{CH}_3\text{CHCl}_2$  (has nonsuperimposable mirror image isomers)

(D)  $\text{CH}_3\text{CHClBr}$  (has nonsuperimposable mirror image isomers)

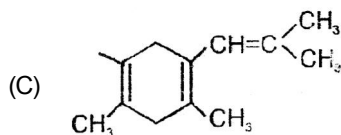
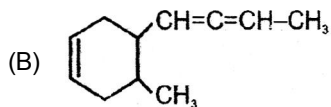
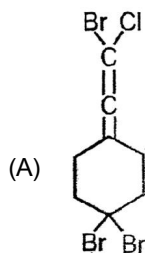
Q.33 Which of the following pairs has correct stability order :



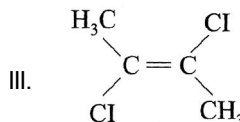
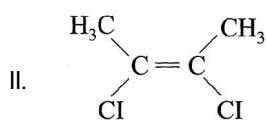
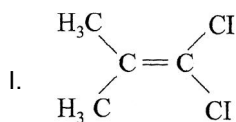
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Q.34 Which of the following compounds can show geometrical isomerism.



Q.35 Arrange the following in decreasing order of dipole moments



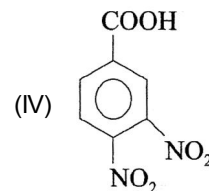
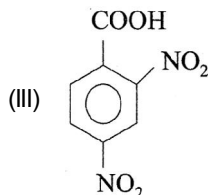
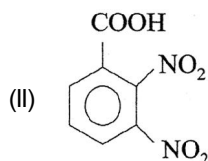
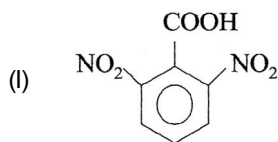
(A) I < II > III

(B) III > II > I

(C) III > I > II

(D) II > I > III

Q.36 Correct acidic strength order is :



(A) III > I > IV > II

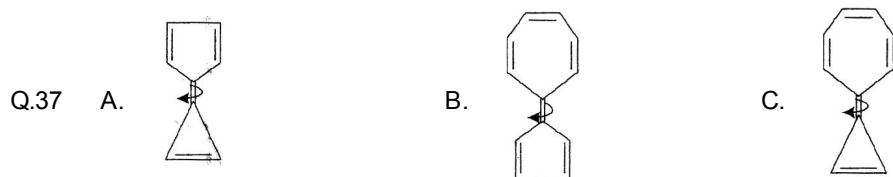
(B) I > III > II > IV

(C) II > III > I > IV

(D) IV > III > II > I

Space for rough works

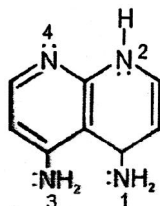




Compare carbon-carbon bond rotation across A, B, and C

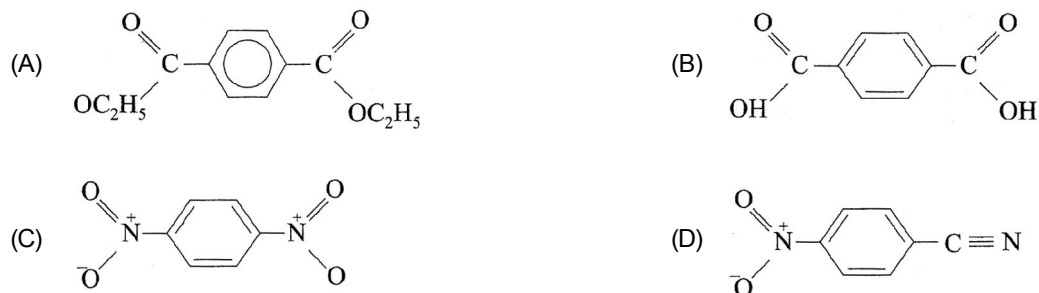
- (A)  $A > B > C$  (B)  $A > C > B$  (C)  $B > A > C$  (D)  $B > C > A$

Q.38 The least basic nitrogen among the following atoms.



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

Q.39 Which compounds should have zero dipole moment ?



Space for rough works

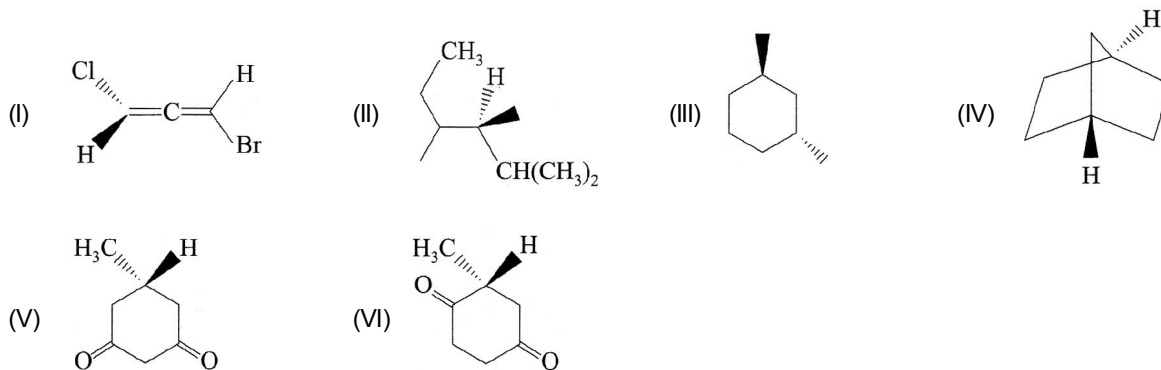




Q.43 Which of the following is unacceptable resonating structure of Buta -1, 2, 3-triene.

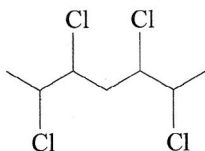
- (A)  $\overset{\ominus}{\text{C}}\text{H}_2 - \text{C} \equiv \text{C} - \overset{\ominus}{\text{C}}\text{H}_2$  (B)  $\text{CH}_2 = \text{C} = \text{C} = \text{CH}_2$   
 (C)  $\overset{\ominus}{\text{C}}\text{H}_2 - \text{C} \equiv \text{C} - \overset{\ominus}{\text{C}}\text{H}_2$  (D)  $\overset{\bullet}{\text{C}}\text{H}_2 - \text{C} \equiv \text{C} - \overset{\bullet}{\text{C}}\text{H}_2$

Q.44 Which of the following molecule is/are chiral



- (A) I and II (B) III and IV (C) II, IV and VI (D) I, II, III and VI

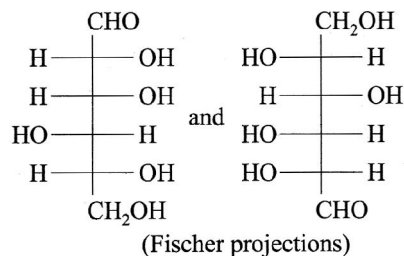
Q.45 The maximum number of stereoisomers that could exist for the compound below ?



- (A) 6 (B) 8 (C) 10 (D) 16

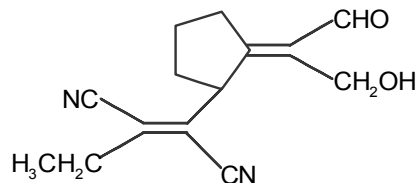
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Q.46 What is the relationship between the molecules in the following pairs ?



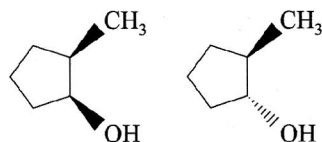
- (A) enantiomers      (B) diastereomers      (C) identical      (D) structural isomers

Q.47 What are the correct designations for the structures below ?



- (A) E, E      (B) Z, E      (C) E, Z      (D) Z, Z

Q.48 The following compounds are identical with respect to :

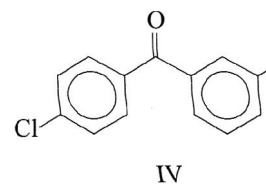
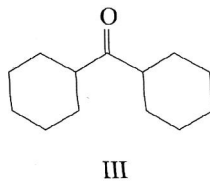
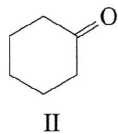
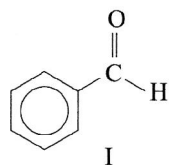


- (A) molecular composition      (B) boiling point  
(C) melting point      (D) IUPAC name

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Q.49 Which of the following will form only one oxime on reaction with  $\text{NH}_2\text{OH}$  solution?



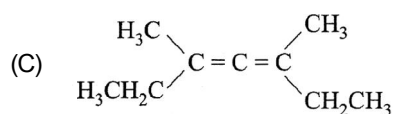
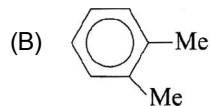
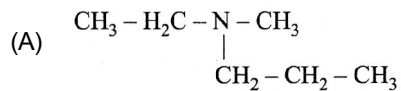
(A) I, II

(B) II, III

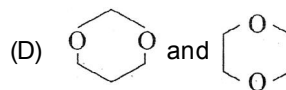
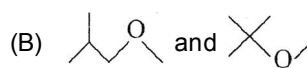
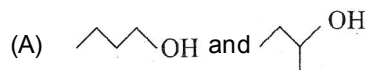
(C) I, IV

(D) II, III, IV

Q.50 Which of the following molecule/s is/are chiral :

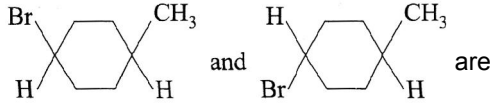


Q.51 Which of the following pairs of compounds are functional isomers ?

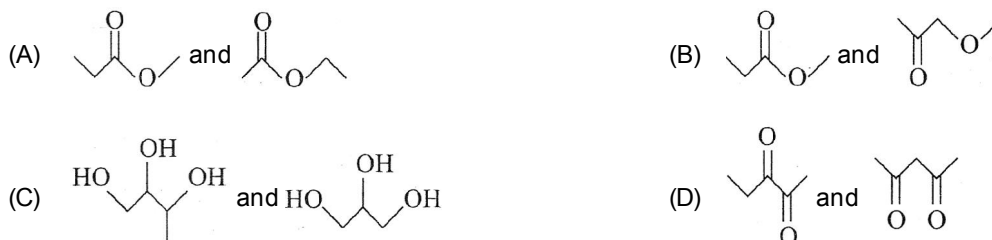


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- Q.52  are  
 (A) Identical (B) Diastereomers (C) Conformers (D) Homologs

Q.53 Which of the following pairs of compounds are functional isomers ?



Q.54 2-butyne and 1,3-butadiene are :

- (A) chain isomer (B) position isomer  
 (C) functional isomer (D) tautomers

Q.55 Which of the following pairs of compounds may be regarded both as functional isomer and position isomer ?

- (A) Benzyl alcohol and methoxy benzene (B) o-cresol and p-cresol  
 (C) Benzyl alcohol and o-cresol (D) Benzyl alcohol and benzyl methyl ether

Q.56 Maleic acid and fumaric acid are :

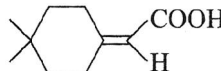
- (A) position isomer (B) geometrical isomer  
 (C) enantiomers (D) functional isomer

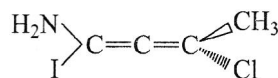
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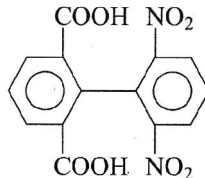


Q.57 Which of the following pairs is correctly method ?

(A)  $\text{CH}_3 - \text{CH} = \text{C} = \text{CH}_2$ ; optically active

(B) ; optically active

(C) ; optically active

(D) ; optically active

Q.58 Total number of isomers (stereo & structural ) possible for  $\text{C}_5\text{H}_{10}$  are

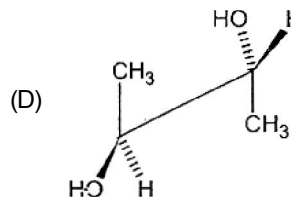
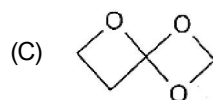
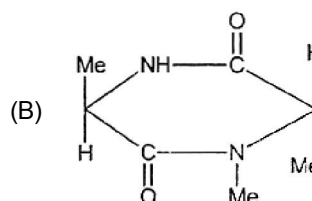
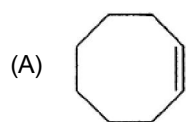
(A) 5

(B) 6

(C) 7

(D) 8

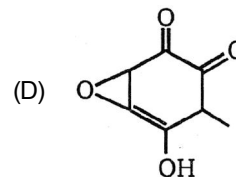
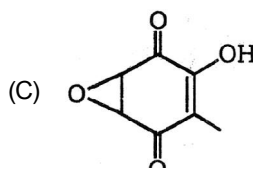
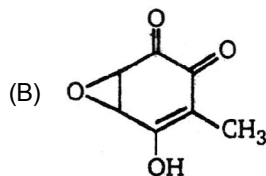
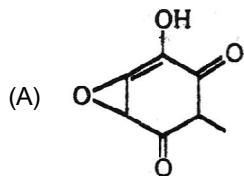
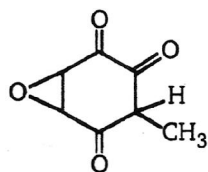
Q.59 Which of the following is optically active ?



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Q.60 Identify most stable enol form of terric acid :



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## PART - III MATHEMATICS

- Q.61 If  $z(1+a) = b+ic$  and  $a^2 + b^2 + c^2 = 1$ , then  $[(1+iz)/(1-iz)] =$
- (A)  $\frac{a+ib}{1+c}$                       (B)  $\frac{b-ic}{1+a}$                       (C)  $\frac{a+ic}{1+b}$                       (D) None of these
- Q.62 Number of solutions of the equation  $z^3 + [3(\bar{z})^2]/|z| = 0$  where  $z$  is a complex number is
- (A) 2                                      (B) 3                                      (C) 6                                      (D) 5
- Q.63 If  $a^2 + b^2 = 1$ , then  $(1+b+ia)/(1+b+ia) =$
- (A) 1                                      (B) 2                                      (C)  $b+ia$                                       (D)  $a+ib$
- Q.64 Let  $z, w$  be complex numbers such that  $\bar{z} + i\bar{w} = 0$  and  $\arg zw = \pi$  Then  $\arg z$  equals
- (A)  $\frac{\pi}{4}$                                       (B)  $\frac{\pi}{2}$                                       (C)  $\frac{3\pi}{4}$                                       (D)  $\frac{5\pi}{4}$
- Q.65 If  $|z^2 - 3| = 3|z|$ , then the maximum value of  $|z|$  is
- (A) 1                                      (B)  $\frac{3+\sqrt{21}}{2}$                                       (C)  $\frac{\sqrt{21}-3}{2}$                                       (D) None of these
- Q.66 If  $|2z-1|=|z-2|$  and  $z_1, z_2, z_3$  are complex numbers such that  $|z_1 - \alpha| < a, |z_2 - \beta| < \beta$ , then  $\left| \frac{z_1 + z_2}{a+\beta} \right|$
- (A)  $< |z|$                                       (B)  $< 2|z|$                                       (C)  $> |z|$                                       (D)  $> 2|z|$
- Q.67 If  $z = (\lambda + 3) - i\sqrt{5 - \lambda^2}$ , then the locus of  $z$  is
- (A) Ellipse                                      (B) Semicircle                                      (C) Parabole                                      (D) Straight line

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- Q.75 The equation of the line that passes through  $(10, -1)$  and is perpendicular to  $y = \frac{x^2}{4} - 2$  is
- (A)  $4x + y = 39$  (B)  $2x + y = 19$  (C)  $x + y = 9$  (D)  $x + 2y = 8$
- Q.76 The length of the shortest normal chord of the parabola  $y^2 = 4ax$  is
- (A)  $2a\sqrt{27}$  (B)  $9a$  (C)  $a\sqrt{54}$  (D) None of these
- Q.77 A variable chord of the hyperbola  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ , ( $b > a$ ), subtends a right angle at the center of the hyperbola if this chord touches
- (A) A fixed circle concentric with the hyperbola (B) A fixed ellipse concentric with hyperbola  
(C) A fixed hyperbola concentric with the hyperbole (D) A fixed parabole having vertex at  $(0, 0)$
- Q.78 The asymptotes of the hyperbola  $\frac{x^2}{a_1^2} - \frac{y^2}{b_1^2} = 1$  and  $\frac{x^2}{a_2^2} - \frac{y^2}{b_2^2} = 1$  are perpendicular to each other. Then,
- (A)  $a_1/a_2 = b_1/b_2$  (B)  $a_1a_2 = b_1b_2$  (C)  $a_1a_2 + b_1b_2 = 0$  (D)  $a_1 - a_2 = b_1 - b_2$
- Q.79 The chords of contact of a point P w.r.t a hyperbola and its auxiliary circle are at right angle. Then the point P lies on
- (A) Conjugate hyperbola (B) One of the directrix  
(C) One of the asymptotes (D) None of these
- Q.80 If two distinct tangents can be drawn from the point  $(\alpha, 2)$  on different branches of the hyperbola  $\frac{x^2}{9} - \frac{y^2}{16} = 1$ , then
- (A)  $|\alpha| < 3/2$  (B)  $|\alpha| > 2/3$  (C)  $|\alpha| > 3$  (D) None of these

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- Q.81 A hyperbola passes through (2, 3) and has asymptotes  $3x - 4y + 5$  and  $12x + 5y - 40 = 0$ . Then, the equation of its transverse axis is
- (A)  $77x - 21y - 265 = 0$  (B)  $21x - 77y + 265 = 0$   
 (C)  $21x - 77y - 265 = 0$  (D)  $21x + 77y - 265 = 0$
- Q.82 The asymptotes of the hyperbola  $xy = hx + ky$  are
- (A)  $x - k = 0$  and  $y - h = 0$  (B)  $x + k = 0$  and  $y + k = 0$   
 (C)  $x - k = 0$  and  $y + h = 0$  (D)  $x + k = 0$  and  $y - h = 0$
- Q.83 If the normals at  $P(\theta)$  and  $Q(\pi/2 + \theta)$  to the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  meet the major axis at  $G$  and  $g$ , respectively, then  $PG^2 + Qg^2 =$
- (A)  $b^2(1 - e^2)(2 - e^2)$  (B)  $a^2(e^4 - e^2 + 2)$   
 (C)  $a^2(1 + e^4)(e^2 + 2)$  (D)  $b^2(1 + e^4)(e^2 + 2)$
- Q.84 The line  $y = mx - \frac{(a^2 - b^2)m}{\sqrt{a^2 + b^2m^2}}$  is normal to the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  for all values of  $m$  belonging to
- (A)  $(0, 1)$  (B)  $(0, \infty)$  (C)  $\mathbb{R}$  (D) None of these
- Q.85 The equation of the line passing through the center and bisecting the chord  $7x + y - 1 = 0$  of the ellipse  $\frac{x^2}{1} + \frac{y^2}{7} = 1$  is
- (A)  $x = y$  (B)  $2x = y$  (C)  $x = 2y$  (D)  $x + y = 0$

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- Q.86 The equation of the chord of contact of the pair of tangents drawn to the ellipse  $4x^2 + 9y^2 = 36$  from the point  $(m, n)$  where  $m \cdot n = m + n$ ,  $m, n$  being nonzero positive integers, is
- (A)  $2x + 9y = 18$                       (B)  $2x + 2y = 1$                       (C)  $4x + 9y = 18$                       (D) None of these
- Q.87 The number of points on the ellipse  $\frac{x^2}{50} + \frac{y^2}{20} = 1$  from which a pair of perpendicular tangents is drawn to the ellipse  $\frac{x^2}{16} + \frac{y^2}{9} = 1$  is
- (A) 0                                              (B) 2                                              (C) 1                                              (D) 4
- Q.88 The equation of the ellipse whose axes are coincident with the coordinates axes and which touches the straight lines  $3x - 2y - 20 = 0$  and  $x + 6y - 20 = 0$  is
- (A)  $\frac{x^2}{40} + \frac{y^2}{10} = 1$                       (B)  $\frac{x^2}{5} + \frac{y^2}{8} = 1$                       (C)  $\frac{x^2}{10} + \frac{y^2}{40} = 1$                       (D)  $\frac{x^2}{40} + \frac{y^2}{30} = 1$
- Q.89 If  $z = (i)^{(i)^{(i)}}$  where  $i = \sqrt{-1}$ , then  $|z|$  is equal to
- (A) 1                                              (B)  $e^{-\pi/2}$                                       (C)  $e^{-\pi}$                                       (D) None of these
- Q.90 Roots of the equations are  $(z + 1)^5 = (z - 1)^5$  are
- (A)  $\pm i \tan\left(\frac{\pi}{5}\right), \pm i \tan\left(\frac{2\pi}{5}\right)$                                       (B)  $\pm i \cot\left(\frac{\pi}{5}\right), \pm i \cot\left(\frac{2\pi}{5}\right)$
- (C)  $\pm i \cot\left(\frac{\pi}{5}\right), \pm i \tan\left(\frac{2\pi}{5}\right)$                                       (D) None of these

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