



RANKRIDGE IIT JEE/NEET JUNIOR COLLEGE (LONGTERM)

TELANGANA

STREAM: JR MPC
Time: 3:00 Hours

WEEKEND TEST-21

Date: 15-12-2025
Max Marks: 300

SYLLABUS

MATHEMATICS
PHYSICS

CHEMISTRY

- : Multiple product of vectors and 3D coordinate system
- : Oscillations(spring concept and Applications only), Mechanical Properties of Fluids (Excluding Viscosity and Surface Tension)
- : Optical isomerism and electron migration effects _ Inductive effect

MATHEMATICS

(SINGLE CORRECT ANSWER TYPE)

This section contains 20 multiple choice questions. Each question has 4 options (A), (B), (C) and (D) for its answer, out of which ONLY ONE option can be correct.

Marking scheme: +4 for correct answer, 0 if not attempted and -1 in all other cases

1. The fourth vertex of the parallelogram whose consecutive vertices are $(2, 4, -1)$, $(3, 6, -1)$, $(4, 5, 1)$ is
 (A) $(3, 3, 1)$ (B) $(4, -2, -4)$
 (C) $(2, 2/3, 2)$ (D) $(5, 0, 1)$
2. The 1st point of trisection of segment joining $(3, -1, 2)$ and $(9, 5, 2)$ is
 (A) $(5, 1, 5)$ (B) $(5, 1, 2)$
 (C) $(5, 1, 4)$ (D) $(4, 1, 6)$
3. If the point $(a, 8, -2)$ divides the line segment joining the points $(1, 4, 6)$ and $(5, 2, 10)$ in the ratio $m:n$ then $\frac{2m}{n} - \frac{a}{3} =$
 (A) -7 (B) 1
 (C) -2 (D) 3
4. If $(2, 1, 3)$, $(3, 2, 5)$, $(1, 2, 4)$ are the mid points of the sides BC , CA , AB of ΔABC respectively, then the vertex A is
 (A) $(2, 3, 6)$ (B) $(0, 2, 2)$
 (C) $(4, 1, 4)$ (D) $(2, 5, 4)$
5. The point on x -axis which is equidistant to $(2, -1, -4)$, $(-4, 3, 0)$ is
 (A) $\left(\frac{13}{3}, 0, 0\right)$ (B) $\left(\frac{16}{3}, 0, 0\right)$

6. A, B, C are projections of $P(5, -2, 6)$ on coordinate axes then centroid of ΔABC is
 (A) $\left(\frac{10}{3}, \frac{-4}{3}, 4\right)$ (B) $\left(\frac{5}{3}, \frac{-2}{3}, 2\right)$
 (C) $\left(\frac{15}{2}, -3, 4\right)$ (D) $(5, -2, 6)$
7. If $A = (1, 2, 3)$ and $B = (3, 5, 7)$ and P, Q are the points on AB such that $AP = PQ = QB$, then the midpoint of PQ is
 (A) $(2, 3, 5)$ (B) $(2, 3.5, 5)$
 (C) $(2, 4, 5)$ (D) $(4, 7, 10)$
8. In the tetrahedron $ABCD$, $A = (1, 2, -3)$ and $G = (-3, 4, 5)$ is centroid of tetrahedron. If P is the centroid of triangle BCD then $AP =$
 (A) $\frac{4\sqrt{21}}{3}$ (B) $\frac{8\sqrt{21}}{3}$
 (C) $4\sqrt{21}$ (D) $\frac{\sqrt{21}}{3}$
9. The distance between the circumcentre and the orthocentre of the triangle formed by $(1, 2, 3)$, $(3, -1, 5)$; $(4, 0, -3)$ is
 (A) $\frac{1}{2}\sqrt{17}$ (B) $\frac{1}{2}\sqrt{66}$
 (C) $\frac{7}{2}$ (D) $\frac{1}{2}\sqrt{7}$
10. In a triangle ABC , if the mid points of sides AB , BC , CA are $(3, 0, 0)$, $(0, 4, 0)$, $(0, 0, 5)$ respectively, then

$$AB^2 + BC^2 + CA^2 =$$

- (A) 50 (B) 200
 (C) 300 (D) 400
11. A = (2, 4, 5) and B = (3, 5, -4) are two points in XY plane, YZ plane divides AB in the ratios a:b, P:Q respectively then
 $\frac{a}{b} + \frac{P}{Q} \dots$
 (A) $\frac{23}{12}$ (B) $\frac{-7}{12}$
 (C) $\frac{7}{12}$ (D) $\frac{-22}{15}$
12. If $\bar{a}, \bar{b}, \bar{c}$ are non-coplanar vectors and $(\bar{a} + 2\bar{b} + \bar{c}) \cdot (\bar{a} - \bar{b}) \times (\bar{a} - \bar{b} - \bar{c}) = \lambda [\bar{a} \bar{b} \bar{c}]$ then $\lambda =$
 (A) 3 (B) 5
 (C) 7 (D) 8
13. The volume of a parallelopiped whose edges are represented by $-12\hat{i} + \lambda\hat{k}, 3\hat{j} - \hat{k}$ and $2\hat{i} + \hat{j} - 15\hat{k}$ is 546, then $\lambda =$
 (A) -3 (B) -2
 (C) 2 (D) 3
14. The volume of the tetrahedron having the edges $\hat{i} + 2\hat{j} - \hat{k}, \hat{i} + \hat{j} + \hat{k}, \hat{i} - \hat{j} + \lambda\hat{k}$ as coterminous, is $\frac{2}{3}$ cubic units. Then $\lambda =$
 (A) 1 (B) 2
 (C) 3 (D) 4
15. Which of the following is meaningless?
 (A) $(\bar{a} \times \bar{b}) \cdot (\bar{c} \times \bar{d})$ (B) $(\bar{a} \times \bar{b}) \times (\bar{c} \times \bar{d})$
 (C) $(\bar{a} \cdot \bar{b})(\bar{c} \times \bar{d})$ (D) $(\bar{a} \cdot \bar{b}) \times (\bar{c} \times \bar{d})$
16. If the four points $\bar{a}, \bar{b}, \bar{c}, \bar{d}$ are coplanar then $[\bar{b} \bar{c} \bar{d}] + [\bar{c} \bar{a} \bar{d}] + [\bar{a} \bar{b} \bar{d}] =$
 (A) $[\bar{a} \bar{b} \bar{c}]$ (B) $2[\bar{a} \bar{b} \bar{c}]$
 (C) $3[\bar{a} \bar{b} \bar{c}]$ (D) 0
17. Let $\bar{a}, \bar{b}, \bar{c}$ be three vectors having magnitudes 1, 1, 2 respectively. If $\bar{a} \times (\bar{a} \times \bar{c}) + \bar{b} = \bar{0}$ then the angle between \bar{a} and \bar{c} is
 (A) $\frac{\pi}{3}$ (B) $\frac{\pi}{6}$

- (C) $\frac{\pi}{4}$ (D) $\frac{\pi}{2}$
18. If $\bar{a}, \bar{b}, \bar{c}$ are non-coplanar unit vectors such that $\bar{a} \times (\bar{b} \times \bar{c}) = \frac{\bar{b} + \bar{c}}{\sqrt{2}}$ then $(\bar{a}, \bar{b}) =$
 (A) $\frac{3\pi}{4}$ (B) $\frac{\pi}{4}$
 (C) $\frac{\pi}{2}$ (D) π
19. If $\bar{r} \cdot \bar{a} = \bar{r} \cdot \bar{b} = \bar{r} \cdot \bar{c} = 0$ where $\bar{a}, \bar{b}, \bar{c}$ are non-coplanar then
 (A) $\bar{r} \perp \bar{c} \times \bar{a}$ (B) $\bar{r} \perp \bar{a} \times \bar{b}$
 (C) $\bar{r} \perp \bar{b} \times \bar{c}$ (D) $\bar{r} = \bar{0}$
20. The sum of all values of α , for which the points whose position vectors are $\hat{i} - 2\hat{j} + 3\hat{k}, 2\hat{i} - 3\hat{j} + 4\hat{k}, (\alpha + 1)\hat{i} + 2\hat{k}$ and $9\hat{i} + (\alpha - 8)\hat{j} + 6\hat{k}$ are coplanar is equal to
 (A) 6 (B) -2
 (C) 2 (D) 4
- (NUMERICAL VALUE TYPE)
 Section-II contains 5 Numerical Value Type questions.
 Marking scheme: +4 for correct answer, 0 if not attempt and -1 in all other cases
21. In a ΔABC the mid points of the sides AB, BC, CA are respectively $(1, 0, 0), (0, m, 0)$ and $(0, 0, n)$. Then $\frac{AB^2 + BC^2 + CA^2}{l^2 + m^2 + n^2} =$
22. The line passing through the points $(5, 1, a)$ and $(3, b, 1)$ crosses the yz-plane at the point $\left(0, \frac{17}{2}, \frac{-13}{2}\right)$. Then $a+b=$ 10
23. If the vertices of a ΔABC are $A=(2, 3, 5)$, $B=(-1, 3, 2)$, $C=(3, 5, -2)$, then the area of the ΔABC is k then $k^2 =$ 162
24. If the shortest distance between the lines $\bar{r} = (-\hat{i} + 3\hat{k}) + \lambda(\hat{i} - a\hat{j})$ and $\bar{r} = (-\hat{j} + 2\hat{k}) + \mu(\hat{i} - \hat{j} + \hat{k})$ is $\sqrt{\frac{2}{3}}$, then the integral value of a is equal to 4, 10

25. If $\vec{a} = \vec{i} - 2\vec{j} - 3\vec{k}$, $\vec{b} = 2\vec{i} + \vec{j} - \vec{k}$,
 $\vec{c} = \vec{i} + 3\vec{j} - 2\vec{k}$ and $\vec{a} \times (\vec{b} \times \vec{c}) = p\vec{i} + q\vec{j} + r\vec{k}$ then $p - q + r =$ -19 " 19 "

PHYSICS
(SINGLE CORRECT ANSWER TYPE)

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26. A spring has length l and force constant k it is cut into two springs of length l_1 and l_2 such that $l_1 = nl_2$ ($n = \text{an integer}$). Mass 'm' suspended from l_1 oscillates with time period....

$$(A) T = 2\pi \sqrt{\frac{m}{(n+1)K}}$$

$$(B) T = 2\pi \sqrt{\frac{nm}{(n+1)K}}$$

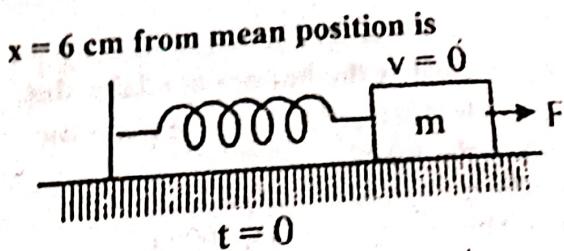
$$(C) T = 2\pi \sqrt{\frac{m}{K}}$$

$$(D) T = 2\pi \sqrt{\frac{(n+1)m}{K}}$$

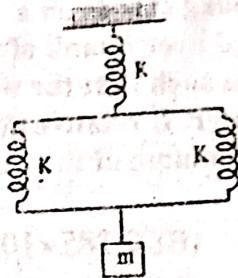
28. A body is executing SHM. If the force acting on the body is 6N when the displacement is 2cm, then the force acting on the body at a displacement of 3 cm is
(A) 6N (B) 9N
(C) 4N (D) $\sqrt{6}N$

29. Two springs of force constants 1000 N/m and 2000 N/m are stretched by same force. The ratio of their respective potential energies is

30. A block of mass 1 kg is connected with a massless spring of force constant 100 N/m. At $t = 0$ a constant force $F = 10N$ is applied on the block. The spring is in its natural length at $t = 0$. The speed of particle at



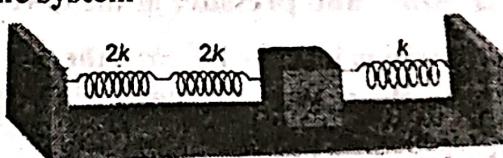
31. A body of mass m is suspended from three springs as shown in figure. If mass m is displaced slightly then time period of oscillation is



(A) $2\pi \sqrt{\frac{m}{3K}}$

~~$$2\pi \sqrt{\frac{2m}{3K}}$$~~

32. Four massless springs whose force constants are $2K$, $2K$, K and $2K$ respectively are attached to a mass M kept on a frictionless plane (as shown in figure). If the mass M is displaced in the horizontal direction, then the frequency of the system



$$(A) \frac{1}{2\pi} \sqrt{\frac{K}{4M}} \quad (B) \frac{1}{2\pi} \sqrt{\frac{4K}{M}}$$

$$(C) \frac{1}{2\pi} \sqrt{\frac{K}{7M}} \quad (D) \frac{1}{2\pi} \sqrt{\frac{7K}{M}}$$

33. In a car lift compressed air exerts a force F_1 on a small piston having a radius of 5cm. This pressure is transmitted to a second piston of radius 15cm. If the mass of the car to be lifted is 1350 kg. What is F_1 ?

(A) $14.7 \times 10^3 N$ (B) $1.47 \times 10^3 N$
 (C) $2.47 \times 10^3 N$ (D) $24.7 \times 10^3 N$

34. The pressure at the bottom of a lake, due to water is $4.9 \times 10^6 \text{ N/m}^2$. What is the depth of the lake?

(A) 500 m (B) 400 m
(C) 300 m (D) 200 m

35. A cube of side 20 cm is floating on a liquid with 5 cm of the cube outside the liquid. If the density of liquid is 0.8 gm/cc then the mass of the cube is

(A) 4.2 kg (B) 4.8 kg
(C) 5 kg (D) 5.2 kg

36. A woman of mass 50 kg stands on a wooden block placed over a tank of water.

The wooden block is such that the woman is entirely above water. If relative density of wood is 0.85, the volume of the wooden block is:

(A) $0.5 \times 10^{-1} \text{ m}^3$ (B) $0.585 \times 10^{-1} \text{ m}^3$
(C) 0.33 m^3 (D) $0.54 \times 10^{-1} \text{ m}^3$

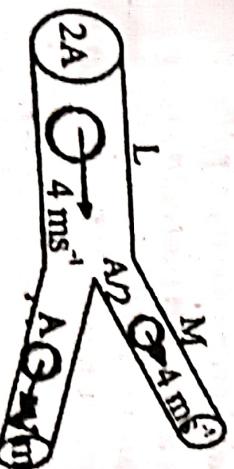
37. The velocity of the wind over the surface of the wing of an aeroplane is 80 ms^{-1} and under the wing 60 ms^{-1} . If the area of the wing is 4 m^2 the dynamic lift experienced by the wing is [density of air = 1.3 kg m^{-3}]

(A) 3640 N (B) 7280 N
(C) 14560 N (D) 72800 N

38. An aeroplane of mass 5000 kg is flying at an altitude of 3 km. If the area of the wings is 50 m^2 and pressure at the lower surface of wings is $0.6 \times 10^5 \text{ Pa}$, the pressure on the upper surface of wings is (in pascal) ($g = 10 \text{ ms}^{-2}$)

(A) 59×10^3 (B) 2×10^4
(C) 6×10^3 (D) 59

39. An incompressible liquid flows through a horizontal tube L M N as shown in the figure. Then the velocity 'V' of the liquid through the tube N is:



(A) 1 ms^{-1} (B) 2 ms^{-1}
(C) 4.5 ms^{-1} (D) 6 ms^{-1}

40. A liquid is kept in a cylindrical jar, which is rotated about the cylindrical axis. The

liquid rises at its sides. The radius of the jar is 'r', and speed of rotation is 'C'. The difference in height at the centre and the sides of the jar is

$$(A) \frac{r^2 \omega^2}{g} \quad (B) \frac{r^2 \omega^2}{2g}$$

$$(C) \frac{g}{r^2 \omega^2} \quad (D) \frac{2g}{r^2 \omega^2}$$

41. The force does water exert on the base of a house tank of base area 1.5 m^2 when it is filled with water up to a height of 1 m is ($g = 10 \text{ m/s}^2$)

(A) 1200 kg wt (B) 1500 kg wt
(C) 1700 kg wt (D) 2000 kg wt

42. In a horizontal pipe line of uniform cross section, pressure falls by 5 Pa between two points separated by 1 km. The change in the kinetic energy per kg of the oil flowing at these points is (Density of oil = 600 kg m^{-3})

(A) $6.25 \times 10^{-3} \text{ J/kg}^{-1}$ (B) $5.25 \times 10^{-4} \text{ J/kg}^{-1}$
(C) $3.25 \times 10^{-4} \text{ J/kg}^{-1}$ (D) $4.25 \times 10^{-2} \text{ J/kg}^{-1}$

43. A horizontal pipe of non uniform cross section has water flow through it such that the velocity is 2 ms^{-1} at a point where the pressure is 40 kPa. The pressure at a point where the velocity of water flow is 3 ms^{-1} (in kilopascals)

(A) 27 (B) 60
(C) 37.5 (D) 40

44. A boat having length 2 m and width 1 m is floating in a lake. When a man stands on the boat, it is depressed by 3 cm. The mass of the man is

(A) 50 kg (B) 55 kg
(C) 60 kg (D) 70 kg

45. At the mouth of the tap, the area of cross-section is 2.0 cm^2 and the speed of water is 3 m/s . The area of cross-section of the water column 80 cm below the tap is ($g = 10 \text{ m/s}^2$)

(A) 0.6 cm^2 (B) 1.2 cm^2
(C) 1.5 cm^2 (D) 2.0 cm^2

NUMERICAL VALUE TYPE

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46.

- Consider two identical springs each of spring constant k and negligible mass compared to the mass M as shown. Fig.1 shows one of them and Fig.2 shows their series combination. The ratios of time period of oscillation of the two SHM is $\frac{T_o}{T_s} = \sqrt{x}$, where value of x is 2.

(Round off to the Nearest Integer)

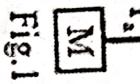
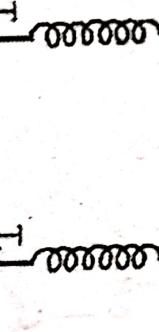
 

Fig.1

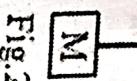


Fig.2

47. As per given figures two springs of spring constants K and $2K$ are connected to mass m . If the period of oscillation in figure(a) is $3s$, then the period of oscillation in

- figure(b) will be $\sqrt{x} s$. The value of X is 3.

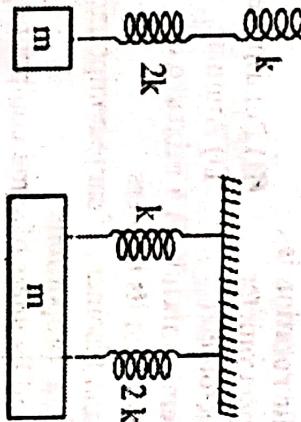


figure (a)

figure (b)

48. The pressure at the bottom of a lake, due to water, is $4.9 \times 10^6 \text{ N/m}^2$. What is the depth of the lake = 50 meter

49. What is force on the base of a tank of base area 1.5 m^2 when it is filled with water upto a height of 1m is $1.65 \times 10^5 \text{ N}$ where $X = \underline{5}$

$$\left(\rho_{\text{water}} = 10^3 \text{ kg/m}^3, R_0 = 10^5 \text{ Pa, and } g = 10 \text{ m/s}^2 \right)$$

50. A syringe of diameter 1 mm having a nozzle of diameter 1mm, is placed horizontally at a height 5m from the ground an incompressible non-viscous

liquid is filled in the syringe and the liquid is compressed by moving the piston at a speed of 0.5 ms^{-1} , the horizontal distance travelled by the liquid jet is 50 m ($g = 10 \text{ ms}^{-2}$)

CHEMISTRY

(SINGLE CORRECT ANSWER TYPE)

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51. Which one of the following will show optical isomerism?

- (A) $\text{CH}_2\text{OH} - \text{COOH}$
 (B) $(\text{CH}_3)_2\text{CH}-\text{COOH}$
~~(C) $\text{CH}_3\text{CH}(\text{OH})\text{COOH}$~~
 (D) $(\text{CH}_3)_2\text{C}(\text{Cl})\text{COOH}$

52. Number of meso forms and racemic forms are possible in the following structure:

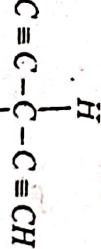


- (A) 0, 2
~~(B) 2, 0~~
 (C) 0, 4
 (D) 0, 0

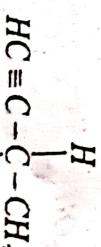
53. A compound with molecular formula $\text{C}_{11}\text{H}_{16}$ shows optical isomerism, the compound will be :

- ~~(A) 2, 3-dimethylpentane~~
~~(B) 2, 2-dimethylpentane~~
 (C) 2-methylhexane,
 (D) none of the above

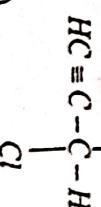
54. Which of the following is most likely to show optical isomerism?



(A)



(B)



(C)

55. $HC \equiv C - C = CH_2$
 (D) The number of optical isomers of the compound, $CH_3 - CHBr - CHBr - COOH$ is
 (A) 0 (B) 1 (C) 3 (D) 4

56. The number of stereoisomers possible for a compound of the molecular formula $CH_3 - CH = CH - CH(OH) - Me$ is
 (A) 2 (B) 3 (C) 4 (D) 6

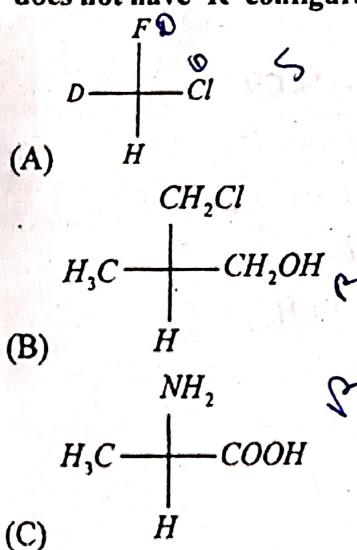
57. The optically inactive compound from the following is:
 (A) 2-chlorobutane
 (B) 2-chloro-2-methylbutane
 (C) 2-chloropentane (D) 2-chloropropanal

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

	List I Compound		List II Number or optical isomers
A	Un symmetrical compound with 'n' chiral carbon.	1	2^{n-1}
B	Symmetrical molecule with 'n' chiral carbon when n is even.	2	$2^{n-1} - 2^{\frac{n-1}{2}}$
C	Symmetrical molecule with 'n' chiral carbon when n is odd.	3	2^n

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

59. Identify, which of the following molecules does not have 'R' configuration?



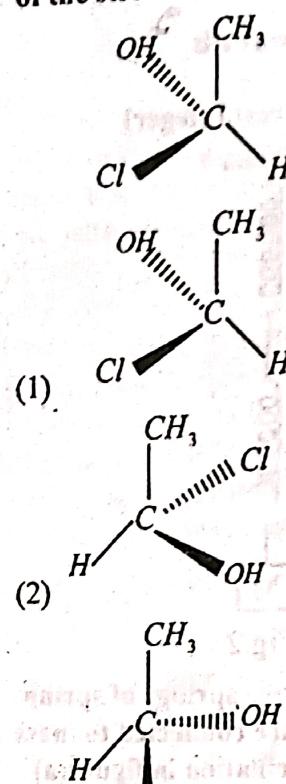
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59. $HOOC - \begin{matrix} NH_2 \\ | \\ - & - \\ | \\ H \end{matrix} - CH_3$
 (D) Which of the following is the enantiomer of the structure?



- (4) It does not have an enantiomer

61. The instrument used for measuring specific rotation is

- (A) Spectrometer (B) Polarimeter
 (C) Lactometer (D) Ammeter

62. A racemic mixture is a mixture of

- (A) Meso and its isomers
 (B) d and l isomers of same compound in equimolar proportions
 (C) D and L isomers of same compound in different proportions
 (D) Mixture of d and meso isomers

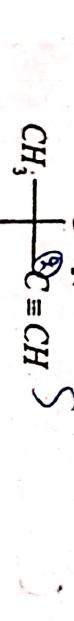
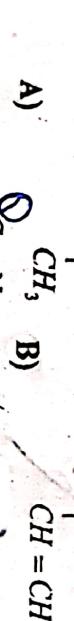
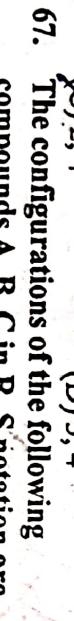
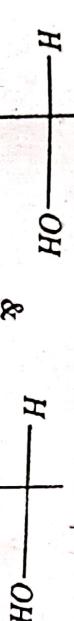
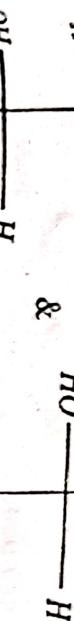
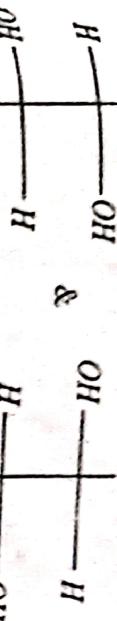
63. Which of the following molecule contains asymmetric carbon

- (A) $CH_3CHClCOOH$ (B) CH_3CH_2COOH
 (C) $ClCH_2CH_2COOH$ (D) $Cl_2CHCOOH$

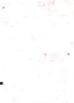
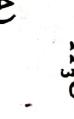
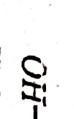
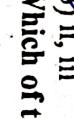
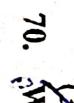
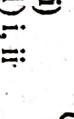
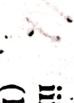
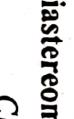
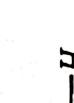
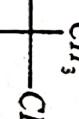
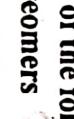
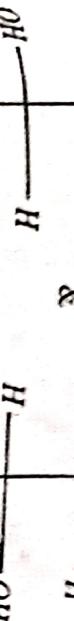
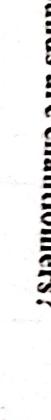
64. Which of the following can have mesoisomer

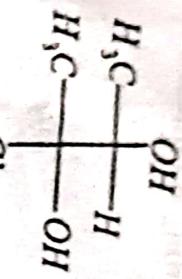
- (A) $CH_2OHCHOHCHO$
 (B) $CH_2OHCHOHCHOHCHO$
 (C) $HOOCCHOHCHOHCOOH$
 (D) $HOH, CH_2OHCHOHCHOHCOOH$

65. Which of the following pairs of compounds are enantiomers?



68. Which of the following is optically active?





(NUMERICAL VALUE TYPE)

Section-II contains 5 Numerical Value Type questions.

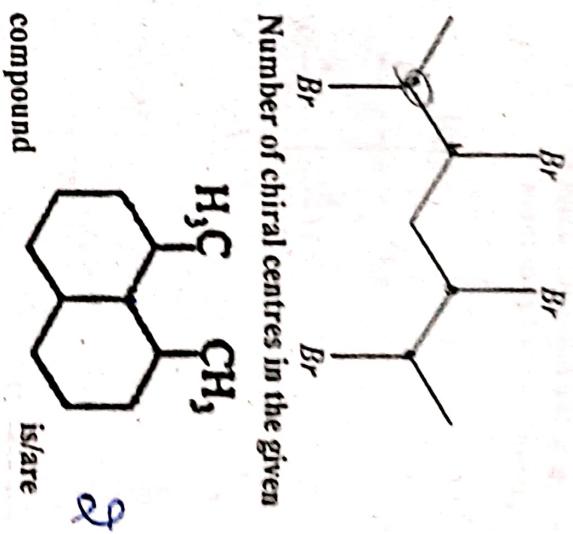
Marking scheme: +4 for correct answer, 0 if not attempted and -1 in all other cases

71. The total number of optical isomers possible for 2,3-dibromobutane is 2

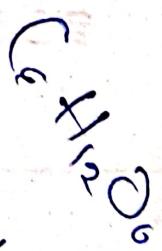
72. Total number of configurational isomers of tartaric acid is 1

73. The maximum number of optically active stereoisomers that could exist for the compound below are 8

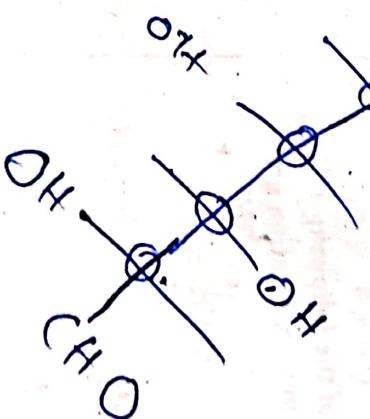
74. Number of chiral centres in the given compound is/are 3



BEST OF LUCK



2
2
3
1





RANKRIDGE IIT JEE/NEET JUNIOR COLLEGE (LONGTERM) TELANGANA

STREAM: JR MPC
Time: 3 Years

Date: 15-07-2018
Max Marks: 300

REVIEWS

MATHEMATICS

PHYSICS

26) B	27) B	28) B	29) A	30) B	31) B	32) B	33) B	34) A	35) B
36) C	37) B	38) A	39) D	40) B	41) B	42) A	43) C	44) C	45) B
46) 2	47) 2	48) 500	49) 5	50) 50					80

CHEMISTRY

51) C	52) A	53) A	54) B	55) D	56) C	57) B	58) C	59) C	60) C
61) B	62) B	63)	64)	65) A	66) C	67) A	68) B	69) C	70) C
71) 3	72) :	73) 8	74) 2	75) 16	76)				

100% $\left\{ \begin{array}{l} 5 \\ 50 \end{array} \right.$