



# RANKRIDGE IIT JEE/NEET JUNIOR COLLEGE (LONGTERM)

TELANGANA

STREAM: JRMPG

Time: 3 Hours

WTA-01

Date: 30-06-2025

Max Marks: 180

## SYLLABUS

### MATHEMATICS (ONE OR MORE CORRECT ANSWER TYPE)

**Section-I** This section contains **THERE (03)** questions.

- Each question has **FOUR** options (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four option(s) is(are) correct answer(s)
- For each question, choose the option(s) corresponding to (all) the correct answer(s).
- Answer to each question will be evaluated according to the following marking scheme:

**Full Marks :+4** ONLY if (all) the correct option(s) is(are) chosen;

**Partial Marks: +3** If all the four options are correct but **ONLY** three options are chosen;

**Partial Marks: +2** If three or more options are correct but **ONLY** two options are chosen, both of which are correct ;

**Partial Marks: +1** If two or more options are correct but **ONLY** two options are chosen, and it is a correct option ;

**Zero Marks : 0** If none of the options is chosen (i.e. the question is unanswered);

**Negative Marks : -2** In all other cases.

1. Which of the following is possible in  $\Delta ABC$ ?

(A)  $\cos A + \cos B + \cos C = \frac{3}{2}$   $A=B=60^\circ$

(B)  $\cos A \cos B \cos C = 0$   $90^\circ$

(C)  $\sin A + \sin B + \sin C = \sqrt{2} + 1$   $A=B=45^\circ$

(D)  $\cos A + \cos B + \cos C = 1$   $\text{Unpossible}$

2. Let  $\alpha, \beta$  and  $\gamma$  be some angles in the 1st

quadrant satisfying  $\tan(\alpha + \beta) = \frac{15}{8}$  and

$\operatorname{cosec} \gamma = \frac{17}{8}$ . Then which of the

following holds good?

(A)  $\alpha + \beta + \gamma = \pi$

(B)  $\cot \alpha \cot \beta \cot \gamma = \cot \alpha + \cot \beta + \cot \gamma$

STREAM: JR MPC

(C)  $\tan \alpha + \tan \beta + \tan \gamma = \tan \alpha \tan \beta \tan \gamma$

(D)  $\tan \alpha \tan \beta + \tan \beta \tan \gamma + \tan \gamma \tan \alpha = 1$

3. If  $\sin \beta$  is the geometric mean between  $\sin \alpha$  and  $\cos \alpha$ , then  $\cos 2\beta$  is equal to

(A)  $2 \sin^2 \left( \frac{\pi}{4} - \alpha \right)$  (B)  $2 \cos^2 \left( \frac{\pi}{4} - \alpha \right)$

(C)  $2 \cos^2 \left( \frac{\pi}{4} + \alpha \right)$  (D)  $2 \sin^2 \left( \frac{\pi}{4} + \alpha \right)$

### (SINGLE CORRECT ANSWER TYPE)

**Section-II** This section contains **FOUR (04)** questions.

- Each question has **FOUR** options (A), (B), (C) and (D). **ONLY ONE** of these four options is the correct answer.

- For each question, choose the option corresponding to the correct answer.

- Answer to each question will be evaluated according to the following marking scheme:

**Full Marks : +3** If ONLY the correct option is chosen;

**Zero Marks : 0** If none of the options is chosen (i.e. the question is unanswered).

**Negative Marks : -1** In all other cases

4. The value of  $8 \cos 10^\circ \cos 50^\circ \cos 70^\circ$  is equal to

(A)  $\sqrt{3}$  (B)  $\frac{\sqrt{3}}{2}$  (C)  $2\sqrt{3}$

(D)  $2 \cos 10^\circ$

5.  $(\cos^2 66^\circ - \sin^2 6^\circ)(\cos^2 48^\circ - \sin^2 12^\circ)$  equals

(A)  $\frac{5}{16}$

(B)  $\frac{3}{16}$

(C)  $\frac{1}{8}$

(D)  $\frac{1}{16}$

6. If  $\cos(\alpha + \beta) = \frac{3}{5}$ ,  $\sin(\alpha - \beta) = \frac{5}{13}$  and  $0 < \alpha, \beta < \frac{\pi}{4}$ , then  $\tan(2\alpha)$  is equal to

- (A)  $\frac{21}{16}$       (B)  $\frac{63}{52}$   
 (C)  $\frac{33}{52}$       (D)  $\frac{63}{16}$

7. If  $\sin^2 x + \sin x = 1$ , then the value of  $(\cos^2 x - \cos x + 1)(\cos^2 x + \cos x + 1)$ , is

- (A)  $\sqrt{5}$       (B) 2  
 (C)  $\sqrt{5} - 1$       (D) 1

#### (NON-NEGATIVE INTEGER.)

Section-III This section contains SIX (06) questions.

- The answer to each question is a NON-NEGATIVE INTEGER.
- For each question, enter the correct integer corresponding to the answer using the mouse and the onscreen virtual numeric keypad in the place designated to enter the answer.
- Answer to each question will be evaluated according to the following marking scheme

Full Marks : +4 If ONLY the correct integer is entered; Zero Marks : 0 In all other cases.

8. The value of  $\frac{\sin^4 t + \cos^4 t - 1}{\sin^6 t + \cos^6 t - 1}$  is equal to \_\_\_\_\_.

9. If  $\sin A, \cos A, \tan A$  from a G.P. then  $\cot^6 A - \cot^2 A =$  \_\_\_\_\_.

10. Value of  $\sqrt{3} \operatorname{cosec} 20^\circ - \sec 20^\circ =$  \_\_\_\_\_.

11. If  $\cot^2 A + \cot^2 B = 3$ , then the value of  $(2 - \cos 2A)(2 - \cos 2B)$  is \_\_\_\_\_.

12. Let  $f_n(\theta) = \tan \frac{\theta}{2} (1 + \sec \theta) (1 + \sec 2\theta) (1 + \sec 4\theta) \dots (1 + \sec 2^n \theta)$ , then

$$f_2\left(\frac{\pi}{16}\right) + f_3\left(\frac{\pi}{32}\right) + f_4\left(\frac{\pi}{64}\right) + f_5\left(\frac{\pi}{128}\right) =$$

13. If  $(1 + \tan 5^\circ)(1 + \tan 10^\circ)(1 + \tan 15^\circ) \dots (1 + \tan 45^\circ) = 2^k$  then the value of 'k' is \_\_\_\_\_.

#### (MATCHING TYPE)

Section-IV This section contains FOUR (04) Matching List Sets.

- Each set has ONE Multiple Choice Question.
- Each set has TWO lists : List-I and List-II.
- List-I has Four entries (A), (B), (C) and (D) and List-II has Five entries (I), (II), (III), (IV) and (V).
- FOUR options are given in each Multiple Choice Question based on List-I and List-II and ONLY ONE of these four options satisfies the condition asked in the Multiple Choice Question.
- Answer to each question will be evaluated according to the following marking scheme:  
**Full Marks: +3 ONLY if the option corresponding to the correct combination is chosen;**  
**Zero Marks: 0 If none of the options is chosen (i.e. the question is unanswered);**  
**Negative Marks: -1 In all other cases.**

14. Observe the following lists.

	List-I	List-II
I.	$\sin^2 \frac{2\pi}{3} + \cos^2 \frac{5\pi}{6} - \tan^2 \frac{3\pi}{4}$	a. $\frac{15}{2}$
II.	$\sin^2 \frac{11\pi}{6} + \cos^2 \frac{7\pi}{6} - \tan^2 \frac{5\pi}{4}$	b. $-\frac{1}{2}$
III.	$\sin^2 \frac{3\pi}{4} + \sec^2 \frac{5\pi}{3} + \tan^2 \frac{2\pi}{3}$	c. 0
IV.	$\cos^2 \frac{2\pi}{3} + \sin^2 \frac{5\pi}{3} - \frac{3}{2} \tan^2 \frac{3\pi}{4}$	d. $1/2$

The correct match for List-I from List-II is

- (A) I-d, II-c, III-a, IV-b  
 (B) I-a, II-b, III-c, IV-d  
 (C) I-b, II-a, III-d, IV-c  
 (D) I-c, II-d, III-b, IV-a

15. Match the following

	List-I	List-II
1.	$\cos 20^\circ + \cos 140^\circ + \cos 100^\circ =$	a. 0
2.	$(1 + \tan 20^\circ)(1 + \tan 25^\circ) =$	b. 2
3.	$\tan 20^\circ \tan 32^\circ + \tan 32^\circ \tan 38^\circ$ $+ \tan 38^\circ \tan 20^\circ =$	c. 1
4.	$\sin^2 10^\circ + \sin^2 110^\circ + \sin^2 130^\circ =$	d. $\frac{3}{2}$

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

**16. Match the following**

List-I	List-II
If $A + B = \frac{\pi}{2}$ then $B + 2 \tan(A - B) =$	a. $2 \tan A \tan B$
If $A + B = \frac{\pi}{4}$ then $(1 + \tan A)(1 + \tan B) =$	b. $\tan A$
If $A + B = \frac{5\pi}{4}$ then $\cot A \cot B$ $(1 + \cot A)(1 + \cot B) =$	c. 2
If $A + B = \frac{3\pi}{4}$ then $(1 + \tan A)(1 + \tan B) =$	d. $\frac{1}{2}$

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

**17. Match the following**

List-I	List-II
$\tan\left(\frac{\pi}{4} + \theta\right) - \tan\left(\frac{\pi}{4} - \theta\right) =$	a. 1
$\tan\left(\frac{\pi}{4} + \theta\right) + \cot\left(\frac{\pi}{4} + \theta\right) =$	b. $4 \sec^2 2\theta$
$\tan\left(\frac{\pi}{4} + \theta\right) \cdot \tan\left(\frac{\pi}{4} - \theta\right) =$	c. $2 \sec 2\theta$
$\cosec^2\left(\frac{\pi}{4} + \theta\right) \cosec^2\left(\frac{\pi}{4} - \theta\right) =$	d. $2 \tan 2\theta$

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

26  
126  
60

**PHYSICS**  
**(ONE OR MORE CORRECT ANSWER TYPE)**

**Section-I** This section contains **THERE (03)** questions.

- Each question has **FOUR** options (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four option(s) is(are) correct answer(s).
- For each question, choose the option(s) corresponding to (all) the correct answer(s).

• Answer to each question will be evaluated according to the following marking scheme:

**Full Marks :+4 ONLY if (all) the correct option(s) is(are) chosen;**

**Partial Marks : +3 If all the four options are correct but ONLY three options are chosen;**

**Partial Marks : +2 If three or more options are correct but ONLY two options are chosen, both of which are correct ;**

**Partial Marks : +1 If two or more options are correct but ONLY two options are chosen, and it is a correct option ;**

**Zero Marks : 0 If none of the options is chosen (i.e. the question is unanswered);**

**Negative Marks : -2 In all other cases.**

- 18. The acceleration of a particle is increasing linearly with time t as  $bt$ . The particle starts from the origin with an initial velocity  $v_0$ . The distance travelled by the particle in time t will be**

- (A)  $v_0 t + \frac{1}{3} bt^2$       (B)  $v_0 t + \frac{1}{2} bt^2$   
 (C)  $v_0 t + \frac{1}{6} bt^3$       (D)  $v_0 t + \frac{1}{3} bt^3$

- 19. Mark the correct statement(s) for a particle going on a straight line.**

- (A) If the velocity and acceleration have opposite sign, the object is slowing down.  
 (B) If the position and velocity have opposite sign, the particle is moving towards the origin.  
 (C) If the velocity is zero at an instant, the acceleration should also be zero at that instant.  
 (D) If the velocity is zero for a time interval, the acceleration is zero at any instant within the time interval.

- 20. A particle moves along a straight line and its velocity depends on time at  $V = 4t - t^2$ . Then for first 5s.**

- (A) Average velocity is  $\frac{25}{3} m/s$   $\checkmark$   
 (B) Average speed is  $\frac{5}{3} m/s$   $3+4+18+0$   
 (C) Average velocity is  $\frac{5}{3} m/s$   
 (D) Acceleration is  $4m/s^2$  at  $t = 0$

**(SINGLE CORRECT ANSWER TYPE)**

**Section-II** This section contains **FOUR (04)** questions.

- Each question has FOUR options (A), (B), (C) and (D). ONLY ONE of these four options is the correct answer.
- For each question, choose the option corresponding to the correct answer.
- Answer to each question will be evaluated according to the following marking scheme:

**Full Marks : +3** If ONLY the correct option is chosen;

**Zero Marks : 0** If none of the options is chosen (i.e. the question is unanswered);

**Negative Marks : -1** In all other cases

**21. Statement I: If the magnitude of acceleration of a particle is constant then speed must change.**

**Statement II: In uniform circular motion speed of the particle is constant but it has some acceleration.**

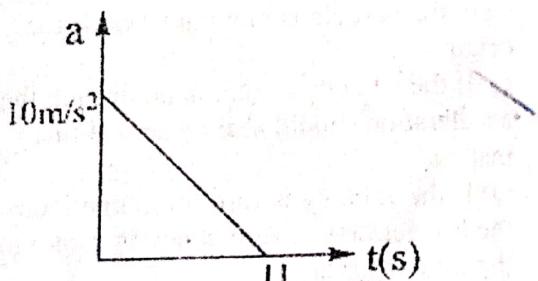
A) If Statement I is true, Statement II is true, Statement II is a correct explanation for Statement I

B) If Statement I is true, Statement II is true, Statement II is not a correct explanation for Statement I

C) If Statement I is true, Statement II is false

D) If Statement I is false, Statement II is true

**22. A particle starts from rest. Its acceleration (a) versus time (t) is as shown in the figure. The maximum speed of the particle will be**



(A) 110 m/s  
(C) 550 m/s

(B) 55 m/s  
(D) 660 m/s

**23. Statement I: The v-t graph perpendicular to time axis is not possible in practice.  
Statement II: Infinite acceleration can't be realized in practice**

A) If Statement I is true, Statement II is true, Statement II is a correct explanation for Statement I

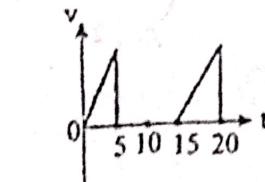
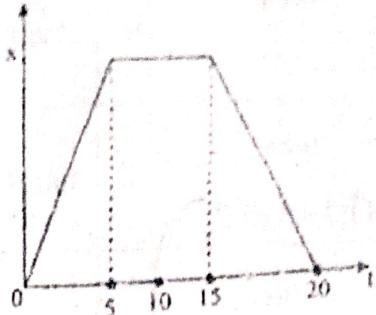
B) If Statement I is true, Statement II is true, Statement II is not a correct explanation for Statement I

C) If Statement I is true, Statement II is false

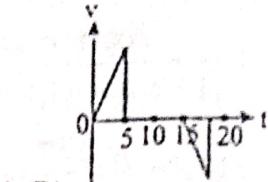
D) If Statement I is false, Statement II is true

**24. Figure shows the displacement-time (x-t) graph of a body moving in a straight line.**

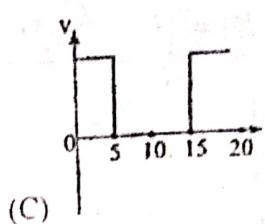
**Which one of the graphs shown in figure represents the velocity-time (v-t) graph of the motion of the body.**



(A)



(B)



(C)

**(NON-NEGATIVE INTEGER.)**

**Section-III** This section contains SIX (06) questions

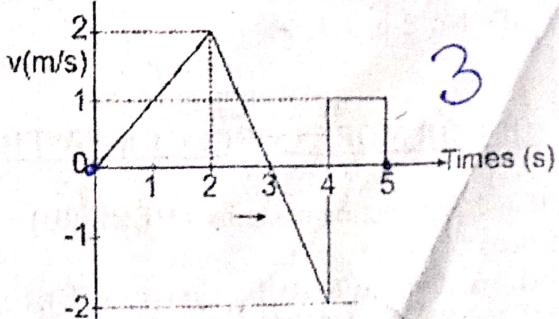
• The answer to each question is a NON-NEGATIVE INTEGER.

• For each question, enter the correct integer corresponding to the answer using the mouse and the onscreen virtual numeric keypad in the place designated to enter the answer

• Answer to each question will be evaluated according to the following marking scheme

**Full Marks : +4** If ONLY the correct integer is entered; Zero Marks : 0 In all other cases.

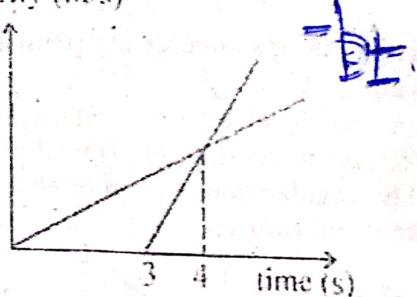
**25. The velocity -time graph of a body moving along straight line is as follows. The displacement of the body in 5s is \_\_\_\_\_**



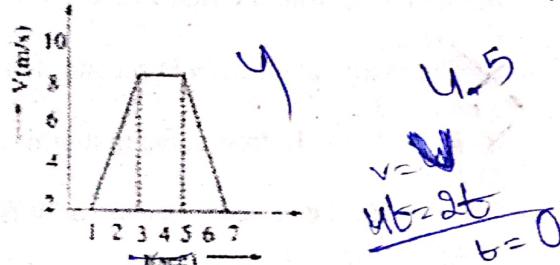
**26. Two cars start off to race velocity 4 m/s and 2 m/s & travel in straight line with uniform acceleration 1m/s² and 2m/s² respectively, if with they reach the final**

- point at the same instant, then the length of the path is 94 m
27. The drawing shows velocity (V) versus time(t) graphs for two cyclists moving along the same straight segment of a highway from the same point. The second cyclist starts moving at  $t=3$  min. At what time do the two cyclists meet min

Velocity (m/s)

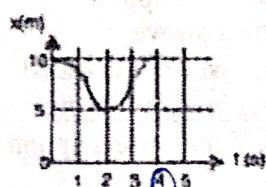


28. For the velocity-time graph shown in figure below the distance covered by the body in last two seconds of its motion is what fraction of the total distance covered by it in all the total distance covered by it in all the seven seconds  $= 1/x$ . then  $x = ?$



29. A force on an object of mass 100g is  $(10\hat{i} + 5\hat{j}) N$ . The position of that object at  $t = 2s$   $(a\hat{i} + b\hat{j})$  m after starting from rest. The value of  $\frac{a}{b}$  will be \_\_\_\_\_.

30. The x-t plot of a car is shown in the figure. The average velocity is zero in the time interval between 0 and t then  $t = 4$  sec



#### (MATCHING TYPE)

**Section-IV** This section contains FOUR (04) Matching List Sets.

- Each set has ONE Multiple Choice Question.
- Each set has TWO lists : List-I and List-II.
- List-I has Four entries (A), (B), (C) and (D) and List-II has Five entries (I), (II), (III), (IV) and (V).

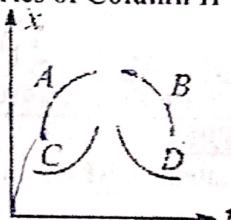
- FOUR options are given in each Multiple Choice Question based on List-I and List-II and ONLY ONE of these four options satisfies the condition asked in the Multiple Choice Question.
- Answer to each question will be evaluated according to the following marking scheme :
  - Full Marks:** +3 ONLY if the option corresponding to the correct combination is chosen;
  - Zero Marks:** 0 If none of the options is chosen (i.e. the question is unanswered);
  - Negative Marks:** -1 In all other cases.

31.

	Column- I		Column- II
a.	$\frac{d\vec{v}}{dt}$	p.	Acceleration
b.	$\frac{d \vec{v} }{dt}$	q.	Magnitude of acceleration
c.	$\frac{d\vec{r}}{dt}$	r.	Velocity
d.	$\frac{d \vec{r} }{dt}$	s.	Magnitude of velocity
		t.	None

- (A) a-p, b-t, c-r, d-t  
 (B) a-q, b-s, c-r, d-t  
 (C) a-p, b-r, c-s, d-t  
 (D) a-p, b-t, c-s, d-s

32. Figure shows the position-time graph of particles moving along a straight line. Match the entries of Column I with the entries of Column II



	Column-I		Column-II
A.	The particle A is	P.	Accelerating
B.	The particle B is	Q.	Decelerating
C.	The particle C is	R.	Speeding up
D.	The particle D is	S.	Slowing down

- (A) A-PS, B-QR, C-PR, D-QS  
 (B) A-QS, B-PR, C-QR, D-PS  
 (C) A-QS, B-QR, C-PS, D-PR  
 (D) A-QS, B-QR, C-PR, D-PS

33. The equation of motion of particle is described in column-I. At  $t = 0$  particle is at origin and at rest

Column-I	Column-II
A. $x = 3t^2 + 2t$	P. Velocity of particle at $t = 1\text{ sec}$ is $8\text{ m/s}$
B. $v = 8t$	Q. Particle moves with uniform Acceleration
C. $a = 16t$	R. Particle moves with variable Acceleration
D. $v = 6t - 3t^2$	S. Acceleration of the particle at $t = 1$ is $2\text{ m/s}^2$
	T. Particle will change its direction of motion

(A) A-PQ, B-PS, C-PR, D-RT

**(B)** A-PR, B-PQ, C-PQ, D-RT

(C) A-PQ, B-PQ, C-PR, D-RT

(D) A-PQ, B-PT, C-PR, D-RT

34. A car accelerates from rest at a constant rate of  $10\text{ ms}^{-2}$  for some time after which it decelerates at constant rate of  $5\text{ ms}^{-2}$  to come to rest. If total time elapsed is 15s. Match the following columns

Column-I	Column-II
A. Maximum velocity of car (in $\text{ms}^{-1}$ )	P. 10
B. Distance (in m) travelled by car, at the instant when its velocity is half of its maximum velocity.	Q. 25
C. Average velocity (in $\text{ms}^{-1}$ ) during total time of motion	R. 50
D. The time (in s) during which the particle is in the condition of deceleration	S. None of these

**(A)** A-S, B-R, C-Q, D-P

**(B)** A-R, B-S, C-Q, D-P

**(C)** A-R, B-Q, C-S, D-P

**(D)** A-Q, B-S, C-P, D-R

### CHEMISTRY (ONE OR MORE CORRECT ANSWER TYPE)

Section-I This section contains THERE (03) questions.

• Each question has FOUR options (A), (B), (C) and (D). ONE OR MORE THAN ONE of these four option(s) is(are) correct answer(s).

• For each question, choose the option(s) corresponding to (all) the correct answer(s).

• Answer to each question will be evaluated according to the following marking scheme:

Full Marks : +4 ONLY if (all) the correct option(s) is(are) chosen;

Partial Marks: +3 If all the four options are correct but ONLY three options are chosen,

Partial Marks: +2 If three or more options are correct but ONLY two options are chosen, both of which are correct;

Partial Marks: +1 If two or more options are correct but ONLY two options are chosen, and it is a correct option;

Zero Marks : 0 If none of the options is chosen (i.e. the question is unanswered),

Negative Marks : -2 In all other cases.

35. Heisenberg's uncertainty principle is not valid for:

(A) moving electrons (B) motor car

(C) stationary particles (D) all of these

36. The angular momentum of electron can have the value(s):

**(A)**  $\frac{h}{2\pi}$

**(B)**  $\frac{h}{\pi}$

**(C)**  $\frac{2h}{\pi}$

**(D)**  $\frac{5h}{2\pi}$

37. The energy of an electron in the first Bohr orbit of H-atom -13.6 eV, then which of the following statement(s) is/are correct for  $\text{He}^{+2}$ ?

**(A)** The energy of electron in second Bohr orbit is -13.6 eV

**(B)** The K.E. of electron in the first orbit is 54.4 eV

**(C)** The K.E. of electron in second orbit is 13.6 eV

**(D)** The speed of electron in the second orbit is  $2.19 \times 10^6 \text{ m/sec}$

### (SINGLE CORRECT ANSWER TYPE)

Section-II This section contains FOUR (04) questions.

• Each question has FOUR options (A), (B), (C) and (D). ONLY ONE of these four options is the correct answer.

• For each question, choose the option corresponding to the correct answer.

• Answer to each question will be evaluated according to the following marking scheme

Full Marks : +3 If ONLY the correct option is chosen;

Zero Marks : 0 If none of the options is chosen (i.e. the question is unanswered),

Negative Marks : -1 In all other cases

38. The wave number of the spectral line in the emission spectrum of hydrogen will be

- equal to 8/9 times the Rydberg's constant if the electron jumps from
- (A)  $n = 3$  to  $n = 1$  (B)  $n = 10$  to  $n = 1$   
 (C)  $n = 9$  to  $n = 1$  (D)  $n = 2$  to  $n = 1$
39. Splitting of spectral lines under the influence of strong magnetic field is called  
 A) Stark effect B) Zeeman effect  
 C) Photoelectric effect D) None of these
40. The momentum of a particle of wave length  $1\text{ \AA}$  is  
 (A)  $6.625 \times 10^{-27} \text{ g.cm.s}^{-1}$   
 (B)  $6.625 \times 10^{-19} \text{ g.cm.s}^{-1}$   
 (C)  $6.625 \times 10^{-16} \text{ g.cm.s}^{-1}$   
 (D)  $6.625 \times 10^{-23} \text{ g.cm.s}^{-1}$
41. Maximum sum of the number of neutrons and protons in an isotope of hydrogen  
 A) 6 B) 5  
 C) 4 D) 3

#### (NON-NEGATIVE INTEGER)

- Section-III This section contains SIX (06) questions.
- The answer to each question is a NON-NEGATIVE INTEGER.
  - For each question, enter the correct integer corresponding to the answer using the mouse and the onscreen virtual numeric keypad in the place designated to enter the answer.
  - Answer to each question will be evaluated according to the following marking scheme
- Full Marks : +4 If ONLY the correct integer is entered; Zero Marks : 0 In all other cases

42. The wavelength for high energy EMR transition in H atom is  $91\text{ nm}$ . The energy required for the transition is  $\text{ } \times 10^5\text{ ev}$ .
43. In a bulk of H-atoms if electrons in all atoms are at an energy level of  $n = 5$  and in their de-excitation to ground state ( $n = 1$ ) if no coloured line is observed in emission spectra then maximum number of remaining possible lines are
44. If the de Broglie wavelength of the electron in  $n$ th Bohr orbit in a hydrogenic atom is equal to  $1.5\pi a_0$  ( $a_0$  is Bohr radius), then the value of  $n/z$  is  $\text{ } \times 10^{-2}$
45. If uncertainty in position is  $\frac{25}{4\pi} A^0$ . Find uncertainty in measurement of de-Broglie wavelength (in  $A^0$ ) is  $x$ . The value of  $x/5 =$

46. If an electron is travelling at a  $200\text{ m/s}$  within  $1\text{ m/s}$  uncertainty in its position in micrometer?
47. If an electron in H-atom has an energy of  $-78.8\text{ kcal/mole}$ , the electron is present in energy \_\_\_\_\_ orbit

#### (MATCHING TYPE)

#### Section-IV This section contains FOUR (04)

Matching List Sets.

- Each set has ONE Multiple Choice Question.
  - Each set has TWO lists : List-I and List-II.
  - List-I has Four entries (A), (B), (C) and (D) and List-II has Five entries (I), (II), (III), (IV) and (V).
  - FOUR options are given in each Multiple Choice Question based on List-I and List-II and ONLY ONE of these four options satisfies the condition asked in the Multiple Choice Question.
  - Answer to each question will be evaluated according to the following marking scheme :
- Full Marks:** +3 ONLY if the option corresponding to the correct combination is chosen;
- Zero Marks:** 0 If none of the options is chosen (i.e. the question is unanswered);
- Negative Marks:** -1 In all other cases.

48. About Hydrogen atom. Matrix matching:

Column-I	Column-II
A. Lyman series	p. Maximum number of spectral line observed = 6
B. Balmer series	q. Maximum number of spectral line observed = 2
C. In a sample $5 \rightarrow 2$	r. Second line has wave number $\frac{8R}{9}$
D. In a single isolated H-atom for $3 \rightarrow 1$ transition	s. Second line has wave number $\frac{3R}{16}$
	t. Total number of spectral line is 10

- A) A - p; B - t; C - s; D - q  
 B) A - r; B - s; C - p; D - q  
 C) A - r; B - q; C - p; D - s  
 D) A - q; B - r; C - s; D - p

49. Match the columns according the Bohr's theory:

$$E_n = \text{Total energy}$$

$$K_n = \text{Kinetic energy}$$

$$V_n = \text{Potential energy}$$

$$r^n = \text{Radius of } n\text{th orbit}$$

	Column-I		Column-II
A.	$\frac{V_n}{K_n} = ?$	P.	0.
B.	If radius of nth orbit $\propto E_n^x$ , $x = ?$	q.	-1
C.	Angular momentum in lowest orbital	r.	-2
D.	$\frac{1}{r^n} \propto z^y$ , $y = ?$	s.	1

- A) A - p; B - t; C - s; D - q  
 B) A - r; B - s; C - p; D - q  
 C) A - r; B - q; C - p; D - s  
 D) A - q; B - r; C - s; D - p

#### 50. Matrix matching:

	Column-I		Column-II
A.	Radius of $n^{\text{th}}$ orbit	p.	Inversely proportional to $z$
B.	Energy of $n^{\text{th}}$ orbit	q.	Integral multiple of $\frac{h}{2\pi}$
C.	Velocity of electron in the $n^{\text{th}}$ orbit	r.	Inversely proportional to $z^2$
D.	Angular momentum of electron	s.	Inversely proportional to $n$
		t.	Inversely proportional to $n^2$

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

#### 51. Matrix matching:

	Column-I		Column-II
A.	H	p.	Radius of 4 <sup>th</sup> orbit $0.53 \times 4 \text{ Å}^0$
B.	$\text{He}^+$	q.	Energy of second orbit = -13.6 eV
C.	$\text{Be}^{3+}$	r.	Radius of second orbit = $(0.53 \times 4) \text{ Å}^0$
D.	$\text{Li}^{2+}$	s.	Velocity of electron in the third orbit is $2.18 \times 10^8 \text{ cm/s}$
		t.	Energy of fourth orbit = $-13.6 \times 2 \text{ eV}$

- A) A-p; B-t; C-s; D-q  
 B) A-r; B-p; C-s; D-q  
 C) A-r; B-q; C-p; D-s  
 D) A-q; B-r; C-s; D-p

**BEST OF LUCK**

**ROUGH WORK**

