RANKERS
JEE | NEET | FOUNDATION

RGP – RANKERS GUARANTEED PROGRAM

Set 1

(Physics, Chemistry and Mathematics)

Time: 1 Hour | **Studying in class 11th (JEE) & Moving to 12th (JEE)** | **Marks: 120**

(Paper Code: 1201)

1. General Instructions:

* *This test paper consists of 30 question in 3 section (A, B, C)*

Marking Scheme:

- ✓ *Full marks: + 4 if answered correctly.*
- ✓ *Zero marks: 0 if not attempted or incorrect.*

2. RGP College Grant Criteria:

- ✓ **Students must score a minimum of 70% positive marks in RGP.**
- ✓ **Student must get under AIR 5,000 in JEE/NEET Examination.**

3. Cash Reward Criteria:

- ✓ **Students must score a minimum of 70% positive marks in their respective papers.**
- ✓ **Exciting Cash Rewards for RGP Toppers**
  - **1st Topper – ₹ 21,000/-**
  - **2nd Topper – ₹ 11,000/-**
  - **3rd – 5th Topper – ₹ 5,100/-**
  - **6th – 10th Topper – ₹ 2,100/-**

  Students Scoring Rank from 11th – 20th will get Exciting Rewards.

4. Scholarship Criteria in Rankers Offline Classroom Program:

***(100% FEE WAIVER – 1ST TOPPER)* and must getting above 70% marks.**

- ✓ **80% Fee Waiver – Student Scoring 80% and above.**
- ✓ **60% Fee Waiver – Student Scoring 70% to 79.999%.**
- ✓ **50% Fee Waiver – Student Scoring 60% to 69.999%.**
- ✓ **40% Fee Waiver – Student Scoring 50% to 59.999%.**
- ✓ **20% Fee Waiver – Student Scoring 30 % to 49.999%**
- ✓ **10% Fee Waiver – All the Aspirants Appearing in RGP.**

Student's Name: - ……

School Name: - ……

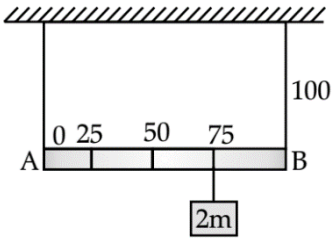
Class: - …… Mob. No. ……

Student's Signature: - …… **Invigilator's Signature: - ……**

Physics (Section – A)

1. Train A and train B are running on parallel tracks in opposite directions with speeds 36 km/hour and 72 km/hour, respectively. A person is walking in train A in the direction opposite to its motion with a speed of 1.8 km/hour. Speed (in ms^{-1}) of this person as observed from train B will be close to: (take the distance between the tracks as negligible)
(A) 30.5 ms^{-1} (B) 29.5 ms^{-1} (C) 31.5 ms^{-1} (D) 28.5 ms^{-1}

2. Shown in the figure is rigid and uniform one-meter-long rod AB held in horizontal position by two strings tied to its ends and attached to the ceiling. The rod is of mass 'm' and has another weight of mass 2m hung at a distance of 75 cm from A. The tension in the string at A is:



(A) 0.75 mg (B) 1 mg (C) 0.5 mg (D) 2 mg

3. A thin circular plate of mass M and radius r has its density varying as $\rho(r) = \rho_0 r$ with ρ_0 as constant and r is the distance from its center. The moment of Inertia of the circular plate about an axis perpendicular to the plate and passing through its edge is $I = a\,MR^2$. The value of the coefficients a is:
(A) $\frac{1}{2}$ (B) $\frac{3}{5}$ (C) $\frac{8}{5}$ (D) $\frac{3}{2}$

4. A particle is oscillating according to the equation X = 7 cos 0.5 πt, where 't' is in second. The point moves from the position of equilibrium to maximum displacement in time:
(A) 4.0 second (B) 2.0 second (C) 1.0 second (D) 0.5 second

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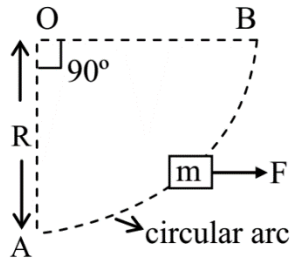
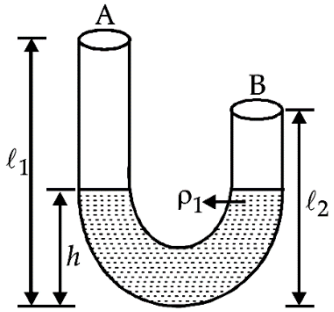
5. A block of mass m is taken from A to B slowly under the action of a constant force F. Work done by this force is:



(A) FR (B) $\frac{\pi}{2}$ FR (B) $\frac{FR}{\sqrt{2}}$ (D) $\frac{FR}{4}$

6. A U-tube having uniform cross-section but unequal arm length $l_1 = 100$ cm and $l_2 = 50$ cm has same liquid of density ρ_1 filled in it upto a height $h = 30$ cm as shown in figure. Another liquied of density $\rho_2 = 2\rho_1$ is poured in arm A. Both liquids are immiscible. The length of the second liquid is …… (in cm) which should be poured in A so that second overtone of A is in unison with fundamental tone of B. (Neglect end correction)



(A) 1.5 (B) 3 (C) 6 (D) 12

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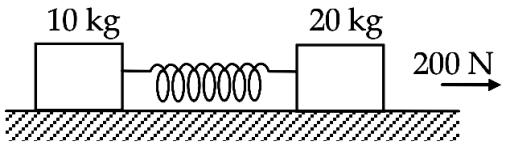
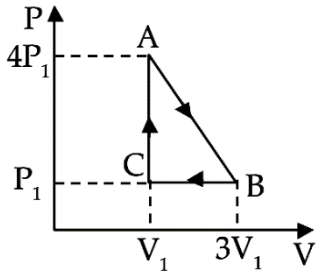
7. The masses of 10 kg and 20 kg, respectively, are connected by massless spring as shown in the figure. A force of 200 N acts on the 20 kg mass. At the instant shown, the 10 kg mass has acceleration of 12 m/s^2. What is the acceleration of 20 kg mass? (g = 10 m/s^2)



(A) 12 m/s^2 (B) 4 m/s^2 (C) 10 m/s^2 (D) zero

8. An ideal gas is taken through series of changes ABCA. The amount of work involved in the cycle is:



(A) $12P_1V_1$ (B) $6P_1V_1$ (C) $3P_1V_1$ (D) P_1V_1

9. The greatest speed of transverse waves through a steel wire of radius 1 mm is …… × 10^2 m. The breaking stress of steel is 6.0 × 10^8 Nm^{-2}. Density of steel = 7800 kg m^{-3}.
(A) 2.78 (B) 1.78 (C) 3.78 (D) 4.78

10. The specific heat of a substance is given by $C = a + bT$. The amount of heat required to raise the temperature of m kg of the material from T_0 to $2T_0$
(A) $m\left[aT_0 + \frac{3}{2}bT_0^2\right]$ (B) $m\left[aT_0 + bT_0^2\right]$

(C) $m\left[aT_0 + \frac{b}{2}T_0^2\right]$ (D) $m\left[aT_0 + \frac{2}{3}bT_0^2\right]$

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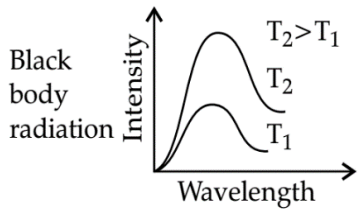
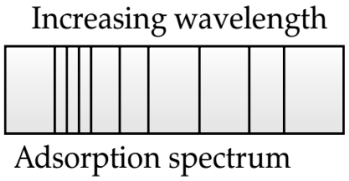
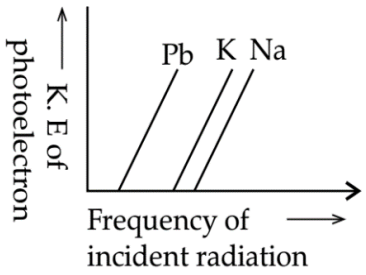
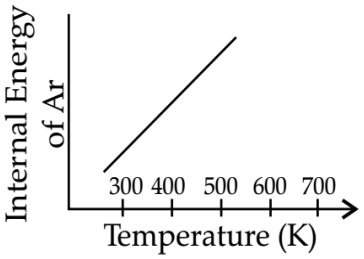
Chemistry (Section – B)

11. The figure that is not a direct manifestation of the quantum nature of atom is

(A) 

(B) 

(C) 

(D) 

12. The Gibb's energy change (in J) for the given reaction at $[Cu^{2+}] = [Sn^{2+}] = 1$ M and 298 K is:
$Cu^{2+}(aq) + Sn(s) \rightarrow Sn^{2+}(aq) + Cu(s)$
$[E^\circ_{Sn^{2+}/Sn} = -0.16V, E^\circ_{Cu^{2+}/Cu} = 0.34V$ Take F = 96500 C $mol^{-1}]$
(A) 96500 (B) 97500 (C) 95500 (D) 98500

13. The internal energy (in J) when 90g of water under goes complete evaporation at 100°C is ……
(Given ΔH_{vap} for water at 373 K = 41 kJ/mol R = 8.314 JK^{-1} mol^{-1})
(A) 189494 (B) 179494 (C) 189472 (D) 189500

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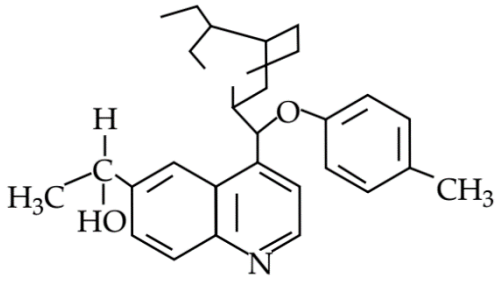
14. The number of chiral carbons present in the molecule given below is ……



(A) 6 (B) 5 (C) 7 (D) 8

15. If AB_5 molecule is a polar molecule, a possible geometry of AB_5 is:
(A) Square pyramidal (B) Rectangular planar
(C) Square planar (D) Tetrahedral

16. The correct order of hydration enthapies of alkali metal ions is:
(A) $Li^+ > Na^+ > Cs^+ > Rb^+$ (B) $Na^+ > Li^+ > K^+ > Rb^+ > Cs^+$
(C) $Li^+ > Na^+ > K^+ > Rb^+ > Cs^+$ (D) $Na^+ > Li^+ > K^+ > Cs^+ > Rb^+$

17. For silver C_P ($J\ K^{-1}\ mol^{-1}$) = 23 + 0.01 T. If the temperature (T) of 3 moles of silver is raised from 300 K to 1000 K at 1 atm, the value of ΔH will be close to:
(A) 63 kJ (B) 16 kJ (C) 21 kJ (D) 13 kJ

18. If solubility product of $Zr_3(PO_4)_4$ is denoted by K_{sp} and its molar solubility is denoted by S, then which of the following relation between S and K_{sp} is correct?
(A) $S = \left(\frac{K_{sp}}{144}\right)^{\frac{1}{6}}$ (B) $S = \left(\frac{K_{sp}}{6912}\right)^{\frac{1}{7}}$ (C) $S = \left(\frac{K_{sp}}{929}\right)^{\frac{1}{9}}$ (D) $S = \left(\frac{K_{sp}}{216}\right)^{\frac{1}{7}}$

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19. The quantum number of four electrons are given below:

I. $n = 4, l = 2, m_1 = -2, m_s = -\frac{1}{2}$

II. $n = 3, l = 2, m_1 = 1, m_s = +\frac{1}{2}$

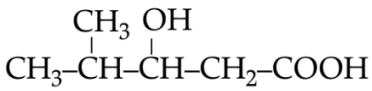
III. $n = 4, l = 1, m_1 = 0, m_s = +\frac{1}{2}$

IV. $n = 3, l = 1, m_1 = 1, m_s = -\frac{1}{2}$

The correct order of their increasing energies will be:

(A) IV < III < II < I
(B) I < II < III < IV
(C) IV < II < III < I
(D) I < III < II < IV

20. The IUPAC name of the following compound is:



(A) 4,4-dimethyl-3-hydroxybutanoic acid
(B) 2-Methyl-5-hydroxypentane-5-oic acid
(C) 3-Hydroxy-4-methyl pentanoic acid
(D) 4-methyl-3-hydroxypentanoic acid

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Math (Section – C)

21. If the quadratic equation $4x^2 - 2x - m = 0$ and $4p\,(q-r)x^2 - 2q(r-p)x + r(p-q) = 0$ have a common root such that second equation has equal roots then the value of m will be:
(A) 0 (B) 1 (C) 2 (D) 3

22. Given that x, y, z are positive reals such that $xyz = 32$. The minimum value of $x^2 + 4xy + 4y^2 + 2z^2$ is equal to:
(A) 64 (B) 256 (C) 96 (D) 216

23. Evaluate: $\sum_{n=1}^{\infty} \frac{1}{(n+1)(n+2)(n+3).....(n+k)}$
(A) $\frac{1}{(k-1)(k-1)!}$ (B) $\frac{1}{k \cdot k!}$ (C) $\frac{1}{(k-1)\,k!}$ (D) $\frac{1}{k\,!}$

24. The value of the expression $\log_2 \left(1 + \frac{1}{2}\sum_{k=1}^{11} {}^{12}C_k\right)$:
(A) 11 (B) 12 (C) 13 (D) 14

25. Sum of all values of x satisfying the equation
$25^{(2x-x^2+1)} + 9^{(2x-x^2+1)} = 34\left(15^{(2x-x^2)}\right)$ is:
(A) 1 (B) 2 (C) 3 (D) 4

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26. The number of 3-digit numbers containing the digit 7 exactly once:
(A) 225 (B) 220 (C) 200 (D) 180

27. The value of cos 12° cos 24° cos 36° cos 48° cos 60° cos 72° cos 84° is:
(A) $\frac{1}{64}$ (B) $\frac{1}{128}$ (C) $\frac{1}{256}$ (D) $\frac{1}{512}$

28. The equation of the line parallel to the line $3x + 4y = 0$ and touching the circle $x^2 + y^2 = 9$ in the first quadrant is:
(A) $3x + 4y = 15$ (B) $3x + 4y = 45$ (C) $3x + 4y = 9$ (D) $3x + 4y = 12$

29. The director circle of the parabola $(y - 2)^2 = 16(x + 7)$ touches the circle $(x - 1)^2 + (y + 1)^2 = r^2$, then r is equal to:
(A) 10 (B) 11 (C) 12 (D) None of these

30. If $\frac{x^2-|x|-2}{2|x|-x^2-2} > 2$ then $x \in$
(A) $(-1, 1)$ (B) $\left(\frac{-2}{3}, \frac{-2}{3}\right)$
(C) $\left(-1, \frac{-2}{3}\right) \cup \left(\frac{2}{3}, 1\right)$ (D) $\left(-\infty, \frac{-2}{3}\right) \cup \left(\frac{2}{3}, \infty\right)$

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