RANKERS
JEE | NEET | FOUNDATION

RGP – RANKERS GUARANTEED PROGRAM

Set 1

(Physics, Chemistry and Mathematics)

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

1. General Instructions: **(Paper Code: 1301)**

* *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)

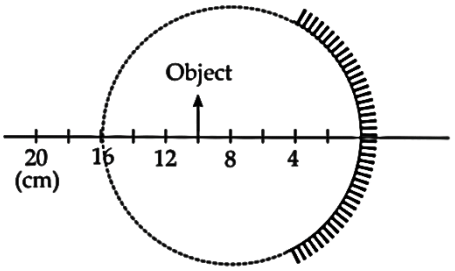
1. A spherical mirror is obtained as shown in the figure from a hollow glass sphere. If an object is positioned in front of the mirror, what will be the nature and magnification of the image of the object? (Figure drawn as schematic and not to scale)

(A) Inverted, real and magnified

(B) Erect, virtual and unmagnified

(C) Inverted, real and unmagnified

(D) Erect, virtual and magnified



2. A charged particle enters a uniform magnetic field with velocity vector making an angle of 30° with the magnetic field. The particle describes a helical trajectory of pitch x. The radius of the helix is

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

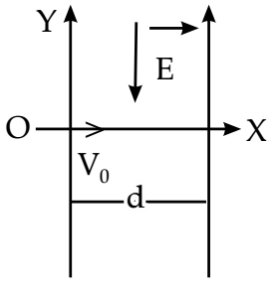
3. A charged particle (mass m and charge q) moves along X axis with velocity V_0. When it passes through the origin it enters a region having uniform electric field $\vec{E} = -E\hat{j}$ which extends upto $x = d$. The y co-ordinate at $x =$ d is –

(A) $y = -2\left(\frac{qEd^2}{mV_0^2}\right)$

(B) $y = -\left(\frac{qEd^2}{mV_0^2}\right)$

(C) $y = -\frac{1}{2}\left(\frac{qEd^2}{mV_0^2}\right)$

(D) $y = -\frac{1}{4}\left(\frac{qEd^2}{mV_0^2}\right)$



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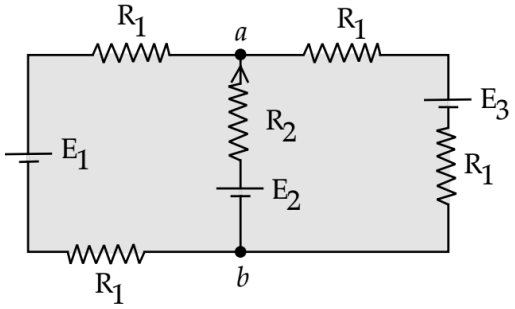
4. For the circuit shown, with $R_1 = 1.0\ \Omega$, $R_2 = 2.0\ \Omega$, $E_1 = 2V$ and $E_2 = E_3 = 4V$, the potential difference between the points 'a' and 'b' is approximately (in V):

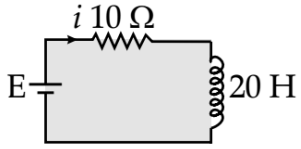


(A) 2.7 (B) 2.3 (C) 3.7 (D) 3.3

5. An alternating voltage $v(t) = 220 \sin 100\pi t$ volt is applied to a purely resistive load of 50 Ω. The time taken for the current to rise from half of the peak value to the peak value is:
(A) 5 ms (B) 2.2 ms (C) 7.2 ms (D) 3.3 ms

6. Voltage rating of a parallel plate capacitor is 500 V. Its dielectric can withstand a maximum electric field of 10^6 V/m. The plate area is 10^{-4} m^2. What is the dielectric constant if the capacitance is 15 pF? (given $\varepsilon_0 = 8.85 \times 10^{-12} C^2/Nm^2$)
(A) 3.8 (B) 8.5 (C) 4.5 (D) 6.2

7. A 20 Henry inductor coil is connected to a 10 Ω resistance in series as shown in figure. The time at which rate of dissipation of energy (Joule's heat) across resistance is equal to the rate at which magnetic energy is stored in the inductor, is:



(A) $\frac{2}{\ln 2}$ (B) $\frac{1}{2}\ln 2$ (C) $2 \ln 2$ (D) $\ln 2$

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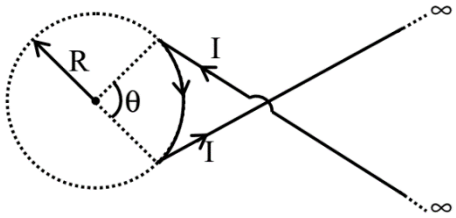
8. Two particles move at right angle to each other. Their de-Broglie wavelengths are λ_1 and λ_2 respectively. The particles suffer perfectly *inelastic* collision. The de-Broglie wavelength λ, of the final particle, is given by:

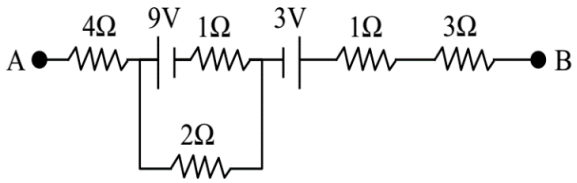
(A) $\frac{1}{\lambda^2} = \frac{1}{\lambda_1^2} + \frac{1}{\lambda_2^2}$ (B) $\lambda = \sqrt{\lambda_1 \lambda_2}$ (C) $\lambda = \frac{\lambda_1 + \lambda_2}{2}$ (D) $\frac{2}{\lambda} = \frac{1}{\lambda_1} + \frac{1}{\lambda_2}$

9. A wire carrying current i has the configuration shown in figure. For the magnetic field to be zero at the centre of the circle, θ must be:



(A) 1 radian (B) 2 radian (C) π radian (D) 2π radian

10. Potential difference between the points A and B in the circuit shown is 16 V, then potential difference across 2Ω resistor is …… V. volt. ($V_A > V_B$)



(A) 7 (B) 8 (C) 6 (D) 9

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Chemistry (Section – B)

11. In the following compounds, the decreasing order of basic strength will be:
(A) $C_2H_5NH_2 > NH_3 > (C_2H_5)_2NH$ (B) $(C_2H_5)_2NH > NH_3 > C_2H_5NH_2$
(C) $(C_2H_5)_2NH > C_2H_5NH_2 > NH_3$ (D) $NH_3 > C_2H_5NH_2 > (C_2H_5)_2NH$

12. For a chemical reaction starting with some initial concentration of reactant A_t as a function of time (t) is given by the equation, $\frac{1}{A_t^4} = 2 + 1.5 \times 10^{-3}t$
The rate of disappearance of [A] is …… $\times 10^{-2}$ M/sec when [A] = 2M.
[Given: $[A_t]$ in M and t in sec.]
[Express your answer in terms of 10^{-2} M/s]
[Round off your answer if required]
(A) 2.20 (B) 1.20 (C) 3.20 (D) 4.20

13. Which one of the following equations does not correctly represent the first law of thermodynamics for the given processes involving an ideal gas? (Assume non-expansion work is zero)
(A) Cyclic process: $q = -W$ (B) Adiabatic process: $\Delta U = -W$
(C) Isochoric process: $\Delta U = q$ (D) Isothermal process: $q = -W$

14. Which of the following amines can be prepared by Gabriel phthalimide reaction?
(A) n-butylamine (B) trimethylamine (C) t-butylamine (D) neo-pentylamine

15. The vapour pressures of pure liquids A and B are 400 and 600 mm Hg, respectively at 298 K. On mixing the two liquids, the sum of their initial volumes is equal to the volume of the final mixture. The mole fraction of liquids B is 0.5 in the mixture. The vapour pressure of the final solution, the mole fractions of components A and B in vapour phase, respectively are:
(A) 450 mm Hg, 0.4, 0.6 (B) 500 mm Hg 0.5, 0.5
(C) 450 mm Hg, 0.5, 0.5 (D) 500 mm Hg, 0.4, 0.6

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16. Given, that

$E°_{O_2/H_2O} = +1.23$ V

$E°_{S_2O_8^{2-}/SO_4^{2-}} = 2.05$ V V

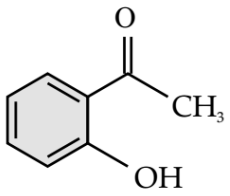
$E°_{Br_2/Br} = 1.09$ V

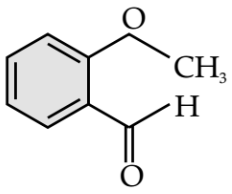
$E°_{Au^{2+}/Au} = +1.4$ V

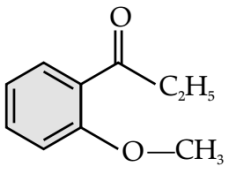
The strongest oxidizing agent is:

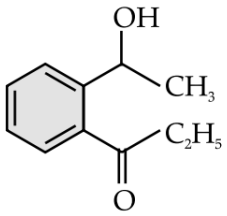
(A) Au^{3+} (B) O_2 (C) $S_2O_8^{2-}$ (D) Br_2

17. An organic compound neither reacts with neutral ferric chloride solution nor with Fehling solution. It however, reacts with Grignard reagent and gives positive iodoform test. The compound is:

(A) 

(B) 

(C) 

(D) 

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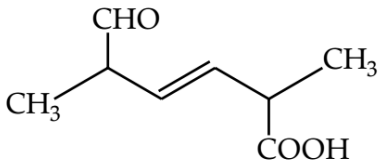
18. The IUPAC name for the following compound is:



(A) 2,5-dimethyl-6-carboxy-hex-3-enal
(B) 2,5-dimethyl-5-carboxy-hex-3-enal
(C) 6-formyl-2-methyl-hex-3-enoic acid
(D) 2,5-dimethyl-6-oxo-hex-3-enoic acid

19. Consider that d^6 metal ion (M^{2+}) forms a complex with aqua ligands and the spin only magnetic moment of the complex is 4.90 BM. The geometry and the crystal field stabilization energy of the complex is:
(A) Tetrahedral and $-1.6\ \Delta_t + 1P$
(B) Octahedral and $-2.4\ \Delta_o + 2P$
(C) Tetrahedral and $-0.6\ \Delta_t + 1P$
(D) Octahedral and $-2.6\ \Delta_o$

20. 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

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Math (Section – C)

21. Let g(x) be the inverse of $f(x) = \frac{2^{x+1}-2^{1-x}}{2^{x}+2^{-x}}$ then g(x) be:
(A) $\frac{1}{2}\log_2\left(\frac{2+x}{2-x}\right)$ (B) $-\frac{1}{2}\log_2\left(\frac{2+x}{2-x}\right)$ (C) $\log_2\left(\frac{2+x}{2-x}\right)$ (D) $\log_2\left(\frac{2-x}{2+x}\right)$

22. The function $f:(-\infty, 3] \to (0, e^7]$ defined by $f(x) = e^{x^3-3x^2-9x+2}$ is:
(A) Many-one and onto (B) Many-one and into
(C) One to one and onto (D) One to one and into

23. If a, b, c are positive and are the pth, qth, and rth terms, respectively, of a G.P., then $\Delta = \begin{vmatrix} \log a & p & 1 \\ \log b & q & 1 \\ \log c & r & 1 \end{vmatrix}$ is
(A) 0 (B) log (abc) (C) $-(p+q+r)$ (D) none of these

24. If $A = [a_{ij}]_{4\times4}$, such that $a_{ij} = \begin{cases} 2, & \text{when } i = j \\ 0, & \text{when } i \neq j \end{cases}$, then $\left\{\frac{\det(adj\,(adj\,A))}{7}\right\}$ is (where {.} represents fractional part function)
(A) 1/7 (B) 2/7 (C) 3/7 (D) none of these

25. The sum of all the roots of the equation $|x^2 - 8x + 15| - 2x + 7 = 0$ is,
(A) $9 + \sqrt{3}$ (B) $11 + \sqrt{3}$ (C) $9 - \sqrt{3}$ (D) $11 - \sqrt{3}$

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26. The sum of the first three terms of a G.P. is S and their product is 27. Then all such S lie in,
(A) $(-\infty,-9]\cup[3,\infty)$ (B) $[-3,\infty)$
(C) $(-\infty,-3]\cup[9,\infty)$ (D) $(-\infty,9]$

27. The number of integral terms in the expansion of $\left(3^{1/2}+5^{1/8}\right)^{n}$ is exactly 33, then the least value of n is,
(A) 264 (B) 128 (C) 256 (D) 248

28. The sum of possible values of x for $\tan^{-1}(x+1)+\cot^{-1}\left(\frac{1}{x-1}\right)=\tan^{-1}\left(\frac{8}{31}\right)$ is,

(A) $\frac{-32}{4}$ (B) $\frac{-33}{4}$ (C) $\frac{-31}{4}$ (D) $\frac{-30}{4}$

29. Let the function $f(x)=\begin{cases}\frac{log_e(1+5x)-log_e(1+\alpha x)}{x}, & if\ x\neq 0\\ 10, & if\ x=0\end{cases}$ be continuous at $x=0$, then α is equal to,
(A) 10 (B) – 10 (C) 5 (D) – 5

30. The value of the integral, $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}}\frac{dx}{(1+e^x)(sin^6x+cos^6x)}$ is equal to,
(A) 2π (B) 0 (C) π (D) $\frac{\pi}{2}$

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