RANKERS
JEE | NEET | FOUNDATION

RGP – RANKERS GENIUS PROGRAM

Set A

(Physics, Chemistry and Mathematics)

Time: 1 Hour | **Moving to 12th (JEE)** | **Marks: 120**

1. General Instructions:

(Paper Code: 1201)

- *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:

- ✓ Exciting Cash Rewards for RGP Toppers

SENIOR WING (Student's Moving to Class XIth, XIIth, Dropper JEE /NEET)		JUNIOR WING (Student's Moving to Class IXth & Xth)	
Overall 1st Topper	₹ 21,000/-	Overall 1st Topper	₹ 5,100/-
Overall 2nd Topper	₹ 11,000/-	Overall 2nd Topper	₹ 3,100/-
Overall 3rd Topper	₹ 5,100/-	Overall 3rd Topper	₹ 2,100/-
Overall 4th – 8th Topper	₹ 2,100/-	Overall 4th – 8th Topper	₹ 1,100/-
Overall 9th – 15th Topper	₹ 1,100/-	Overall 9th – 15th Topper	₹ 500/-

** Rankings from 1 to 20 are determined based on the specific criteria outlined in the FAQ section of our website, www.myrankers.com.

4. Scholarship Criteria in Rankers Offline Classroom Program:

- ✓ 100% Fee Waiver – Student Scoring 90% and Above
- ✓ 80% Fee Waiver – Student Scoring 85% to 89.999%
- ✓ 60% Fee Waiver – Student Scoring 75% to 84.999%
- ✓ 50% Fee Waiver – Student Scoring 70% to 74.999%
- ✓ 40% Fee Waiver – Student Scoring 60% to 69.999%
- ✓ 20% Fee Waiver – Student Scoring 40 % to 59.999%
- ✓ 10% Fee Waiver – Student Scoring 30% to 39.999%
- ✓ 5% Fee Waiver – All the Aspirants Appearing in RGP

RGP RESULT & REWARD CEREMONY

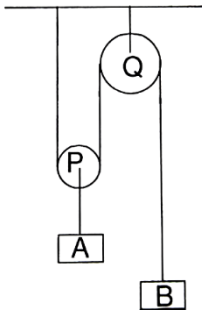
Result Date: 12th Feb 2025
Check Your Result at: www.myrankers.com
Reward Ceremony Date: 16th Feb 2025

Student's Name: - .....

Physics (Section – A)

1. A ball of mass 100 gm is dropped from height 5m. If the ball bounces back to a height 1.25m and ball remains in contact with the floor for 10^{-2} seconds what is the average fore exerted by the floor on the ball is ___ ($g = 10\ m/s^2$)
(A) 50N (B) 100 N (C) 150 N (D) 200 N

2. In figure the mass of body A is four times as great as that of body B.
The system is released from rest find acceleration of block B. ($g = 10\ m/s^2$)
(A) 2.5 m/s^2
(B) 3.75 m/s^2
(C) 5 m/s^2
(D) 7.5 m/s^2



3. Two blocks of mass 2kg and 3kg are connected to a spring of force constant 120 N/m. If both the blocks are given a velocity 1.0 m/s each directed away from each other then find the maximum elongation in spring.
(A) 20cm (B) 10cm (C) 5cm (D) 15cm

4. What amount of heat must be given to a sample of nitrogen gas at constant pressure so that it performs 2J of work?
(A) 2 J (B) 3 J (C) 5 J (D) 7 J

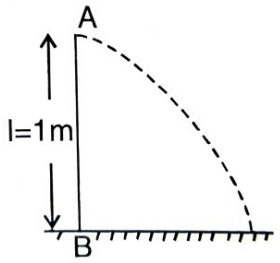
5. With what minimum speed, a particle must be projected in order to acquire a horizontal range of 40 m. ($g = 10\ m/s^2$)
(A) 10 m/s (B) 20 m/s (C) 30 m/s (D) 40 m/s

---------- *Rough Work* ----------

6. A rocket is launched vertically upward from surface of earth with a velocity equal to the orbital velocity of a satellite revolving around earth near its surface. Find the maximum height reached (above surface of earth) by the rocket (g = 10 m/s^2, Radius of earth = 6400 km)
(A) 3200 km (B) 6400 km (C) 12800 km (D) ∞

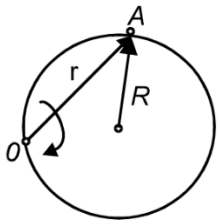
7. A block of mass 1kg connected with a spring of spring constant 4 N/m lies on a smooth horizontal surface. The block is compressed by 20 cm and then released. Find the minimum time after which the elongation in spring becomes 10 cm.
(A) π sec (B) $\frac{\pi}{2}$ sec (C) $\frac{\pi}{3}$ sec (D) $\frac{\pi}{4}$ sec

8. A one-meter long stick (rod) is held vertically with one of its ends on a rough horizontal surface, while its other end is allowed to fall. Assuming that its end on the floor does not slip, find the angular speed of the stick when it hits the surface. (g = 10 m/s^2)
(A) 2.7 rad/s
(B) 5.4 rad/s
(C) 8.1 rad/s
(D) 10.8 rad/s



9. A cubical block of copper (density = 9×10^3 kg/m^3) of side 12 cm floats in mercury (density = 13.5×10^3 kg/m^3). What is the height of the block above mercury level?
(A) 2cm (B) 3cm (C) 4cm (D) It will not float

10. A particle A moves along a circle of radius $R = 50$ cm so that its radius vector r relative to the fixed point O (Figure) rotates with the constant angular velocity $\omega = 0.40$ rad/s. Then velocity of the particle will be –
(A) v = 0.4 m/s
(B) v = 0.8 m/s
(C) v = 0.2 m/s
(D) v = 1.6 m/s

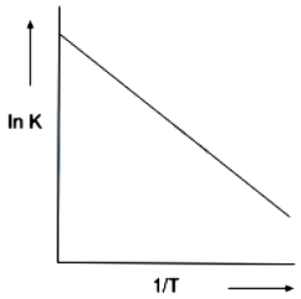


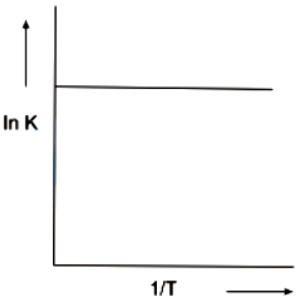
---------- *Rough Work* ----------

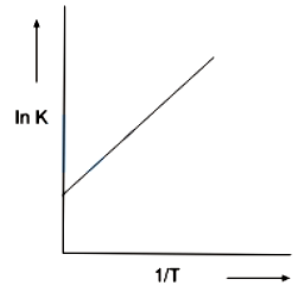
Chemistry (Section – B)

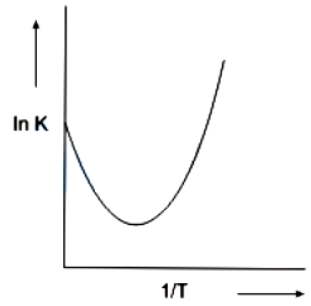
11. The following reaction is performed at 298K.
$2NO_{(g)} + O_{2(g)} \rightleftharpoons 2NO_{2(g)}$
The standard free energy of formation of $NO_{(g)}$ is 86.6 kJ/mol at 298 K. What is the standard free energy of formation of $NO_{2(g)}$ at 298 K? ($K_p = 1.6 \times 10^{12}$)
(A) $8660 - \frac{\ln(1.6\times10^{12})}{R(298)}$
(B) $0.5[2\times86,600 - R\,(298)\ln(1.6\times10^{12})]$
(C) $R\,(298)\ln(1.6\times10^{12}) - 86600$
(D) $86600 + R\,(298)\ln(1.6\times10^{12})$

12. Which ln K vs 1/T plot is correct for an equilibrium that shifts towards reactants at higher temperatures?

(A) 

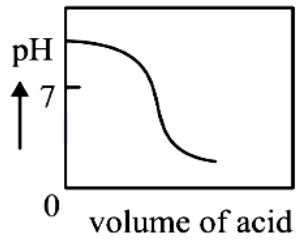
(B) 

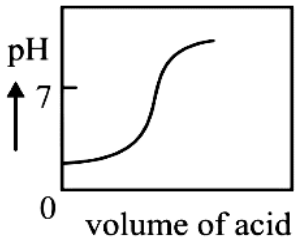
(C) 

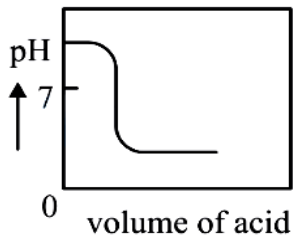
(D) 

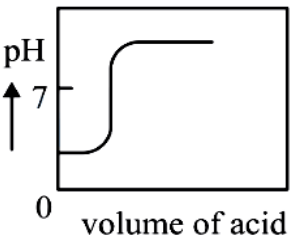
---------- *Rough Work* ----------

13. The Plot of pH-metric titration of weak base NH_4OH vs strong acid HCl looks like

(A) 

(B) 

(C) 

(D) 

14. The element that does not show catenation is
(A) Sn (B) Si (C) Ge (D) Pb

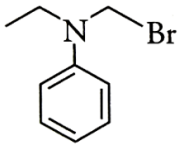
15. Consider the following reaction:
$x\,MnO_4^- + y\,C_2O_4^{2-} + zH^+ \longrightarrow x\,Mn^{2+} + 2y\,CO_2 + \frac{z}{2}H_2O$
The values of x, y and z in the reaction are, respectively:
(A) 2, 5 and 16 (B) 5, 2 and 8 (C) 5, 2 and 16 (D) 2, 5 and 8

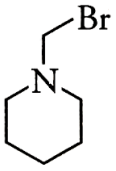
16. Assuming fully decomposed, the volume of CO_2 released at STP on heating 9.85 g of $BaCO_3$ (Atomic mass of Ba = 137) will be
(A) 0.84L (B) 2.24L (C) 4.06L (D) 1.12L

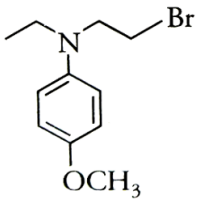
17. The energy of one mole of photons of radiation of wavelength 300 nm is (Given: $h = 6.63\times10^{-34}$ J s, $N_A = 6.02 \times 10^{23}$ mol^{-1} $c = 3 \times 10^8$ ms^{-1})
(A) 235 kJ mol^{-1} (B) 325 kJ mol^{-1} (C) 399 kJ mol^{-1} (D) 435 kJ mol^{-1}

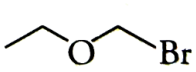
---------- *Rough Work* ----------

18. Which of the following compounds will form the precipitate with aq. $AgNO_3$ solution most readily?

(A) 

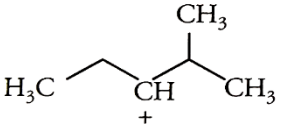
(B) 

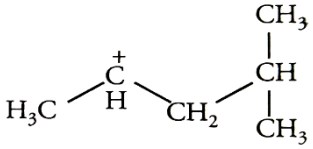
(C) 

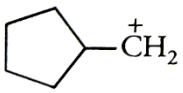
(D) 

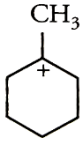
19. Given below are two statements:
Statement I: In an organic compound, when inductive and electromeric effects operate in opposite directions, the inductive effect predominates.
Statement II: Hyperconjugation is observed in *o*-xylene.
In the light of the above statements, choose the correct answer from the options given below:
(A) Statement I is true but Statement II is false.
(B) Statement I is false but Statement II is true.
(C) Both Statement I and Statement II are true.
(D) Both Statement I and Statement II are false.

20. The most stable carbocation among the following is

(A) 

(B) 

(C) 

(D) 

---------- *Rough Work* ----------

Math (Section – C)

21. The value of cosec 20° tan 60° – sec 20° is
(A) 0 (B) 1 (C) 2 (D) 4

22. The sum of all the solutions of the equation $(8)^{2x} - 16 \cdot (8)^{x} + 48 = 0$ is:
(A) $1 + \log_6(8)$ (B) $\log_8(6)$ (C) $1 + \log_8(6)$ (D) $\log_8(4)$

23. If x satisfies the inequality $\log_{25} x^2 + (\log_5 x)^2 < 2$, then x belongs to
(A) $\left(\frac{1}{5}, 5\right)$ (B) $\left(\frac{1}{25}, 5\right)$ (C) $\left(\frac{1}{5}, 25\right)$ (D) $\left(\frac{1}{25}, 25\right)$

24. A man X has 7 friends, 4 of them are ladies and 3 are men. His wife Y also has 7 friends, 3 of them are ladies and 4 are men. Assume X and Y have no common friends. Then the total number of ways in which X and Y together can throw a party inviting 3 ladies and 3 men, so that 3 friends of each of X and Y are in this party, is
(A) 468 (B) 469 (C) 484 (D) 485

25. If the coefficients of x^7 in $\left(ax^2 + \frac{1}{2bx}\right)^{11}$ and x^{-7} in $\left(ax - \frac{1}{3bx^2}\right)^{11}$ are equal, then
(A) $64ab = 243$ (B) $729ab = 32$ (C) $32ab = 729$ (D) $243ab = 64$

---------- *Rough Work* ----------

26. Let $a_1, a_2, a_3, \ldots, a_n, \ldots$ be in A.P. If $a_3 + a_7 + a_{11} + a_{15} = 72$, then the sum of its first 17 terms is equal to
(A) 306 (B) 204 (C) 153 (D) 612

27. The foot of the perpendicular drawn from the origin on the line, $3x + y = \lambda(\lambda \neq 0)$ is *P*. If the line meets x-axis at A and y-axis at B, then the ratio *BP: PA* is
(A) 9 : 1 (B) 1 : 3 (C) 3 : 1 (D) 1 : 9

28. Number of common tangents of $y = x^2$ and $y = -x^2 + 4x - 4$ is
(A) 1 (B) 2 (C) 3 (D) 4

29. If one of the diameters of the curve $x^2 + y^2 - 4x - 6y + 9 = 0$ is a chord of a circle with centre (1, 1), the radius of the circle is
(A) 3 (B) 2 (C) $\sqrt{2}$ (D) 1

30. Let the mean and the variance of 5 observations x_1, x_2, x_3, x_4, x_5 be $\frac{24}{5}$ and $\frac{194}{25}$ respectively. If the mean and variance of the first 4 observation are $\frac{7}{2}$ and a respectively, then $(4a + x_5)$ is equal to:
(A) 13 (B) 15 (C) 17 (D) 18

---------- *Rough Work* ----------