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(Advanced)
2017



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(Advanced)
Paper # 01 & Paper # 02

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(irrespective of question paper set)



JEE (ADVANCED) 2017
(PAPER # 01) 21.05.2017 SET – 6
PHYSICS

More than One Options Correct Type (+4, -2)

1. In the circuit shown,is/are correct?
Ans. (AC)
(A) The frequency at which the current will be in phase with the voltage is independent of R
(C) At $\omega \rightarrow 0$ the current flowing through the circuit becomes nearly zero
2. A human body has a options is/are correct?
Ans. (ABC OR BC)
(A) The amount of energy radiated by the body in 1 second is close to 60 Joules.
(B) Reducing the exposed surface area of the body (eg. by curling up) allows humans to maintain the same body temperature while reducing the energy lost by radiation.
(C) If the surrounding temperature reduces by a small amount $\Delta T_0 \ll T_0$, then to maintain the same body temperature the same (living) human being needs to radiate $\Delta W = 4\sigma T_0^3 \Delta T_0$ more energy per unit time.
3. A block of mass Mis/are correct?
Ans. (BD)
(B) The x component of displacement of the center of mass of the block M is: $-\frac{mR}{M+m}$
(D) The velocity of the point mass m is : $v = \sqrt{\frac{2gR}{1+\frac{m}{M}}}$
4. A block M hangs verticallyoptions is/are correct?
Ans. (BCD)
(B) The time $T_{AO} = T_{OA}$
(C) The velocity of any pulse along the rope is independent of its frequency and wavelength
(D) The velocities of the two pulses (Pulse 1 and Pulse 2) are the same at the midpoint of rope
5. A circular insulated copperoptions is/are correct?
Ans. (BC)
(B) The amplitude of the maximum net emf induced due to both the loops is equal to the amplitude of maximum emf induced in the smaller loop alone.
(C) The rate of change of the flux is maximum when the plane of the loops is perpendicular to plane of the paper
6. A flat plate is moving normalis/are true?
Ans. (BCD)
(B) The pressure difference between the leading and trailing faces of the plate is proportional to uv
(C) At a later time the external force F balances the resistive force
(D) The resistive force experienced by the plate is proportional to v .
7. For an isosceles prism ofoptions is/are correct?
Ans. (ABC)
(A) For this prism, the emergent ray at the second surface will be tangential to the surface when the angle of incidence at the first surface is $i_1 = \sin^{-1} \left[\sin A \sqrt{4 \cos^2 \frac{A}{2} - 1} - \cos A \right]$
(B) At minimum deviation, the incident angle i_1 and the refracting angle r_1 at the first refracting surface are related by $r_1 = (i_1 / 2)$
(C) For the angle of incidence $i_1 = A$, the ray inside the prism is parallel to the base of the prism



Integer Type (+3, 0)

8. An electron in a hydrogensmallest possible n_f is-
Ans. (5)
9. A monochromatic light is travellingthe value of m ?
Ans. (8)
10. ^{131}I is an isotope of Iodineliters is approximately-
Ans. (5)
11. A drop of liquidvalue of α is -
Ans. (6)
12. A stationary source emits sound ofit has received)
Ans. (6)

Single Correct Type (+3, -1)

13. In which case will the particlepositive z direction?
Ans. (C) (IV) (i) (S)
14. In which case would the particle(i.e. move along $-\hat{y}$)?
Ans. (B) (III) (ii) (R)
15. In which case will the particle move in a straight line with constant velocity?
Ans. (B) (II) (iii) (S)
16. Which one of the following options is the correct combination?
Ans. (C) (III) (ii) (S)
17. Which one of the following optionssound in an ideal gas?
Ans. (A) (I) (iv) (Q)
18. Which of the following options is the $\Delta U = \Delta Q - P\Delta V$?
Ans. (A) (II) (iii) (P)

CHEMISTRY

More than One Options Correct Type (+4, -2)

19. The colour of the X_2 molecules of This is due to
Ans. (BC)
(B) decrease in $\pi^* - \sigma^*$ gap down the group
(C) decrease in HOMO-LUMO gap down the group
20. The correct statement(s) about the oxoacids, HClO_4 and HClO , is/are
Ans. (ABC)
(A) The central atom in both HClO_4 and HClO is sp^3 hybridized.
(B) HClO_4 is more acidic than HClO because of the resonance stabilization of its anion
(C) The conjugate base of HClO_4 is weaker base than H_2O
21. The IUPAC name(s) of the following compound is(are)
Ans. (AC)
(A) 1-chloro-4-methylbenzene
(C) 4-chlorotoluene



22. Addition of excess aqueous ammoniastatement(s) is(are) correct?
 Ans. (ABC)
 (A) When X and Z are in equilibrium at 0°C , the colour of the solution is pink
 (B) The hybridization of the central metal ion in Y is d^2sp^3
 (C) Z is a tetrahedral complex
23. The correct statement(s) for the following addition reactions is(are)
 Ans. (CD)
 (C) (M and O) and (N and P) are two pairs of diastereomers
 (D) Bromination proceeds through trans-addition in both the reactions
24. An ideal gas is expanded fromamong the following is(are)
 Ans. (ACD)
 (A) The work done on the gas is maximum when it is compressed irreversibly from (p_2, V_2) to (p_1, V_1) against constant pressure p_1
 (C) If the expansion is carried out freely, it is simultaneously both isothermal as well as adiabatic
 (D) The work done by the gas is less when it is expanded reversibly from V_1 to V_2 under adiabatic conditions as compared to that when expanded reversibly from V_1 to V_2 under isothermal conditions.
25. For a solution formed by mixing liquids L and M,to this system is(are)
 Ans. (CD)
 (C) Attractive intermolecular interactions between L-L in pure liquid L and M-M in pure liquid M are stronger than those between L-M when mixed in solution
 (D) The point Z represents vapour pressure of pure liquid L and Raoult's law is obeyed when $x_L \rightarrow 1$

Integer Type (+3, 0)

26. The sum of the number of lone $Br = 35, Te = 52, Xe = 54$
 Ans. (6)
27. A crystalline solid of a pure substance The value of N is
 Ans. (2)
28. Among the following, the number of aromatic compound(s) is -
 Ans. (5)
29. Among $H_2, He_2^+, Li_2, Be_2, B_2, C_2, N_2, O_2$ and F_2 , $N = 7, O = 8, F = 9$
 Ans. (6)
30. The conductance of a 0.0015 M aqueous solution The value of Z is
 Ans. (6)

Single Correct Comprehension Type (+3, -1)

31. For He^+ ion, the only INCORRECT combination is -
 Ans. (A) (I) (iii) (R)
32. For hydrogen atom, the only CORRECT combination is -
 Ans. (C) (I) (i) (S)
33. For the given orbital in Column 1, the only CORRECT combination for any hydrogen like species is
 Ans. (D) (II) (ii) (P)
34. The only CORRECT combination in which the reaction proceeds through radical mechanism is
 Ans. (B) (I) (iii) (R)



35. The only CORRECT combination that given two different carboxylic acids is

Ans. (C) (III) (iii) (P)

36. For the synthesis of benzoic acid, the only CORRECT combination is

Ans. (A) (II) (i) (S)

MATHEMATICS

More than One Options Correct Type (+4, -2)

37. Let X and Y be two events such $P(Y/X) = \frac{2}{5}$. Then

Ans. (AC)

(A) $P(Y) = \frac{4}{15}$

(C) $P(X'|Y) = \frac{1}{2}$

38. Let $[x]$ be the greatest integer less than or equals to x . Then, at which of the following point(s) the function $f(x) = x \cos(\pi(x + [x]))$ is discontinuous?

Ans. (BCD)

(B) $x = 2$

(C) $x = -1$

(D) $x = 1$

39. Let $f: R \rightarrow (0,1)$ be a continuous in the interval $(0,1)$?

Ans. (BD)

(B) $x^9 - f(x)$

(D) $x - \int_0^{\frac{x}{2-x}} f(t) \cos t \, dt$

40. Let a, b, x and y be real numbers possible value(s) of x ?

Ans. (CD)

(C) $-1 + \sqrt{1-y^2}$

(D) $-1 - \sqrt{1-y^2}$

41. If $2x - y + 1 = 0$ is a tangent to the a right angled triangle?

Ans. (ABC)

(A) $2a, 8, 1$

(B) $a, 4, 1$

(C) $a, 4, 2$

42. Which of the following is(are) NOT the square of a 3×3 matrix with real entries?

Ans.

(AB) (A)

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$$

(B)

$$\begin{bmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$$



43. If a chord, which is not a tangent, of the of p, h and k ?

Ans. (A) $p = 2, h = 3, k = -4$

Integer Type (+3, 0)

44. Let $f : R \rightarrow R$ be a differentiable function, then $\lim_{x \rightarrow 0} g(x) =$

Ans. (2)

45. The sides of a right angled triangle are of its smallest side?

Ans. (6)

46. For a real number α , if the system, then $1 + \alpha + \alpha^2$

Ans. (1)

47. For how many values of p , the circle three common points?

Ans. (2)

48. Words of length 10 are formed using the is repeated. Then, $\frac{y}{9x} =$

Ans. (5)

Single Correct Comprehension Type (+3, -1)

49. The tangent to a suitable conic only CORRECT combination?

Ans. (B) (II) (iv) (R)

50. For $a = \sqrt{2}$, if a tangent is drawn for obtaining its equation?

Ans. (D) (I) (ii) (Q)

51. If a tangent to a suitable conic only CORRECT combination?

Ans. (A) (III) (i) (P)

52. Which of the following options is the only CORRECT combination?

Ans. (C) (II) (ii) (Q)

53. Which of the following options is the only CORRECT combination?

Ans. (A) (II) (iii) (S)

54. Which of the following options is the only INCORRECT combination?

Ans. (B) (III) (i) (R)

END OF TEST PAPER



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(Advanced)

Paper # 02

“Winners always do it first.”

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Kartik Patekar

**2015
AIR-3**
H...

DELHI ZONE TOPPER
Anjali Rai

***DROPPER'S BATCHES Starting From
1st, 15th & 25th June, 2017***



JEE (ADVANCED) 2017
(PAPER # 02) 21.05.2017 SET – 5

PHYSICS

Single Answer Correct Type (+3, -1)

1. A photoelectric material having work-..... is proportional to -
Ans. (D) $\frac{\lambda_d^3}{\lambda^2}$
2. Consider regular polygons with number on n and h as -
Ans. (A) $\Delta = h \left(\frac{1}{\cos\left(\frac{\pi}{n}\right)} - 1 \right)$
3. Consider an expanding sphere of sphere is proportional to -
Ans. (B) R
4. A person measures the depth of, is closest to -
Ans. (D) 1%
5. A symmetric star shaped conducting of the loop is
Ans. (B) $\frac{\mu_0 I}{4\pi a} 6[\sqrt{3} - 1]$
6. A rocket is launched normal to the surface of Earth system is closest to
Ans. (A) $v_s = 42 \text{ km s}^{-1}$
7. Three vectors \vec{P}, \vec{Q} and \vec{R} \vec{P}, \vec{Q} and \vec{S} is
Ans. (B) $\vec{S} = (1-b)\vec{P} + b\vec{Q}$

Multiple Answers Correct Type (+4, -2)

8. The instantaneous voltages at the voltmeter will be -
Ans. (AC)
(A) $V_{XY}^{rms} = V_0 \sqrt{\frac{3}{2}}$
(C) Independent of the choice of the two terminals
9. A point charge $+Q$ is placed statements is/are correct?
Ans. (BD)
(B) The circumference of the flat surface is an equipotential
(D) The electric flux passing through the curved surface of the hemisphere is $-\frac{Q}{2\epsilon_0} \left(1 - \frac{1}{\sqrt{2}} \right)$
10. Two coherent monochromatic options is/are correct?
Ans. (ACD)
(A) The angular separation between two consecutive bright spots decreases as we move from P_1 to P_2 along the first quadrant
(C) At P_2 the order of the fringe will be maximum
(D) The total number of fringes produced between P_1 and P_2 in the first quadrant is close to 3000



11. A uniform magnetic field Boption(s) is/are correct?

Ans. (BD)

(B) For $B = \frac{8}{13} \frac{p}{QR}$, the particle will enter region 3 through the point P_2 on x-axis

(D) For $B > \frac{2}{3} \frac{p}{QR}$, the particle will re-enter region 1

12. A wheel of radius R and mass Moption(s) is/are correct?

Ans. (AD OR D) If torque of Mg is not considered or (D) if torque of Mg is considered.

(A) If the force is applied normal to the circumference at point X then τ is constant

(D) If the force is applied normal to the circumference at point P then τ is zero

13. A source of constantoption(s) is/are correct?

Ans. (ABC)

(A) After a long time, the current through L_1 will be $\frac{V}{R} \frac{L_2}{L_1 + L_2}$

(B) The ratio of the currents through L_1 and L_2 is fixed at all time ($t > 0$)

(C) After a long time, the current through L_2 will be $\frac{V}{R} \frac{L_1}{L_1 + L_2}$

14. A rigid uniform bar ABits motion is/are correct?

Ans. (CD) (As point B is accelerated, to calculate torque pseudo force should also be taken into consideration.

(C) The midpoint of the bar will fall vertically downward

(D) When the bar makes an angle θ with the vertical, the displacement of its midpoint from the initial position is proportional to $(1 - \cos \theta)$

Comprehension Type (+3, 0)

15. In process 1, the energyare related by :

Ans. (C) $E_C = E_D$

16. In process 2, total energy dissipated across the resistance E_D is :

Ans. (A) $E_D = \frac{1}{3} \left(\frac{1}{2} C V_0^2 \right)$

17. The total kinetic energy of the ring is :

Ans. (C) $\frac{3}{2} M \omega_0^2 (R - r)^2$

18. The minimum value of ω_0 below which the ring will drop down is :

Ans. (C) $\sqrt{\frac{g}{\mu(R - r)}}$



Single Answer Correct Type (+3, -1)

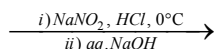
19. Which of the following combination will produce H_2 gas?

Ans. (C) Zn metal and $NaOH(aq)$

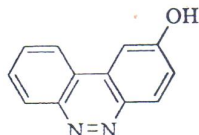
20. The order of basicity among the following compounds is -

Ans. (C) $IV > I > II > III$

21. The major product of the following reaction is -



Ans. (A)



22. For the following cell, $E^\circ(\text{cell}) = 1.1V$

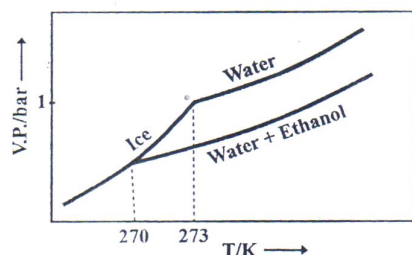
Ans. (B) $2.303 RT - 2.2 F$

23. The order of the oxidation state of the phosphorus atom in H_2PO_2 , H_3PO_4 , H_3PO_3 and $H_4P_2O_6$ is :

Ans. (D) $H_3PO_4 > H_4P_2O_6 > H_3PO_3 > H_3PO_2$

24. Pure water freezes at 273 K and 1 bar.the freezing point is:

Ans. (B)



25. The standard state Gibbs free $1\text{bar} = 10^5 \text{Pa}$

Ans. (C) 14501 bar

Multiple Answers Correct Type (+4, -2)

26. Among the following, the correct statement(s) is(are)

Ans. (BCD)

(B) BH_3 has the three-centre two-electron bonds in its dimeric structure

(C) $Al(CH_3)_3$ has the three-centre two-electron bonds in its dimeric structure

(D) The Lewis acidity of BCl_3 is greater than that of $AlCl_3$

27. For a reaction taking place in a containeris described by

Ans. (CD)

(C) With increase in temperature, the value of K for endothermic reaction increase because unfavourable change in entropy of the surroundings decreases

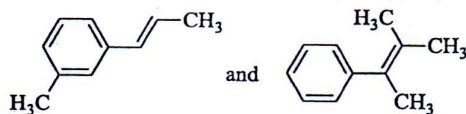
(D) With increase in temperature, the value of K for exothermic reaction decreases because favourable change in entropy of the surroundings decreases



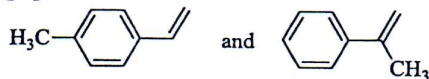
28. Compounds P and R uponP and R, respectively, is(are)

Ans. (AC)

(A)



(C)



29. For the following compounds,reactions is(are)

Ans. (ABD) & (C) can also be included if only resonance stabilization is consider as a major factor in stabilization of intermediary benzylic carbocation & not the releaveness from steric crowding in tert. butyl bromide & its intermediary carbocation tert. butyl carbocation stabilized due to +I effect & hyper conjugative effect.

(A) I and II follow S_N2 mechanism

(B) Compound IV undergoes inversion of configuration

(D) I and III follow S_N1 mechanism

30. In a bimolecular reaction,among the following is(are)

Ans. (AC)

(A) The value of frequency factor predicted by Arrhenius equation is higher than that determined experimentally

(C) The activation energy of the reaction is unaffected by the value of the steric factor

31. The correct statement(s) about surface properties is(are)

Ans. (BD)

(B) Adsorption is accompanied by decrease in enthalpy and decrease in entropy of the system

(D) The critical temperatures of ethane and nitrogen are 563 K and 126 K, respectively. The adsorption of ethane will be more than that of nitrogen on same amount of activated charcoal at a given temperature

32. The option(s) with only amphoteric oxides is(are)

Ans. (AB)

(A) ZnO , Al_2O_3 , PbO , PbO_2

(B) Cr_2O_3 , BeO , SnO , SnO_2

Comprehension Type (+3, 0)

33. Y and Z are, respectively -

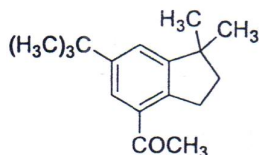
Ans. (A) N_2O_5 and HPO_3

34. W and X are, respectively -

Ans. (C) O_2 and P_4O_{10}

35. The product S is -

Ans. (C)



36. The reactions, Q to R and R to S, are

Ans. (B) Friedel-Crafts alkylation, dehydration and Friedel-Crafts acylation



MATHEMATICS

Single Answer Correct Type (+3, -1)

37. The equation of the plane passing $3x - 6y - 2z = 7$, is -
Ans. (A) $14x + 2y + 15z = 31$
38. How many 3×3 matrices M entries of $M^T M$ is 5?
Ans. (A) 162
39. Three randomly chosen nonnegative that z is even, is
Ans. (D) $\frac{6}{11}$
40. Let O be the origin and let PQR has S as its -
Ans. (A) orthocenter
41. If $y = y(x)$ satisfies the, then $y(256) =$
Ans. (A) 3
42. If $f : R \rightarrow R$ is a twice $f\left(\frac{1}{2}\right) = \frac{1}{2}, f(1) = 1$, then
Ans. (B) $f'(1) > 1$
43. Let $S = \{1, 2, 3, \dots, 9\}$ Then $N_1 + N_2 + N_3 + N_4 + N_5 =$
Ans. (A) 126

Multiple Answers Correct Type (+4, -2)

44. If $f(x) = \begin{vmatrix} \cos(2x) & \cos(2x) & \sin(2x) \\ -\cos x & \cos x & -\sin x \\ \sin x & \sin x & \cos x \end{vmatrix}$, then
Ans. (AC)
(A) $f(x)$ attains its maximum at $x = 0$
(C) $f'(x) = 0$ at more than three points in $(-\pi, \pi)$
45. Let $f(x) = \frac{1-x(1+|1-x|)}{|1-x|} \cos\left(\frac{1}{1-x}\right)$ for $x \neq 1$. Then
Ans. (AB)
(A) $\lim_{x \rightarrow 1^-} f(x) = 0$
(B) $\lim_{x \rightarrow 1^+} f(x)$ does not exist
46. If $I = \sum_{k=1}^{98} \int_k^{k+1} \frac{k+1}{x(x+1)} dx$, then
Ans. (AB)
(A) $I > \frac{49}{50}$
(B) $I < \log_e 99$



47. If $g(x) = \int_{\sin}^{\sin(2x)} \sin^{-1}(t) dt$, then

Ans. () Given OPTIONS are not correct.

48. If the line $x = \alpha$ divides thetwo equal parts, then

Ans. (AC)

(A) $2\alpha^4 - 4\alpha^2 + 1 = 0$

(C) $\frac{1}{2} < \alpha < 1$

49. If $f: R \rightarrow R$ is a differentiable function such that $f'(x) > 2f(x)$ for all $x \in R$, and $f(0) = 1$, then

Ans. (BD)

(B) $f(x) > e^{2x}$ in $(0, \infty)$

(D) $f(x)$ is increasing in $(0, \infty)$

50. Let α and β be nonzero realfollowing is/are true?

Ans. (AB)

(A) $\tan\left(\frac{\alpha}{2}\right) + \sqrt{3} \tan\left(\frac{\beta}{2}\right) = 0$

(B) $\tan\left(\frac{\alpha}{2}\right) - \sqrt{3} \tan\left(\frac{\beta}{2}\right) = 0$

Comprehension Type (+3, 0)

51. $|\overrightarrow{OX} \times \overrightarrow{OY}| =$

Ans. (D) $\sin(P+Q)$

52. If the triangle PQR varies, then the minimum value of $\cos(P+Q) + \cos(Q+R) + \cos(R+P)$ is

Ans. (A) $-\frac{3}{2}$

53. If $a_4 = 28$, then $p + 2q =$

Ans. (B) 12

54. $a_{12} =$

Ans. (B) $a_{11} + a_{10}$

END OF TEST PAPER





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Though JEE team at CatalyseR has taken utmost care in drafting the answers.

But due to early documentation & printing, an error of $\pm 5\%$ may occur.

Answer should be taken in that respect.

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***DROPPER'S BATCHES Starting From
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