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# 2025 JEE 28<sup>TH</sup> Shift -1 Questions **HISTORY CREATED**

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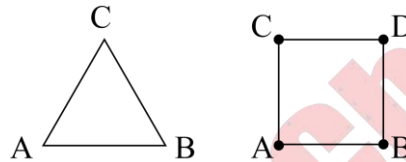
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**JEE Main – 28<sup>th</sup> January – 2025 (Shift-1)**

**[Memory Based Questions]**

**PHYSICS**

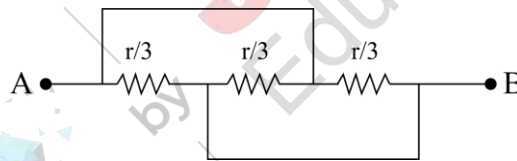
1. A wire of resistor  $R$  is bent into an equilateral triangle. An identical wire is bent into a square. What is the ratio of the resistances between any two vertices of the triangle to the any two adjacent vertices of the square.



- a)  $1/3$                       b)  $27/11$                       c)  $36/45$                       d)  $32/27$

**Ans: (d)**

2. Effective resistance between A and B is



- a)  $r/11$                       b)  $r/9$                       c)  $r/13$                       d)  $r/15$

**Ans: (b)**

3. Two solid spheres of radii  $R_1$  and  $R_2$  made of same material where  $R_2 = 2R_1$  find Ratio of Moment of Inertia  $I_1/I_2 = ?$

- a)  $2/17$                       b)  $3/25$                       c)  $1/15$                       d)  $1/32$

**Ans: (d)**

4. In YDSE for  $\lambda_1 = 600$  nm 10<sup>th</sup> bright fringe at 10 mm from central maxima then for  $\lambda_2 = 660$  nm what is the distance of 10<sup>th</sup> bright fringe from central maxima

- a) 7                      b) 9                      c) 11                      d) 15

**Ans: (c)**

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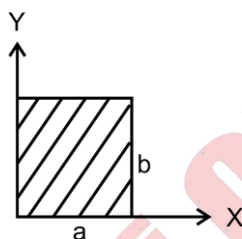
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5. A proton of mass ' $m_p$ ' has same energy as that of photon of specific wavelength. If the proton is moving at non-relativistic speed, then ratio of de Broglie wavelength of the proton to the wavelength of photon is

a)  $\frac{1}{c} \sqrt{\frac{2E}{m_p}}$       b)  $\frac{1}{c} \sqrt{\frac{E}{2m_p}}$       c)  $\frac{1}{c} \sqrt{\frac{E}{m_p}}$       d)  $\frac{1}{2c} \sqrt{\frac{E}{m_p}}$

Ans: (b)

6. Find center of mass of Rectangular Plate of mass density



$\sigma = \frac{\sigma_0 x}{ab}$  is

a)  $\left( \frac{2a}{3}, \frac{b}{2} \right)$       b)  $\left( \frac{a}{3}, \frac{2b}{3} \right)$       c)  $\left( \frac{a}{2}, \frac{b}{3} \right)$       d)  $\left( \frac{a}{3}, \frac{b}{2} \right)$

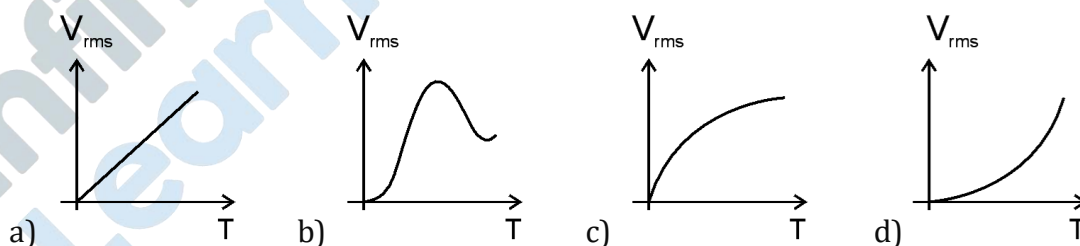
Ans: (a)

7. A thin prism  $P_1$  with angle  $4^\circ$  made of glass having refractive index 1.54, is combine with another thin prism  $P_2$  made of glass having refractive index 1.72 to get dispersion without deviation. The angle of the prism  $P_2$  in degrees is

a) 4      b) 16/3      c) 3      d) 1.5

Ans: (c)

8. The variation of RMS velocity of gas molecules with temperature.



Ans: (c)

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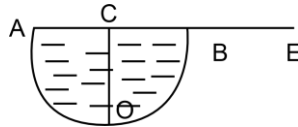
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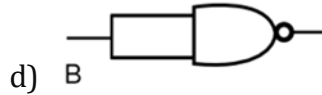
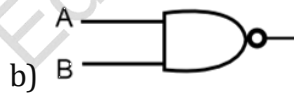
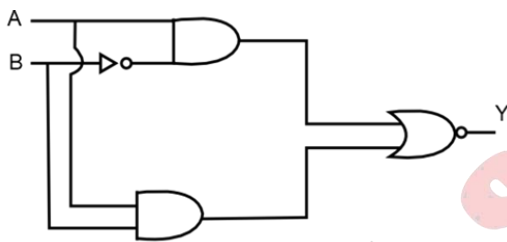
9. A hemispherical vessel is completely filled with a liquid of refractive index of  $\mu$ . A small coin is kept at the lowest part of the vessel as shown in figure. The minimum value of the refractive index of the liquid so that a person can see the coin from the point  $E$  (at the level of the vessel) is



- a)  $\sqrt{3}$       b)  $\sqrt{2}$       c)  $\frac{\sqrt{3}}{2}$       d)  $3/2$

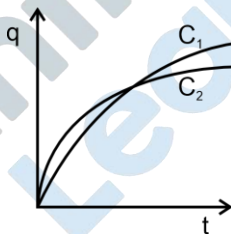
Ans: (b)

10. The given logic gate gives same output as



Ans: (c)

11. Two capacitors  $C_1, C_2$  are connected in parallel to a battery. Charge time graph is shown below for the two capacitors. The energy store with them in steady state are  $u_1$  and  $u_2$  respectively. Which of the given statement is correct



- a)  $C_1 > C_2, u_1 < u_2$     b)  $C_1 > C_2, u_1 > u_2$     c)  $C_2 > C_1, u_2 > u_1$     d)  $C_2 > C_1, u_2 < u_1$

Ans: (b)

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12. Which of the following is correct reaction  
a)  $n \rightarrow p + e^- + \nu$  b)  $n \rightarrow p + e^+ + \nu^-$  c)  $n \rightarrow p + e^- + \nu^-$  d)  $n \rightarrow p + \nu^-$

Ans: (c)

13. In the experiment for measurement of viscosity  $\eta$  of given liquid with a ball having radius  $R$ , consider the following statements.
- A. Graph between terminal velocity  $v$  and  $R$  will be a Parabola.
  - B. Terminal velocities of different diameter balls are constant for a given liquid
  - C. Measurement of terminal velocity is dependent on the temperature.
  - D. This experiment can be utilize to assess the density of a given liquid
  - E. If balls are dropped with some initial speed, the value of  $\eta$  will change.

Choose the correct answer from the options given below.

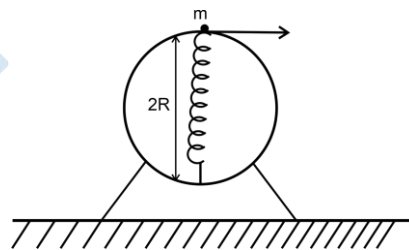
- a) B, D and E only
- b) A, B and E only
- c) A, C and D only
- d) C, D and E only

Ans: (c)

14. If dimensions of modulus of elastically by torque =  $M^a L^b T^c$  Find c.

Ans: 0

15. A bead of mass  $m$  slides without friction on the wall of a vertical circular hoop of radius  $R$  as shown in figure. The bead moves under the combined action of gravity and massless spring ( $k$ ) attached to the bottom of the hoop with zero initial speed, velocity of bead when the length of spring becomes ' $R$ ', would be.



- a)  $\sqrt{2Rg + \frac{4kR^2}{m}}$
- b)  $\sqrt{3gR + \frac{kR^2}{m}}$
- c)  $\sqrt{gR + \frac{kR^2}{m}}$
- d)  $\sqrt{2Rg + \frac{kR^2}{m}}$

Ans: (b)

[JEE Main 2025 Paper Analysis \(28th Jan\) Check Shift Wise](#)

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**CHEMISTRY**

1. The product A and B in the following reactions, respectively



- a)  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{ONO}$ ,  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CN}$   
 b)  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{NO}_2$ ,  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{NC}$   
 c)  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{NO}_2$ ,  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2\text{CN}$   
 d)  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{ONO}$ ,  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{NC}$

Ans: (b)

2. Consider the following element in In, Tl, Al, and Pb. The most stable oxidation states of elements with highest and lowest first ionization enthalpies, respectively are

- a) +4 and +1      b) +2 and +3      c) +4 and +3      d) +1 and +4

Ans: (b)

3. The incorrect decreasing order of atomic radii is,

- a)  $\text{Si} > \text{P} > \text{Cl} > \text{F}$       b)  $\text{Mg} > \text{Al} > \text{C} > \text{O}$   
 c)  $\text{Al} > \text{B} > \text{N} > \text{F}$       d)  $\text{Be} > \text{Mg} > \text{Al} > \text{Si}$

Ans: (d)

4. The molecules having square pyramidal geometry are

- a)  $\text{SbF}_5$  &  $\text{PCl}_5$       b)  $\text{BrF}_5$  &  $\text{XeOF}_4$   
 c)  $\text{BrF}_5$  &  $\text{PCl}_5$       d)  $\text{SbF}_5$  &  $\text{XeF}_4$

Ans: (b)

5. A weak acid HA has degree of dissociation x. Which options gives the correct expression of  $(\text{pH} - \text{pK}_a)$  ?

- a) 0      b)  $(\log(1 + 2x))$       c)  $\log\left(\frac{x}{1-x}\right)$       d)  $\log\left(\frac{1-x}{x}\right)$

Ans: (c)

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6. Both acetaldehyde and acetone (individually) undergo which of the following reactions,

- |                        |                        |
|------------------------|------------------------|
| A) Iodoform Reaction   | B) Cannizzaro Reaction |
| C) Aldol condensation  | D) Tollen's test       |
| E) Clemmesen Reduction |                        |
| a) A, C & E only       | b) A, D & E only       |
| c) A, B, C, D & E      | d) A & C only          |

Ans: (b)

7. What is the freezing point depression constant of a solvent 50g of which contain 1g of non-volatile solute (M.W:256g/mol) and depression in freezing point is 0.4K?

- |                                |                                |
|--------------------------------|--------------------------------|
| a) 0.372K Kg mol <sup>-1</sup> | b) 4.213K Kg mol <sup>-1</sup> |
| c) 4.213K Kg mol <sup>-1</sup> | d) 5.12K Kg mol <sup>-1</sup>  |

Ans: (d)

8. Ice and water are placed in a closed container at a pressure at 1 atm and temperature 273.15 K. If the pressure of the container increases 2 times and the temperature is kept constant, then identify the correct observation from the following

- The amount of ice decreases
- Volume of system increases
- Liquid phase disappear completely
- Solid phase (ice) disappear completely

Ans: (d)

9. Which of the following set of quantum numbers have same energy?

- $n = 2, l = 2, m = +1$
- $n = 2, l = 1, m = -1$
- $n = 3, l = 2, m = 0$
- $n = 3, l = 2, m = 1$

- |         |         |         |         |
|---------|---------|---------|---------|
| a) 1, 2 | b) 2, 3 | c) 3, 4 | d) 1, 4 |
|---------|---------|---------|---------|

Ans: (c)

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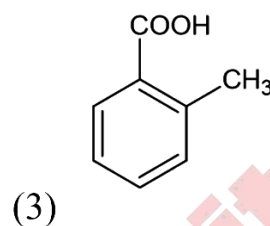
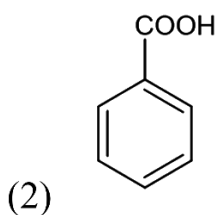
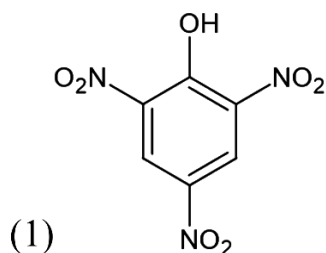
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10. What is the rate of reaction for releasing  $\text{CO}_2(\text{g})$  with aq.  $\text{NaHCO}_3$  among following compounds?

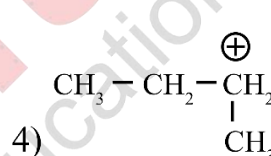
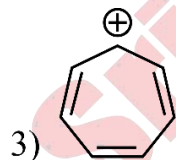
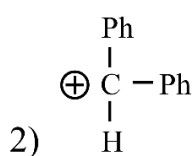
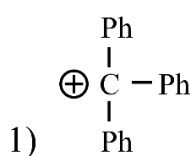


- a) (1) > (2) > (3)  
c) (1) > (3) > (2)

- b) (3) > (2) > (1)  
d) (2) > (3) > (1)

Ans: (b)

11. Correct order of stability of carbocations

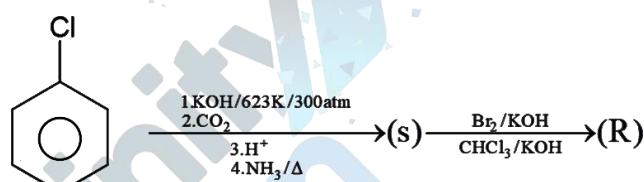


- a) (3) > (1) > (2) > (4)  
c) (3) > (4) > (2) > (1)

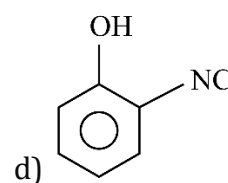
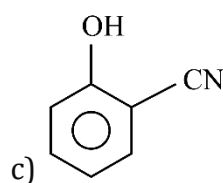
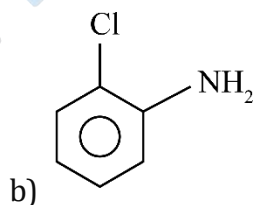
- b) (1) > (2) > (3) > (4)  
d) (2) > (1) > (3) > (4)

Ans: (a)

12. In the given reaction sequence:



What is (R) ?



Ans: (d)

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13.  $\text{H}_2(\text{g}) + \frac{1}{2}\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{g})$   $\Delta H_f = -248 \text{ kJ/mol}$ . Bond energy of  $\text{H}_2$  and  $\text{O}_2$  are 222 & 250 kJ/mol respectively. What is bond energy of O – H bond?

- a) 720                      b) 645                      c) 471                      d) 567

Ans: (c)

14. Which gives borax bead test violet?

- a)  $\text{Ti}^{+3}$                       b)  $\text{Ni}^{+2}$                       c)  $\text{Mn}^{+2}$                       d)  $\text{V}^{+3}$

Ans: (c)

15. 70% by mass solution of  $\text{HNO}_3$  is taken having density 1.41 gm/ml. Calculate molarity (Rounded off to nearest integer)

- a) 16                      b) 24                      c) 12                      d) 30

Ans: (a)

16. **Statement-1:** Glucose pentaacetate give 2-4DNP test

**Statement-2 :** Starch on heating with conc.sulphuric acid at  $100^\circ\text{C}$  and 2-3 atm gives glucose.

- a) Both Statements are true                      b) Both Statements are false  
c) Statement-1 is true and Statement-2 is false  
d) Statement-1 is false and Statement-2 is true

Ans: (d)

17. Match the following column and choose the correct option.

	Column-I		Column-II
(A)	$\text{H}_2\text{O}_2 \rightarrow \text{H}_2\text{O} + \text{O}_2$	(P)	Combustion reaction
(B)	$\text{NaH} \rightarrow \text{Na} + \text{H}_2$	(Q)	Disproportionation
(C)	$\text{CH}_4 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$	(R)	Decomposition reaction
(D)	$\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$	(S)	Displacement reaction

- a) A – (Q), B – (P), C – (R), D – (S)                      b) A – (R), B – (Q), C – (S), D – (P)  
c) A – (Q), B – (R), C – (P), D – (S)                      d) A – (R), B – (Q), C – (P), D – (S)

Ans: (c)



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18. The number of lone pairs in the most stable structure of  $\text{ClF}_3$  are  $n$ , then compound that doesn't have the same number of unpaired electrons is ?

- a)  $\text{Ni}^{+2}$                       b)  $\text{V}^{+3}$                       c)  $\text{Ti}^{+4}$                       d)  $\text{Ti}^{+2}$

Ans: (c)

19. A compound contains 14.4% of carbon, 1.8% of hydrogen and 64.46% of Chlorine by mass. The empirical formula of the compound

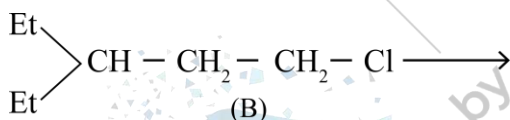
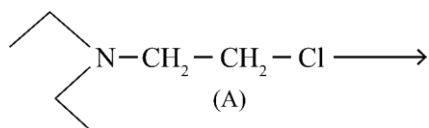
(Cl – 35.5, C – 12, O – 16, H – 1)

- a)  $\text{CH}_3\text{Cl}$                       b)  $\text{C}_2\text{H}_4\text{Cl}$                       c)  $\text{CH}_2\text{Cl}_2$                       d)  $\text{CHCl}_3$

Ans: (c)

20. Given below are two statements:

**Statement-I**



(A) give hydrolysis faster than (B).

**Statement-II:** Compound (A) first combined itself to give intramolecular bond.

In the light of the above statements, choose the most appropriate answer from the options given below:

- (a) Both Statement I and Statement II are incorrect  
(b) Statement I is correct but Statement II is incorrect  
(c) Both Statement I and Statement II are correct  
(d) Statement I is incorrect but Statement II is correct

Ans: (c)

21. Which of the following Oxidation reaction reactions are carried out by both  $\text{K}_2\text{Cr}_2\text{O}_7$  and  $\text{KMnO}_4$  in Acidic Medium

- a)  $\text{I}^- \rightarrow \text{I}_2$                       b)  $\text{S}^{2-} \rightarrow \text{S}$                       c)  $\text{I}^- \rightarrow \text{IO}_3^-$                       d)  $\text{S}_2\text{O}_3^{2-} \rightarrow \text{SO}_4^{2-}$

Ans: (a)



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**MATHEMATICS**

1. If  $f(x) = \frac{2^x}{2^{x+\sqrt{2}}}$ ,  $x \in R$ , then  $\sum_{k=1}^{81} f\left(\frac{k}{82}\right)$  is equal to  
 a)  $81\sqrt{2}$                       b) 82                      c)  $\frac{81}{2}$                       d) 41  
**Ans: (c)**
2.  $z_1 = \sqrt{3} + 2\sqrt{2}i$  &  $\sqrt{3}|z_1| = |z_2|$  and  $\arg(z_2) = \arg(z_1) + \frac{\pi}{6}$  then area of triangle with vertices  $z_1, z_2$  and origin.  
 a)  $\frac{11\sqrt{3}}{4}$                       b)  $\frac{3\sqrt{2}}{5}$                       c)  $\frac{2\sqrt{3}}{5}$                       d)  $\frac{2\sqrt{5}}{7}$   
**Ans: (a)**
3.  $\cos(\sin^{-1}\frac{3}{5} + \sin^{-1}\frac{5}{13} + \sin^{-1}\frac{33}{65})$  is equal to:  
 a) 0                      b) 1                      c)  $\frac{32}{65}$                       d)  $\frac{33}{65}$   
**Ans: (a)**
4. Area of region  $\{(x, y): 0 \leq y \leq 2|x| + 1, 0 \leq y \leq x^2 + 1, |x| \leq 3\}$   
 a)  $\frac{17}{3}$                       b)  $\frac{32}{3}$                       c)  $\frac{64}{3}$                       d)  $\frac{80}{3}$   
**Ans: (c)**
5. The relation  $R = \{(x, y) \mid x, y \in Z, x + y = \text{even}\}$  then  $R$  is  
 a) Equivalence  
 b) Reflexive & Transitive but-not Symmetric  
 c) Symmetric & Transitive but not reflexive  
 d) Reflexive & symmetric but not transitive  
**Ans: (a)**
6.  $\int_0^x tf(t)dt = x^2f(x)$ ,  $f(2) = 3, f(6) = ?$   
 a) 3                      b) 0                      c) 2                      d) 1  
**Ans: (d)**

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7.  $y = \int_{-\pi/2}^{\pi/2} \frac{96x^2 \cos 2x}{1+e^x} dx = (\alpha\pi^3 + \beta)$ . Then  $(\alpha + \beta)$  is equal to

- a) 120                      b) 100                      c) 115                      d) 120

**Ans: (b)**

8. The no. of different 5 digit numbers greater than 50000 than can be formed using the digits 0, 1, 2, 3, 4, 5, 6, 7 such that the sum of their first and last digits should not be more than 8, is

- a) 5720                      b) 4607                      c) 4608                      d) 5719

**Ans: (b)**

9. If the image of the point (4,4,3) in the line  $\frac{x-1}{2} = \frac{y-2}{1} = \frac{z-1}{3}$  is  $(\alpha, \beta, r)$ , then  $(\alpha + \beta + r)$  is equal to

- a) 12                      b) 8                      c) 9                      d) 7

**Ans: (c)**

10. The sum of all local minimum values of the function

$$\begin{cases} \frac{1-2x}{3} & x < -1 \\ \frac{1}{7+2|x|} & -1 \leq x \leq 2 \\ \frac{11}{18}(x-4)(x-5) & x > 2 \end{cases} \text{ is}$$

- a)  $\frac{131}{72}$                       b)  $\frac{157}{72}$                       c)  $\frac{171}{72}$                       d)  $\frac{167}{72}$

**Ans: (b)**

11. The sum of squares of roots of equation  $x^2 + |2x - 3| - 4 = 0$

- a)  $6(3 - \sqrt{2})$                       b)  $3(3 - \sqrt{2})$                       c)  $6(2 - \sqrt{2})$                       d)  $3(2 - \sqrt{2})$

**Ans: (c)**

12. Let  $a_n$  be sequence,  $a_0 = 0, a_n = \frac{1}{2}$  and  $2a_{n+2} = 5a_{n+1} - 3a_n, n = 0, 1, 2, \dots$  then  $\sum_{k=1}^{100} a_k$

- a)  $3a_{100} - 100$                       b)  $3a_{99} + 100$                       c)  $3a_{100} + 100$                       d)  $3a_{99} - 100$

**Ans: (a)**

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13. Three defective oranges are accidentally mixed with Seven good ones & on looking at them, it is not possible to differentiate between them. Two oranges are drawn at random from the lot. If  $x$  denote the number of defective oranges, then the variance of  $x$  is.

- a)  $\frac{4}{75}$                       b)  $\frac{14}{75}$                       c)  $\frac{28}{75}$                       d)  $\frac{26}{75}$

Ans: (c)

14. Let  ${}^nC_{r-1} = 28$ ,  ${}^nC_r = 56$  and  ${}^nC_{r+1} = 70$ , let  $A(4 \cos t, 4 \sin t)$ ,  $B(2 \sin t, -2 \cos t)$  and  $C(3r - n, r^2 - n - 1)$  be the vertices of a triangles ABC, where  $t$  is a parameter. If  $(3x - 1)^2 + (3y)^2 = \alpha$ , is the locus of the centroid of triangle ABC, then  $\alpha$  equates.

- a) 20                      b) 8                      c) 48                      d) 6

Ans: (a)

15. Let  $f: R \rightarrow R$  be a function defined by  $f(x) = (2 + 3a)x^2 + \left(\frac{a+2}{a-1}\right)x + b$ ,  $a \neq 1$ , if  $f(x + y) = f(x) + f(y) + 1 - \frac{2}{7}xy$ , then the value of  $28 \sum_{i=1}^5 |f(i)|$  is.

- a) 675                      b) 750                      c) 545                      d) 725

Ans: (a)

16. Let ABCD be a trapezium whose vertices lie on parabola  $y^2 = 4x$ . let the sides the AD and BC of the trapezium be Parallel to  $y$ -axis If the diagonal AC is of length  $\frac{25}{4}$  and it Passes through the Point (1, 0) then the area of ABCD is

- a)  $\frac{125}{8}$                       b)  $\frac{25}{2}$                       c)  $\frac{75}{8}$                       d)  $\frac{75}{4}$

Ans: (d)

17. Let  $A(x, y, z)$  be point in  $xy$  plane, which is equidistant from three Points (0,3,2), (2,0,3) and (0,0,1). let  $B(1,4, -1)$  and  $C(2,0, -2)$ . Then among the statements.  $S_1 = \Delta ABC$  is an isosceles right angle triangle, and  $S_2 =$  the area of  $\Delta ABC$  is  $\frac{9\sqrt{2}}{2}$ ,

- a) Only  $S_1$  is true    b) Both are false    c) Only  $S_2$  is true    d) Both are true

Ans: (a)

18. Let  $T_r$  be the  $r^{\text{th}}$  term of an A.P. If for some  $m$ ,  $T_m = \frac{1}{25}$ ,  $T_{25} = \frac{1}{20}$ , and  $20 \sum_{r=1}^{25} T_r = 13$ , Then  $5m \sum_{r=m}^{2m} T_r$  is

- a) 112                      b) 90                      c) 142                      d) 126

Ans: (d)

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19. Two numbers,  $k_1$  and  $k_2$  are randomly chosen from the set of natural numbers. Then, the probability that the value of  $i^{k_1} + i^{k_2}$ , ( $i = \sqrt{-1}$ ) is non-zero, equal to

a)  $\frac{2}{8}$

b)  $\frac{1}{4}$

c)  $\frac{3}{4}$

d)  $\frac{1}{2}$

Ans: (c)

20. Let the equation of the circle, which touches  $x$ -axis at the point  $(a, 0)$ ,  $a > 0$  cuts off an intercept of length 'b' on  $y$ -axis be  $x^2 + y^2 - \alpha x + \beta y + r = 0$ . If the circle lies below  $x$ -axis, then the ordered pair  $(2a, b^2)$  is equal to.

a)  $(r, \beta^2 + 4\alpha)$

b)  $(\alpha, \beta^2 - 4r)$

c)  $(r, \beta^2 - 4\alpha)$

d)  $(\alpha, \beta^2 + 4r)$

Ans: (b)

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