

2024 JEE 29<sup>th</sup> Shift-2 Questions

# HISTORY CREATED

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**29-Jan-2024 Shift-2**

Maths

1. The value of  $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \sqrt{1 - \sin 2x} dx$  is

- (a)  $\sqrt{2} - \sqrt{3} + 1$
- (b)  $2\sqrt{2} - \sqrt{3} - 1$
- (c)  $2\sqrt{2} + \sqrt{3} - 1$
- (d)  $\sqrt{2} + \sqrt{3} - 1$

**Ans: (b)**

2. Given set =  $\{1,2,3, \dots, 50\}$  one number is selected randomly from set. Find probability that number is multiple of 4 or 6 or 7 .

- (a)  $\frac{21}{50}$
- (b)  $\frac{18}{50}$
- (c)  $\frac{8}{25}$
- (d)  $\frac{21}{25}$

**Ans: (a)**

3. If P(3,2,3) Q(4,6,2) R(7,3,2) are the vertices of  $\Delta$  PQR, then find  $\angle$ QPR =

- 1)  $\cos^{-1} \frac{1}{18}$
- 2)  $\frac{\pi}{6}$
- 3)  $\frac{\pi}{3}$
- 4)  $\cos^{-1} \frac{7}{18}$

**Ans: (3)**

4. The remainder when  $64^{32^{32}}$  is divided by 9 is

**Ans: (1)**

5. Area bounded by  $0 \leq y \leq \min\{x^2 + 2, 2x + 2\}$ ,  $x \in [0,3]$ , then 12A is

**Ans: (164)**

6.  $A = \{1,2,3,4\}$  Minimum number of elements added to make it equivalence relation on set A containing (1,3)&(1,2) in it.

a) 8

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b) 9

C) 12

d) 16

**Ans: (a)**

7. In which interval the function  $f(x) = \frac{x}{x^2 - 6x - 16}$  is increasing:

(a)  $\phi$

(b)  $\left[1, \frac{3}{7}\right] \cup \left(\frac{5}{4}, \infty\right)$

(C)  $\left(\frac{5}{4}, \infty\right)$

(d)  $\left[\frac{3}{4}, \frac{5}{4}\right]$

**Ans: (a)**

8.  $y = f(x) = \log\left(\frac{1-x^2}{1+x^2}\right)$ , at  $x = \frac{1}{2}$  find  $225(y' - y'')$ .

A. 736

B. 746

C. 732

D. 716

**Ans: (a)**

9. If  $\ln a, \ln b, \ln c$  are in A.P. and  $\ln a - \ln 2b, \ln 2b - \ln 3c, \ln 3c - \ln a$  are in A.P. then  $a:b:c$  is

(a) 1:2:3

(b) 7:7:4

(C) 9:6:4

(d) 4:6:9

**Ans: (c)**

10. If  $r = |z|, \theta = \arg(z)$  and  $z = 2 - 2i \tan\left(\frac{5\pi}{8}\right)$ , then find  $(r, \theta)$ .

(a)  $\left(2 \sec \frac{5\pi}{8}, \frac{3\pi}{8}\right)$

(b)  $\left(2 \sec \frac{3\pi}{8}, \frac{3\pi}{8}\right)$

(C)  $\left(2 \tan \frac{3\pi}{8}, \frac{5\pi}{8}\right)$

(d)  $\left(2 \tan \frac{3\pi}{8}, \frac{3\pi}{8}\right)$

**Ans: (b)**

11.  $(\alpha, \beta)$  lies on the  $y^2 = 4x$  and  $(\alpha, \beta)$  also lie on chord with mid-point  $\left(1, \frac{5}{4}\right)$  of another parabola  $x^2 = 8y$ , then value  $|(8 - \beta)(\alpha - 28)|$  is

- (a) 192
- (b) 92
- (C) 64
- (d) 128

Ans: (a)

12. Unit vector  $\hat{u} = x\hat{i} + y\hat{j} + z\hat{k}$  makes angles  $\frac{\pi}{2}, \frac{\pi}{3}, \frac{2\pi}{3}$  with  $(\frac{1}{\sqrt{2}}\hat{i} + \frac{1}{\sqrt{2}}\hat{k}), (\frac{1}{\sqrt{2}}\hat{j} + \frac{1}{\sqrt{2}}\hat{k}), (\frac{1}{\sqrt{2}}\hat{i} + \frac{1}{\sqrt{2}}\hat{j})$  respectively and  $\vec{v} = \frac{1}{\sqrt{2}}\hat{i} + \frac{1}{\sqrt{2}}\hat{j} + \frac{1}{\sqrt{2}}\hat{k}$ . Find  $|\vec{u} - \vec{v}|$

- (a)  $\sqrt{\frac{5}{2}}$
- (b)  $\sqrt{\frac{7}{2}}$
- (C)  $\sqrt{\frac{2}{5}}$
- (d)  $\sqrt{\frac{2}{7}}$

Ans: (a)

13. If first term of non-constant G.P. be  $\frac{1}{8}$  and every term is A.M. of next two, then  $\sum_{r=1}^{20} T_r - \sum_{r=1}^{18} T_r$  is:

- (a)  $2^{15}$
- (b)  $-2^{15}$
- (C)  $-2^{18}$
- (d)  $2^{18}$

Ans: (b)

14. The mean of 5 observations is  $\frac{24}{5}$  and variance is  $\frac{194}{25}$ . If the mean of first four observations is  $\frac{7}{2}$ , then the variance of first four observations is

- (a)  $\frac{3}{2}$
- (b)  $\frac{5}{2}$
- (c)  $\frac{5}{4}$
- (d)  $\frac{2}{3}$

Ans: (c)

15. The number of ways to distribute 8 identical books into 4 distinct bookshelf is (where any bookshelf can be empty)

16.  $x \left( \cos \left( \frac{y}{x} \right) \right) \frac{dy}{dx} = y \cos \left( \frac{y}{x} \right) + x$ , where  $\sin \left( \frac{y}{x} \right) = \ln |x| + \frac{\alpha}{2}$  and  $f(1) = \frac{\pi}{3}$ , then  $\alpha^2 = ?$

Ans: (3)

17. If  $\vec{OA} = \vec{a}, \vec{OC} = \vec{b}$  and area of  $\triangle OAC$  is  $S$  and a parallelogram with sides parallel to  $\vec{OA}$  &  $\vec{OC}$  and diagonal  $\vec{OB} = 12\vec{a} + 4\vec{b}$ , has area equal to  $B$ , then  $\frac{B}{2}$  is equal to

Ans: (96)

**29-Jan-2024 Shift-2**

Physics

1. A rod of length 2 m moving with velocity 2 mm/sec along positive x-axis and  $B = 2T$  along negative side x-axis . Find the emf induce in the rod

**Ans: 8mV**

2.  $Q = \frac{a^3 \times b^4}{r^5}$

% error in a is 0.3%

% error in b is 0.4%

% error in r is 0.2%

Find the % error in Q

**Ans: 3.5 %**

3. In a simple pendulum of length 10 m, string is initially kept horizontal and the bob is released. 10% of energy is lost till the bob reaches lowermost position. Then find speed of bob at lowermost position.

**Ans:  $6\sqrt{5}$  m/s**

4. The intensity at each slit are equal for a YDSE and it is maximum

$I_{\max}$  at central maxima. If I is intensity for phase difference  $\frac{7\pi}{2}$

between two waves at screen. Then  $\frac{I}{I_{\max}}$  is ?

**Ans:  $\frac{1}{2}$**

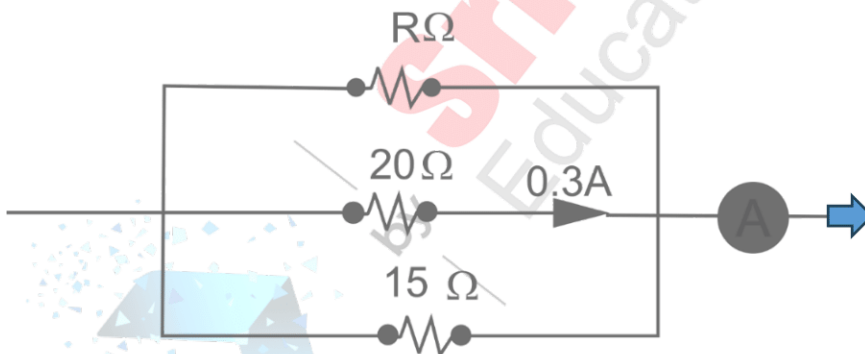
5. An electromagnetic wave has electric field given by  $\vec{E} = (9.6\hat{j})\sin \left[ 2\pi \left\{ 30 \times 10^6 t - \frac{1}{10} x \right\} \right]$  where, x and t are in S.I units.  
The max magnetic field is :

**Ans:  $3.2 \times 10^{-8} T$**

6. A planet at distance r from sun takes 200 days to complete one revolution around the sun. what will be time period for a planet at distance  $\frac{r}{4}$  from the sun?

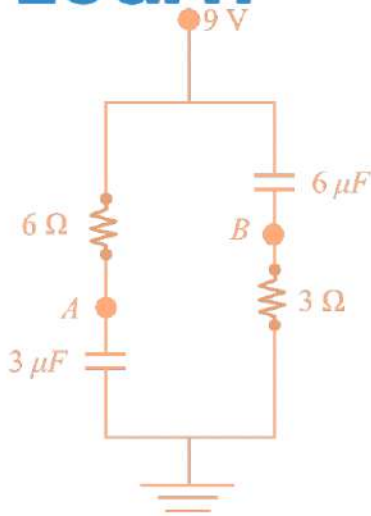
**Ans: 25 days**

7. In the circuit, the ammeter reads 0.9 A. The value of R is



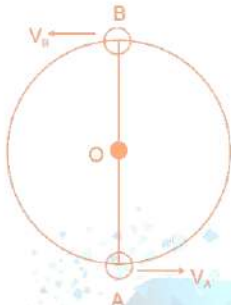
**Ans: 30 ohm**

8. In the circuit below, the charge on  $6 \mu F$  when A and B are shorted is  $\mu C$ .



Ans:  $36 \mu\text{C}$

9. Find the ratio of kinetic energy of the bob at point A to point B if the bob just complete the circle



Ans:  $5:1$

10. Two identical charges of different masses are accelerated through same potential different and set normally to uniform magnetic field the ratio of the radii is  $R_1/R_2$  then find ratio of there masses

Ans:  $(R_1/R_2)^2$

11. P, Q are two metallic wires with same volume  
And areas in the ratio 4: 1

If  $F_1$  force is applied on P wire then elongation produced is equal



to  $\Delta l$

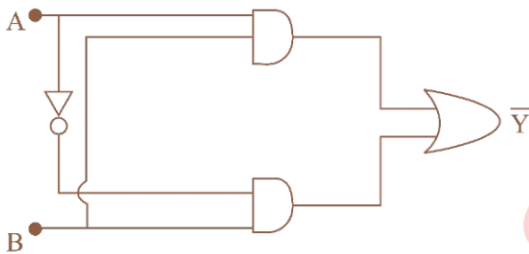
Then for what value of  $f_2$

Q wire gets same elongation

Then find ratio of  $F_1 : f_2$

**Ans: 16:1**

12. Find the truth table of the given logic gate



**Ans:**

A	B	$\bar{Y}$
1	0	1
0	1	0
1	1	0
0	0	1

**29-Jan-2024 Shift-2**

Chemistry

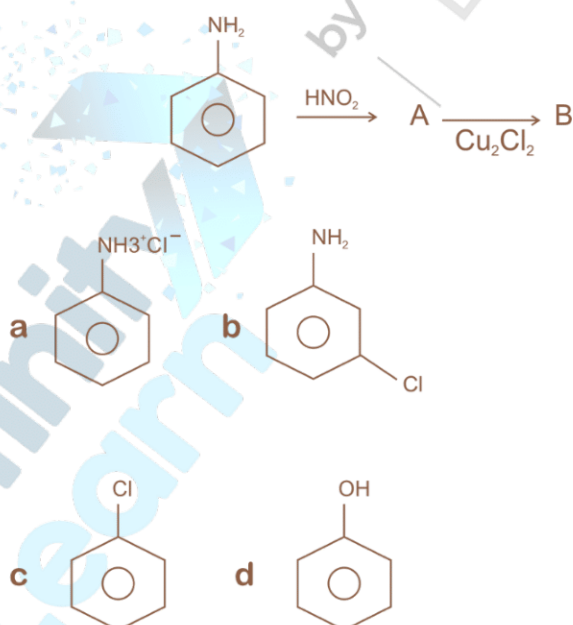
1. Which of the following has highest Ionisation Enthalpy
- N*
  - C*
  - Si*
  - Al*

**Ans: (a)**

2. Nessler's reagent gives brown colour with
- $\text{CO}_2$
  - $\text{NH}_3$
  - $\text{SO}_2$
  - $\text{CO}$

**Ans: b**

3.



**Ans: c**

4. Dipole moment of  $\text{CH}_4, \text{BF}_3, \text{H}_2\text{O}, \text{HF}, \text{NH}_3,$

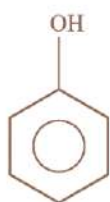
Ans:  $\mu = 0$



5. IUPAC Name of the compound is

- a) Hex-2-en-1-ol
- b) Cyclohex-2-en-1-ol
- c) 3-Hydroxycyclohexene
- d) Cyclohex-1-en-3-ol

Ans: b



6.  $\text{C}_6\text{H}_5\text{OH} + \text{CHCl}_3 + \text{NaOH} \rightarrow \text{A}$

- (a) Benzene -1,2 diol
- (b) Benzene -1,3 diol
- (c) Salicylic acid
- (d) Salicylaldehyde

Ans: d

7. Matching

- |                 |                        |
|-----------------|------------------------|
| A) Sucrose      | I) Nucleotide          |
| B) Protein      | I) Amino acid          |
| C) Starch       | III) $\alpha$ -Glucose |
| D) Nucleic Acid | IV) $\beta$ -Fructose  |
| E) Cellulose    | V) $\beta$ -Glucose    |

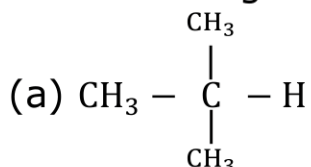
Ans: c

8. What type of Chromatography depends upon differential adsorption?

- (a) Thin layer Chromatography
- (b) Paper Chromatography
- (c) Column Chromatography
- (d) Chromatography

**Ans: a**

9. Acidic strength in increasing order



- (b)  $\text{CH}_2 = \text{CH}_2$
- (c)  $\text{CH} \equiv \text{C} - \text{H}$
- (d)  $\text{CH}_3 - \text{CH}_3$

**Ans: a**

10. Good reducing agent

- (a)  $\text{Eu}^{+2}$
- (b)  $\text{Ce}^{+4}$
- (c)  $\text{Gd}^{+2}$
- (d)  $\text{Lu}^{+3}$

**Ans: a**

11. Oxidation state of Fe in brown ring formula

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

**Ans: a**

12. Why does oxygen show anomalous behavior?

- a) Small size, high electronegativity, absence of vacant d-orbital
- b) Small size, small electronegativity
- c) Large size high electronegativity presence of vacant d-orbital
- d) Large size, high electronegativity

**Ans: a**

13. Which reagent gives bright red ppt With  $\text{Ni}^{2+}$  in basic medium?

- (a) KCNS
- (b)  $\text{K}_4[\text{Fe}(\text{CN})_6]$
- (c) DMG
- (d) Nessler's Reagent

**Ans: c**

14. IUPAC name of  $\text{K}_2\text{MnO}_4$  is

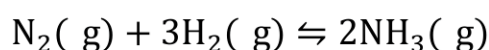
- a) Potassium tetraoxomanganate(VI)
- b) Potassium tetraoxomanganate(III)
- c) Potassium tetraoxomanganese(VI)
- d) Tetraoxomanganese(VI) Potassium

**Ans: a**

**15.** 50 mL of 0.5 oxalic acid is completely neutralized by 25 mL of NaOH solution. Find out the amount of NaOH (in gm) present in 25 mL of given NaOH solution

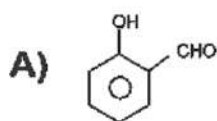
**Ans:  $M = \frac{n}{v}$**

16. Calculate equilibrium constant for the given following reaction at 500 K.

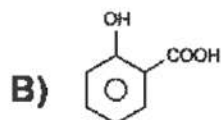


Given Molarity of  $\text{NH}_3(\text{g})$ ,  $\text{N}_2(\text{g})$  and  $\text{H}_2(\text{g})$  at equilibrium is  $1.5 \times 10^{-2}\text{M}$ ,  $2 \times 10^{-2}\text{M}$  and  $3 \times 10^{-2}\text{M}$  respectively..

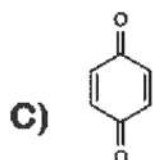
Ans:  $K = \frac{[\text{NH}_3]^2}{[\text{N}_2]^1[\text{H}_2]^3}$



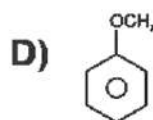
a)  $\text{NaOH}, \text{CO}_2, \text{H}^+$



b)  $\text{Na}_2\text{Cr}_2\text{O}_7/\text{H}_2\text{O}$



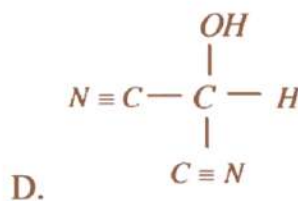
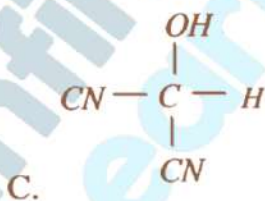
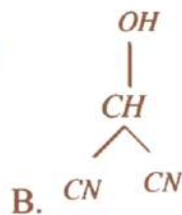
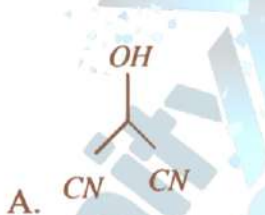
c)  $\text{NaOH}/\text{CH}_3 - \text{Cl}$



d)  $\text{NaOH}/\text{CHCl}_3$

Ans: A - d, B - a, C - b, D - d

17. Which represents the line formula of  $(\text{OH})\text{CH}(\text{CN})_2$



Ans: a



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**ALL INDIA**



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**ALL INDIA**



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