

FIITJEE - JEE (Main)

PHYSICS, CHEMISTRY & MATHEMATICS BATCHES: Two Yr CRP(2022) X&A Lot PHASE TEST – III Q.P. CODE:

Time Allotted: 3 Hours

Maximum Marks: 300

- Do not open this Test Booklet until you are asked to do so.
- Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.

Important Instructions

Caution: Question Paper CODE as given above MUST be correctly marked in the answer OMR sheet before attempting the paper. Wrong CODE or no CODE will give wrong results.

A. General Instructions

1. Attempt ALL the questions. Answers have to be marked on the OMR sheets.
2. This question paper contains **Three Sections**.
3. **Section-I** is Physics, **Section-II** is Chemistry and **Section-III** is Mathematics.
4. Each **Section** is further divided into **Two Parts: Part-A & C** in the OMR. Part-B of OMR to be left unused
5. Rough spaces are provided for rough work inside the question paper. No additional sheets will be provided for rough work.
6. No candidate is allowed to carry any textual material, printed or written, bits of papers, clip boards, log tables, slide rule, calculator, cellular phones, pagers and electronic devices ext. except the Admit Card inside the examination hall / room.

B. Filling of OMR Sheet:

1. Ensure matching of OMR sheet with the Question paper before you start marking your answers on OMR sheet.
2. On the OMR sheet, darken the appropriate bubble with **Blue/Black Ball Point Pen** for each character of your Enrolment No. and write in ink your Name, Test Centre and other details at the designated places.
3. OMR sheet contains alphabets, numerals & special characters for marking answers.
4. **Do not fold or make any stray marks on the Answer Sheet.**

C. Marking Scheme for All Two Parts:

- (i) **Part-A (01-20)** – Contains Twenty (20) multiple choice objective questions which have four (4) options each and only one correct option. Each question carries **+4 marks** which will be awarded for every correct answer and **-1 mark** will be deducted for every incorrect answer.
- (ii) **Part-B (01-05)** contains five (05) Numerical based questions, the answer of which maybe positive or negative numbers or decimals (e.g. 6.25, 7.00, -0.33, -30, 30.27, -127.30) and each question carries **+4 marks** for correct answer and **there will be no negative marking**.

Name of the Candidate : _____

Batch : _____ Date of Examination : _____

Enrolment Number : _____

Physics

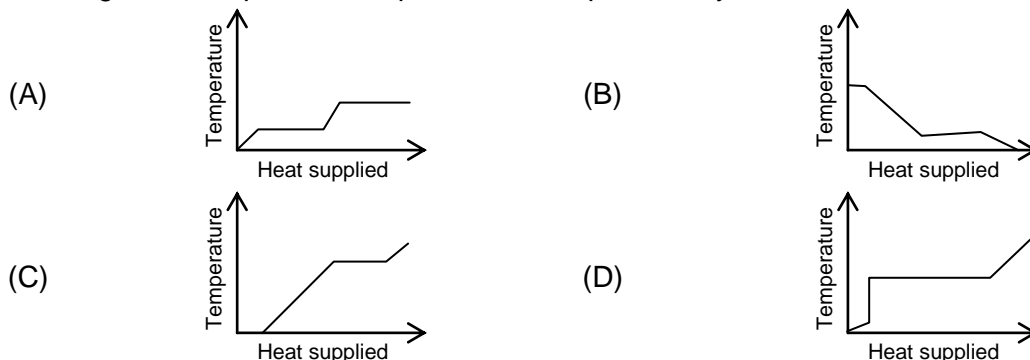
PART – A

Straight Objective Type

This part contains **20 multiple choice questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

1. A sound wave of frequency 400 Hz is traveling in air at a speed of 320 ms^{-1} . The difference in phase between two points on the wave 0.2 m apart in the direction of travel is
 (A) $\frac{\pi}{4}$ (B) $\frac{\pi}{2}$ (C) $\frac{2\pi}{5}$ (D) $\frac{4\pi}{5}$
 1. **B**
2. During an adiabatic process, the pressure of a gas is found to be proportional to the cube of its absolute temperature. The ratio $\frac{C_p}{C_v} = \gamma$ for the gas is
 (A) 2 (B) 3/2 (C) 5/3 (D) 4/3
 2. **B**
3. Suppose there is a hole in a copper plate. Upon heating the plate, diameter of hole would
 (A) increases (B) decreases
 (C) remains the same (D) none of these
 3. **A**
4. A body is projected vertically upwards from the earth's surface to reach a height $7R$, where R is the Radius and M is mass of earth. The minimum velocity required to do so is
 (A) $\sqrt{\frac{7GM}{8R}}$ (B) $\sqrt{\frac{7GM}{4R}}$ (C) $\sqrt{\frac{8GM}{3R}}$ (D) $\sqrt{\frac{20 GM}{11 R}}$
 4. **B**
5. Internal energy of n_1 moles of hydrogen at temperature T is equal to internal energy of n_2 moles of Helium at temperature $2T$. The ratio $n_1 : n_2$ is
 (A) $\frac{3}{5}$ (B) $\frac{2}{3}$ (C) $\frac{6}{5}$ (D) $\frac{3}{7}$
 5. **C**
6. A cylindrical tube, open at both ends, has a fundamental frequency f in air. The tube is dipped vertically in water so that half of it is in water. The fundamental frequency of the air column is now
 (A) $f/2$ (B) $3f/4$ (C) f (D) $2f$
 6. **C**
7. A particle executes simple harmonic motion with a frequency 'f'. The frequency with which its kinetic energy oscillates is
 (A) $f/2$ (B) f (C) $2f$ (D) $4f$
 7. **C**
8. In order to shift a body of mass m from a circular orbit of radius $2R$ to a higher orbit of radius $4R$ around the earth, (Where R is radius and M is mass of earth) the work done on the body is
 (A) $\frac{GMm}{8R}$ (B) $\frac{GMm}{2R}$ (C) $\frac{GMm}{4R}$ (D) $\frac{GMm}{R}$
 8. **A**

9. A block of ice at -10°C is slowly heated and converted to steam at 100°C . Which of the following curves represent the phenomenon qualitatively?



9. **A**

10. Maximum velocity in SHM is v_m . The magnitude average velocity during motion from one extreme point to the other extreme point will be

(A) $\frac{\pi}{2}v_m$ (B) $\frac{2}{\pi}v_m$ (C) $\frac{4}{\pi}v_m$ (D) $\frac{\pi}{4}v_m$

10. **B**

11. Two SHM's are represented by $y_1 = 10 \sin(3\pi t + \pi/4)$ and $y_2 = 5 \sin(3\pi t) + 5\sqrt{3} \cos(3\pi t)$, the ratio of their amplitudes is

(A) 1 : 2 (B) $5 : \sqrt{7}$ (C) 2 : 1 (D) 1 : 1

11. **D**

12. The escape velocity of an object projected from the surface of a given planet depends on

(A) mass of the object (B) direction of projection
(C) mass of the planet (D) all of the above

12. **C**

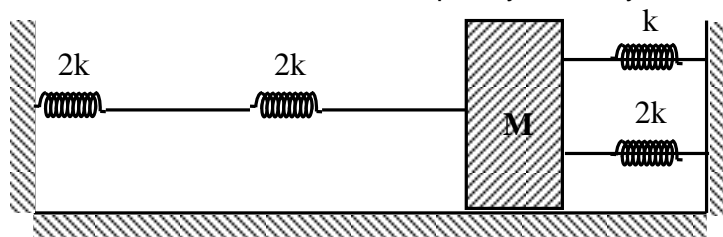
13. Which of the following is not true for the progressive wave $y = 4 \sin\left\{2\pi\left(\frac{t}{0.02} - \frac{x}{100}\right)\right\}$ where

x & y are in cm and t in seconds?

(A) The amplitude is 4 cm (B) The wavelength is 100 cm
(C) The frequency is 50 Hz (D) The velocity of propagation is 2 cm/s

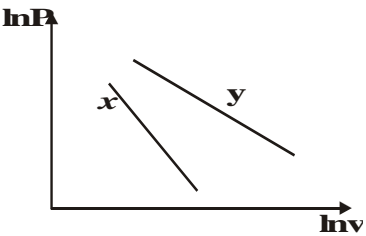
13. **D**

14. Four massless springs whose force constants are $2k$, $2k$, k and $2k$ respectively are attached to a mass M kept on a frictionless plane (as shown in figure) . If the mass M is displaced in the horizontal direction, then the frequency of the system is



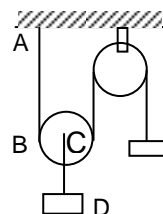
(A) $\frac{1}{2\pi} \sqrt{\frac{k}{4M}}$ (B) $\frac{1}{2\pi} \sqrt{\frac{4k}{M}}$
(C) $\frac{1}{2\pi} \sqrt{\frac{k}{7M}}$ (D) $\frac{1}{2\pi} \sqrt{\frac{7k}{M}}$

14. **B**

15. The work done in slowly lifting a body from earth's surface to a height R (radius of earth) is equal to two times the work done in lifting the same body from earth's surface to a height h . Here h is equal to
 (A) $\frac{R}{6}$ (B) $\frac{R}{4}$ (C) $\frac{R}{3}$ (D) $\frac{R}{2}$
15. **C**
16. A wave represented by the equation $y = a \cos(kx - \omega t)$ is superposed with another wave to form a stationary wave such that the point $x = 0$ is a node. The equation for other wave is
 (A) $a \sin(kx + \omega t)$ (B) $-a \cos(kx - \omega t)$
 (C) $-a \cos(kx + \omega t)$ (D) $-a \sin(kx - \omega t)$
16. **C**
17. A particle moves according to the law $x = a \cos \pi t$. The distance covered by it 2.5 second is :
 (A) $3a$ (B) $5a$ (C) $2a$ (D) $9a$
17. **B**
18. For two different gases X and Y, having degrees of freedom f_1 and f_2 and molar heat capacities at constant volume C_{v_1} and C_{v_2} respectively, for adiabatic process, the $\ln P$ versus $\ln V$ graph is plotted as shown, then
 (A) $f_1 > f_2$
 (B) $f_2 > f_1$
 (C) Constant temperature
 (D) $C_{v_1} > C_{v_2}$
- 
18. **B**
19. Two wires made up of same material are of equal lengths but their radii are in the ratio 1 : 2. On stretching each of these two strings by the same tension the ratio between the fundamental frequencies is
 (A) 1 : 2 (B) 2 : 1 (C) 1 : 4 (D) 4 : 1
19. **B**
20. What is the mass of the planet that has a satellite whose time period is T and orbital radius is r .
 (A) $\frac{4\pi^2 r^3}{GT^2}$ (B) $\frac{4\pi^2 r^2}{GT^2}$ (C) $\frac{4\pi^2 r^3}{GT^3}$ (D) $\frac{4\pi^2 r}{GT^2}$
20. **A**

PART-B
Numerical Type

1. Both the string shown figure are made of same material and have same cross – section. The pulleys are light. The wave speed of a transverse wave in the string AB is v_1 and in CD it is v_2 . Then v_1/v_2 (upto two decimal places) is



1. **0.71**
2. The velocity of waves in a string fixed at both ends is 2 m/s. The string forms standing waves with nodes 5.0 cm apart. The frequency of vibration of the string (In Hz) is
2. **20**

3. Hot water cools from 60°C to 50°C in the first 10 min and to 42°C in the next 10 min. The temperature of the surrounding (in $^{\circ}\text{C}$) is
3. **10**
4. A person carrying a whistle emitting continuously a note of 272 Hz is running towards a reflecting surface with a speed 18 km/ hr. The speed of sound in air is 345 m/s. The number of beats heard by him is
4. **8**
5. The motion of a particle executing SHM is given by $x = 0.01 \sin \{100\pi (t+0.5)\}$ where x is in m and t in seconds. The time period is (in sec)
5. **0.02**

Space For Rough Work

Chemistry

PART – A

Straight Objective Type

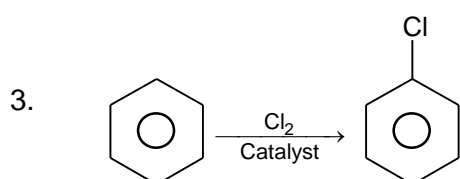
This part contains **20 multiple choice questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

1. Which of the following electronic effect is called no bond resonance?
 (A) Inductive effect (B) Hyperconjugation
 (C) –R effect (D) +R effect

1. **B**

2. Cyclopropane is an isomer of
 (A) C₃H₈ (B) C₃H₆
 (C) C₃H₄ (D) C₃H₃

2. **B**



The catalyst used in the above reaction is:

- (A) sunlight (B) heat
 (C) FeCl₃ (D) Br₂

3. **C**

4. Which of the following molecule boils at the highest temperature?
 (A) 2, 2-dimethyl propane (B) 2-methyl butane
 (C) n-pentane (D) n-butane

4. **C**

5. Which of the following substance will form only acetone(propanone) upon ozonolysis reaction?

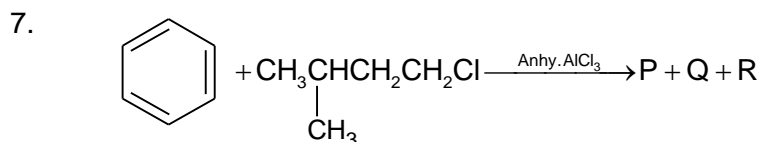
- (A) CH₃CH₂CH = CHCH₂CH₃ (B) (CH₃)₂C = C(CH₃)₂
 (C) (CH₃)₂C = CHCH₂CH₃ (D) (C₂H₅)₂C = C(CH₃)₂

5. **B**

6. Which reagent will form optical isomers when reacts with CH₃CH = CH₂?

- (A) Br₂/CCl₄ (B) Cl₂/CCl₄
 (C) BrCl (D) All are correct

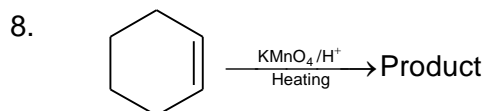
6. **D**



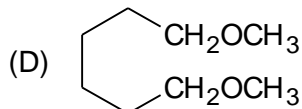
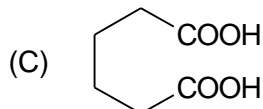
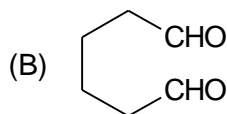
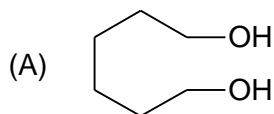
The incorrect statement regarding the products P, Q and R is

- (A) all the products have same molar mass
 (B) one product displays optical isomerism
 (C) one product contains a 4^o (quaternary) carbon atom
 (D) all products contain at least one 3^o(tertiary) carbon atom

7. **D**

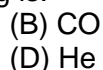


The organic product of above reaction is:



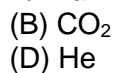
8. **C**

9. The most dangerous gas out of the following is:



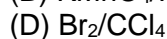
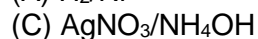
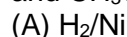
9. **B**

10. Which of the following gas can absorb maximum amount of heat from the atmosphere?



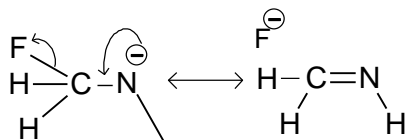
10. **B**

11. Which of the following reagent should be used in order to distinguish between $CH_3C \equiv CCH_3$ and $CH_3CH_2C \equiv CH$?

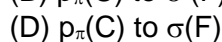
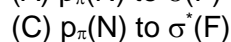
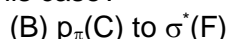
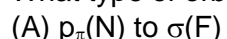


11. **C**

12. Negative hyperconjugation is observed in the following species

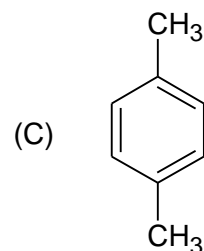
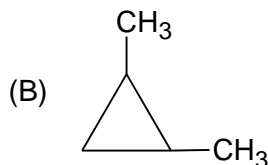
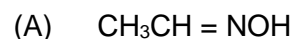


What type of orbital overlap takes place in this case?



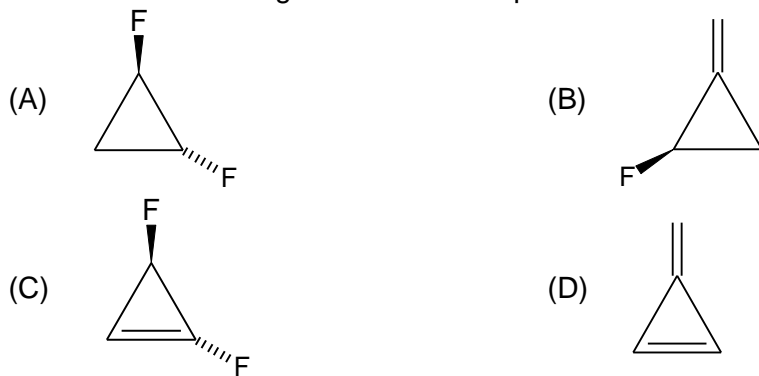
12. **B**

13. Which can't show geometrical isomerism?

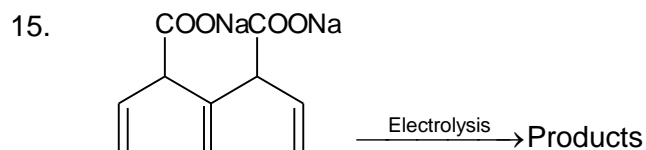


13. **C**

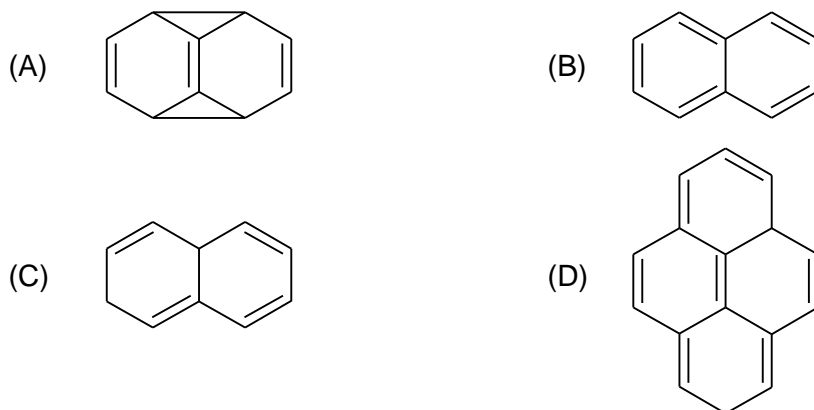
14. Which of the following does not show optical isomerism?



14. **D**

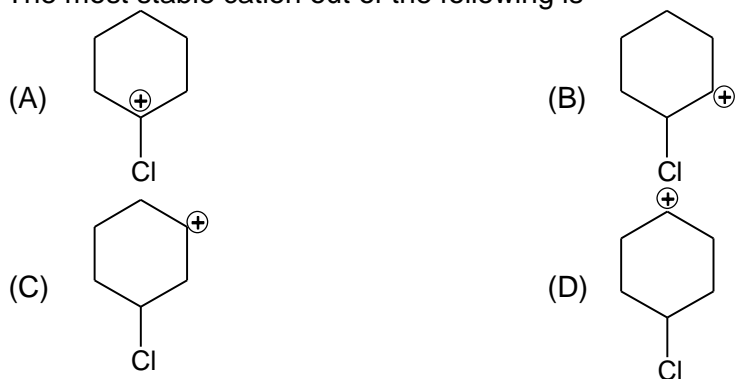


The most stable product of above reaction is:

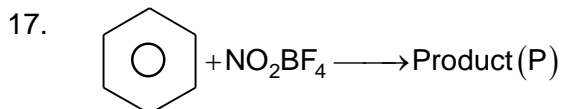


15. **B**

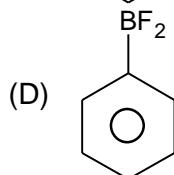
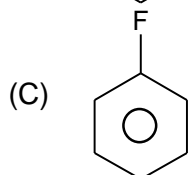
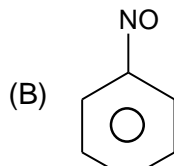
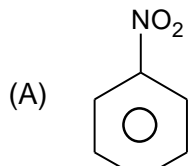
16. The most stable cation out of the following is



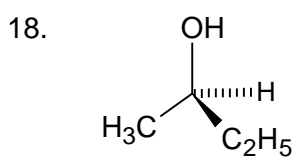
16. **A**



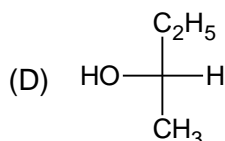
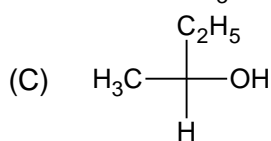
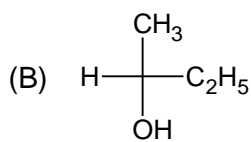
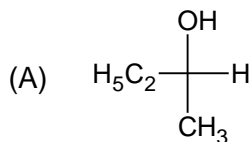
In above reaction, (P) is



17. **A**

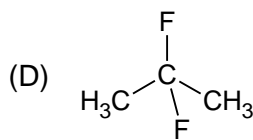
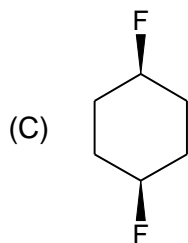
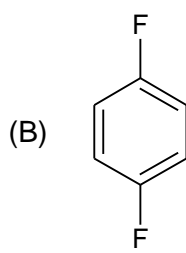
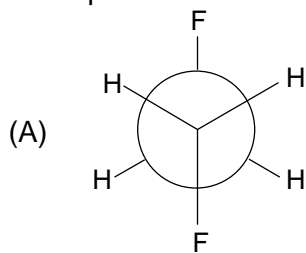


The enantiomer of above compound is



18. **C**

19. The dipole moment of which compound increases on heating?



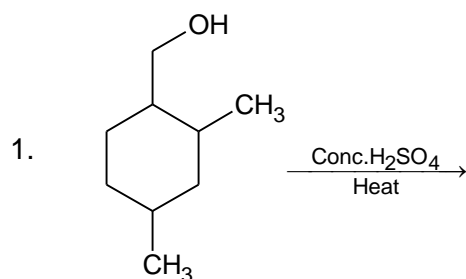
19. **A**

20. Which can easily decolourize bromine water?



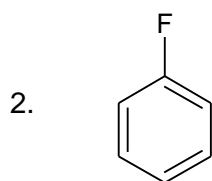
20. C

PART-B
Numerical Type



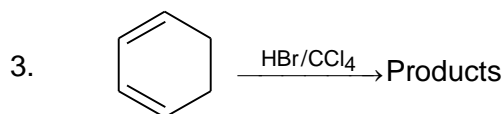
How many maximum number of isomeric alkenes can be formed in above reaction?

1. 18



How many total number of different types of electronic effects are observed in above molecule?

2. 4

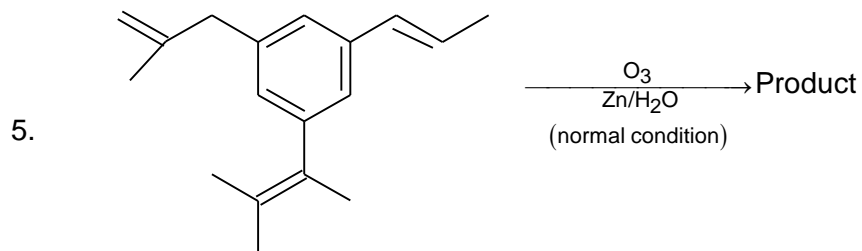


How many different types of product(s) is/are formed in above reaction? [Consider low temperature as well as high temperature products]

3. 4

4. Among the isomers of pentane, how many primary (1°) hydrogen atom(s) is/are present in the most boiling isomer?

4. 6



In above reaction

If x = Number of aliphatic ketones formed

y = Number of aromatic polycarbonyl compounds formed and

z = Number of aldehydes formed

What is the value of(x + y + z)?

5. 4

Space For Rough Work

Mathematics

PART – A

Straight Objective Type

This part contains **20 multiple choice questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

1. If ${}^{72}C_{7r} = {}^{72}C_{2r+9}$, then the value of 'r' is

- (A) 3 (B) 6
(C) 9 (D) 7

1. D

$${}^{72}C_{7r} = {}^{72}C_{2r+9}$$

$$\Rightarrow 7r = 2r + 9 \text{ or } 7r = 72 - (2r + 9)$$

$$\Rightarrow r = \frac{9}{5} \text{ (not possible) or } 9r = 63$$

$$\Rightarrow r = 7$$

Hence (D) is the correct answer

2. Maximum value of ${}^{20}C_{r+2}$ is equal to

- (A) ${}^{25}C_{11}$ (B) ${}^{25}C_{10}$
(C) ${}^{25}C_{12}$ (D) None of these

2. C

${}^{25}C_{r+2}$ is maximum when

$$r + 2 = \frac{25}{2}, \quad \text{or} \quad r + 2 = \frac{24}{2}$$

$$\Rightarrow r = \frac{21}{2} \text{ (not possible) or } r = 10$$

Hence (C) is the correct answer.

3. If number of terms in the expression of $(x - 2y + 3z)^n$ is 45, then n =

- (A) 7 (B) 8
(C) 9 (D) none of these

3. B

$$3. \text{ Number of terms} = (n + 1) + n + \dots + 3 + 2 + 1 = \frac{(n+1)(n+2)}{2} = 45$$

$$\Rightarrow n = 8.$$

Hence (B) is the correct answer.

4. The value of $2C_0 + \frac{2^2}{2}C_1 + \frac{2^3}{3}C_2 + \dots + \frac{2^{11}}{11}C_{10}$ is

- (A) $\frac{3^{11} - 1}{11}$ (B) $\frac{2^{11} - 1}{11}$
(C) $\frac{11^3 - 1}{11}$ (D) $\frac{11^2 - 1}{11}$

4. A

5. $\sum_{r=1}^n {}^n C_r \cdot 3^r$ is equal to
 (A) 4^n (B) $4^n + 1$
 (C) $4^n - 1$ (D) None of these

5. C

6. Number of irrational terms in the expansion of $(\sqrt{2} + \sqrt{3})^{15}$ is equal to
 (A) 16 (B) 7
 (C) 12 (D) 15

6. A

$$\begin{aligned} (\sqrt{2} + \sqrt{3})^{15} &= \sum_{r=0}^{15} {}^{15}C_r (\sqrt{2})^r (\sqrt{3})^{15-r} \\ &= \sum_{r=0}^{15} {}^{15}C_r 2^{r/2} \cdot 3^{\frac{15-r}{2}} \end{aligned}$$

For integral term $\frac{r}{2}$ must be a integer and $\frac{15-r}{2}$ should also be a integer. But these two conditions cannot fulfilled at the same time. Hence all terms in the expansion are irrational. Thus there are 16 irrational terms. Hence (A) is the correct answer.

7. Let a and b be the coefficient of x^3 in $(1+2x-x^2+3x^3)^4$ and $(1+2x-x^2+3x^3+4x^4)^4$ respectively. Find the value of (a - b).
 (A) 1 (B) 3
 (C) 0 (D) -1

7. C

7. We have b = coefficient of x^3 in $\left((1+2x-x^2+3x^2)+4x^4\right)^4$
 = coefficient of x^3 in
 $\left[{}^4C_0(1+2x-x^2+3x^3)^4(4x^4)^0 + {}^4C_1(1+2x-x^2+3x^3)^3(4x^4)^1 + \dots \right]$
 = coefficient of x^3 in $(1+2x-x^2+3x^3)^4 = a$
 Coefficient of x^3 in $(1+2x-x^2+3x^3)^4 = a$
 Hence a - b = 0

8. The remainder when 2^{2003} is divided by 17 is
 (A) 1 (B) 2
 (C) 8 (D) none of these

8. C

8. Expand in terms of 17.
 $2^{2003} = 8 \cdot 2^{2000} = 8 \cdot (17-1)^{500}$
 $= 8 \cdot \left[{}^{500}C_0(17)^{500} - {}^{500}C_1(17)^{499} + {}^{500}C_2(17)^{498} - \dots - {}^{500}C_{499}(17) + 1 \right]$
 $= 8(17) \left[{}^{500}C_0(17)^{499} - {}^{500}C_1(17)^{498} + \dots - {}^{500}C_{499} \right] + 8$

9. Let a_1, a_2, \dots, a_{10} be a G.P. If $\frac{a_3}{a_1} = 25$, then $\frac{a_9}{a_5}$ equals:
 (A) 5^4 (B) $4(5^2)$
 (C) 5^3 (D) $2(5^2)$

9. A

$$\frac{a_3}{a_1} = \frac{a_1 r^2}{a_1} = r^2$$

$$\Rightarrow r^2 = 25$$

$$\text{Now } \frac{a_9}{a_5} = \frac{a_1 r^8}{a_1 r^4} = r^4 = (25)^2 = 5^4$$

10. If $1 + 2 + 3 + \dots + 49 = x$, then $1^3 + 2^3 + 3^3 + \dots + 49^3$ is given by
 (A) x^3 (B) x^2
 (C) $x^2 + x$ (D) $x^3 + x^2$

10. B

$$10. \quad x = 1 + 2 + 3 + \dots + 49$$

$$= \sum_{n=1}^{49} n$$

$$= \frac{n(n+1)}{2}, \text{ where } n = 49 \quad (i)$$

$$\text{Let } 1^3 + 2^3 + 3^3 + \dots + 49^3 = y$$

$$y = \sum_{n=1}^{49} n^3 = \left(\frac{n(n+1)}{2} \right)^2, \text{ where } n = 49 \quad (ii)$$

Hence $y = x^2$ by comparing (i) & (ii)

11. If $(1+x)^n = C_0 + C_1 x + C_2 x^2 + \dots + C_n x^n$, then $C_0 + 2C_1 + 3C_2 + \dots + (n+1)C_n$ is equal to
 (A) $2^{n-1}(n+2)$ (B) $2^n(n+1)$
 (C) $2^{n-1}(n+1)$ (D) $2^n(n+2)$

11. A

11. $(1+x)^n = C_0 + C_1 x + C_2 x^2 + \dots + C_n x^n$ multiplying both sides by x and then differentiate

$$nx(1+x)^{n-1} + (1+x)^n = C_0 + 2C_1 x + 3C_2 x^2 + \dots + (n+1)C_n x^n \text{ put } x = 1$$

12. For the A.P. $a_1, a_2, a_3, \dots, a_{40}, a_1 + a_5 + a_{15} + a_{25} + a_{35} + a_{40} = 105$. The sum of the A.P. is
 (A) 700 (B) 1400
 (C) 630 (D) None of these

12. A

$$12. \quad a_1 + a_{40} = a_5 + a_{36} = a_{15} + a_{26}$$

$$S = \frac{40}{2} [a_1 + a_{40}]$$

13. The 8th terms of the H.P. 6, 4, 3,..... Is
- (A) $\frac{4}{3}$ (B) $\frac{3}{4}$
 (C) $\frac{2}{3}$ (D) $\frac{3}{2}$

13. A

13. Consider $\frac{1}{6}, \frac{1}{4}, \frac{1}{3}, \dots$

Here $T_2 - T_1 = T_3 - T_2 = \frac{1}{12} \Rightarrow \frac{1}{6}, \frac{1}{4}, \frac{1}{3}, \dots$ is an A.P.

and the 8th term = $\frac{1}{6} + 7 \times \frac{1}{12} = \frac{9}{12}$

and the 8th term = $\frac{12}{9} = \frac{4}{3}$

Hence (A) is correct answer

14. If 19th terms of non – zero A.P. is zero, then its (49th term) : (29th term) is:
- (A) 4:1 (B) 1:3
 (C) 3:1 (D) 2:1

14. C

14. $a + 18d = 0 \Rightarrow a = -18d$

$$\frac{t_{49}}{t_{29}} = \frac{a + 48d}{a + 28d} = \frac{-18d + 48d}{-18d + 28d}$$

$$= \frac{30d}{10d} = 3$$

15. The sum of the real values of x for which the middle term in the binomial expansion of

$\left(\frac{x^3}{3} + \frac{3}{x}\right)^8$ equals 5670 is:

- (A) 0 (B) 6
 (C) 4 (D) 8

15. A

15. 5th term will be the middle term.

$$t_{4+1} = {}^8C_4 \left(\frac{x^3}{3}\right)^4 \left(\frac{3}{x}\right)^4 = 5670 = {}^8C_4 \cdot x^8 = 5670$$

$$= \frac{8 \times 7 \times 6 \times 5}{4 \times 3 \times 2} x^8 = 5670 = x^8 = \frac{567}{7} = 81$$

$$= x^8 - 81 = 0 \Rightarrow \text{Real value of } x = \pm\sqrt[3]{81}$$

16. Let S_n denote the sum of the first n terms of an A.P.. If $S_4 = 16$ and $S_6 = -48$, then S_{10} is equal to :

- (A) -410 (B) -260
 (C) -320 (D) -380

16. C

16. $2\{2a + 3d\} = 16$

$$3(2a + 5d) = -48$$

$$2a + 3d = 8$$

$$2a + 5d = -16$$

$$d = -12$$

$$S_{10} = 5\{44 - 9 \times 12\}$$

$$= -320$$

17. Total number of four digit numbers having all different digits, is equal to

- (A) 4536 (B) 504
(C) 5040 (D) 720

17. A

17. Let the number be $x_1x_2x_3x_4$.

Then x_1 can be chosen in 9 ways. x_2 can be chosen in 9 ways. Similarly x_3 and x_4 can be chosen in 8 and 7 ways respectively.

\therefore Total number of such numbers

$$= 9 \cdot 8 \cdot 7 = 4536$$

Hence (A) is the correct answer.

18. If a_1, a_2, a_3, \dots are in A.P. such that $a_1 + a_7 + a_{16} = 40$, then the sum of the first 15 terms of this A.P. is:

- (A) 200 (B) 280
(C) 150 (D) 120

18. A

18. a_1, a_2, \dots, a_n are in A.P.

$$a_1 + a_7 + a_{16} = 40$$

$$\Rightarrow a + a + 6d + a + 15d = 40$$

$$\Rightarrow 3a + 21d = 40$$

$$\Rightarrow a + 7d = \frac{40}{3}$$

$$515 = \frac{15}{2}[2a + 14d]$$

$$= 15[a + 7d]$$

$$= 15 \times \frac{40}{3}$$

$$= 200$$

19. The sum of the series $1 + 2 \times 3 + 3 \times 5 + 4 \times 7 + \dots$ upto 11th term is

- (A) 915 (B) 946
(C) 945 (D) 916

19. B

19. $S = 1 + 2 \times 3 + 3 \times 5 + 4 \times 7 + \dots +$ upto 11 terms

n^{th} term of the series is $T_n = n(2n - 1)$

$$\Rightarrow S = \sum_{n=1}^{11} T_n = \sum_{n=1}^{11} (2n^2 - n)$$

$$\Rightarrow S_n = \frac{2n(n+1)(2n+1)}{6} - \frac{n(n+1)}{2}$$

Put $n = 11$

$$\Rightarrow S_{11} = \frac{2(11)(12)(23)}{6} - \frac{11(12)}{2}$$

$$\Rightarrow S_{11} = 946$$

20. If the numbers 330, 486 and 604 divided by a positive number 'p' leaving the remainder 7, 11 and 15 respectively, then the largest value of p is
 (A) 15 (B) 19
 (C) 14 (D) 16

20. B

$$20. k_1 p + 7 = 330$$

$$k_2 p + 11 = 486$$

$$k_3 p + 15 = 604$$

$$k_1 p = 323 = (19)(17)$$

$$k_2 p = 475 = (19)(25)$$

$$k_3 p = 589 = (19)(31)$$

Hence p is 19

PART-B Numerical Type

1. Sum of all even divisors of 420 is k then sum of digits of k is

1. 9

$$1. \text{ Sum of even divisors} = (2 + 2^2)(3^0 + 3^1)(5^0 + 5^1)(7^0 + 7^1)$$

2. $\sum_{r=1}^{20} r {}^{20}C_r 4^r (-3)^{20-r}$ equals to k then sum of digits of k is

2. 8

3. Sum of coefficients of even powers of 'x' in the expansion of $(1 + x + x^2 + x^3 + x^4 + x^5 + x^6 + x^7)^3$ is 2^K then K is equal to

3. 8

4. The greatest integer less than or equal to $(\sqrt{2} + 1)^6$ is $190 + K$, then K is equal to

4. 7

5. Number of triangles that can be formed joining the angular points of decagon is k then sum of digits of k is

5. 3

Space For Rough Work

FIITJEE INTERNAL TEST

BATCHES: Two Yr CRP(2022) X&A Lot_PT-III

PHYSICS, CHEMISTRY & MATHEMATICS

JEE MAIN-PHASE-III

Paper Code

ANSWER KEY

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(PHYSICS)

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PART – B

SECTION – II

(CHEMISTRY)

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