

# FIITJEE - JEE (Main)

PHYSICS, CHEMISTRY & MATHEMATICS

BATCH: NWCMSW425A1

PHASE TEST – III

Q.P. CODE: 100882

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

- Attempt ALL the questions. Answers have to be marked on the OMR sheets.
- This question paper contains **Three Sections**.
- Section-I** is Physics, **Section-II** is Chemistry and **Section-III** is Mathematics.
- Each **Section** is further divided into **Two Parts: Part-A & B** in the OMR.
- Rough spaces are provided for rough work inside the question paper. No additional sheets will be provided for rough work.
- 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:

- Ensure matching of OMR sheet with the Question paper before you start marking your answers on OMR sheet.
- 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.
- OMR sheet contains alphabets, numerals & special characters for marking answers.
- Do not fold or make any stray marks on the Answer Sheet.**

### C. Marking Scheme for All Two Parts:

- 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.
- Part-B (01-05)** contains five (05) Numerical based questions, the answer of which maybe positive or negative numbers or decimals **Two decimal Places** (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 : \_\_\_\_\_

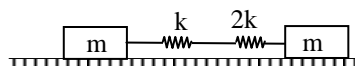
# Physics

## PART – A

### Straight Objective Type

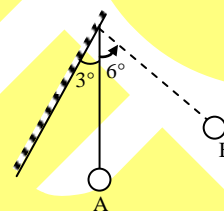
This part contains **20 multiple choice questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

1. A system is shown in the figure. The time period for small oscillations of the two blocks will be -



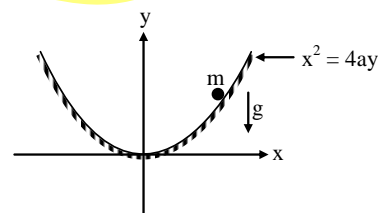
- (A)  $2\pi \sqrt{\frac{3m}{k}}$       (B)  $2\pi \sqrt{\frac{3m}{4k}}$       (C)  $2\pi \sqrt{\frac{3m}{8k}}$       (D)  $2\pi \sqrt{\frac{3m}{2k}}$

2. A pendulum of length 10 cm is hanged by wall making an angle  $3^\circ$  with vertical. It is swung to position B. Time period of pendulum will be ( $g = 10 \text{ m/s}^2$ )



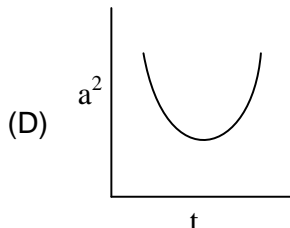
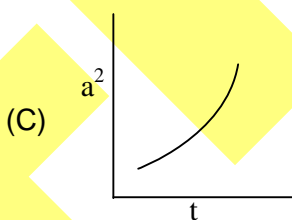
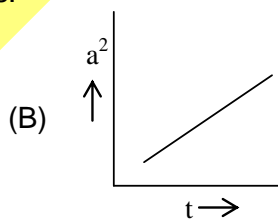
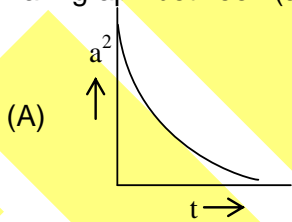
- (A)  $\pi/5$  sec  
 (B)  $\frac{2\pi}{15}$  sec  
 (C)  $\pi/6$  sec  
 (D) Subsequent motion will not be periodic

3. A particle of mass  $m$  is allowed to oscillate near the minimum point of a vertical parabolic path having the equation  $x^2 = 4ay$ , then the angular frequency of small oscillations of particle is -



- (A)  $\sqrt{ga}$       (B)  $\sqrt{2ga}$   
 (C)  $\sqrt{\frac{g}{a}}$       (D)  $\sqrt{\frac{g}{2a}}$

4. In an Experiment to find loss of energy w. r. t. time in case of swinging simple pendulum mark graph between  $(\text{amplitude})^2$  and time is:

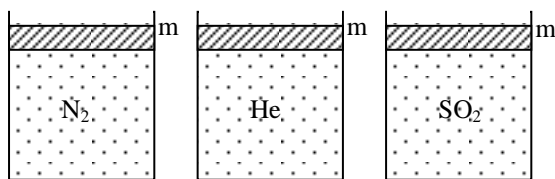


Space For Rough Work

5. A metal rod of Young's modulus  $2 \times 10^{10} \text{ Nm}^{-2}$  undergoes an elastic strain of 0.06%. The energy per unit volume stored in  $\text{J m}^{-3}$  is -  
 (A) 3600 (B) 7200 (C) 10800 (D) 14400
6. The equation of stationary wave is  $y = 4\sin\left(\frac{\pi x}{15}\right)\cos(96\pi t)$ . The distance between a node and its next antinode is:  
 (A) 7.5 units (B) 1.5 units (C) 22.5 units (D) 30 units
7. Two perfectly identical wires kept under tension are in unison. When the tension in wire is increased by 1% then on sounding them together 3 beats are heard in 2 seconds. Find the frequency of each wire -  
 (A) 300 Hz (B) 400 Hz (C) 256 Hz (D) 288 Hz
8. In a mixture of gases, the average number of degrees of freedom per molecule is 6. The rms speed of the molecules of the gas is  $c$ . The velocity of sound in the gas is -  
 (A)  $c/\sqrt{2}$  (B)  $3c/4$  (C)  $2c/3$  (D)  $c/\sqrt{3}$
9. The maximum intensity in Young's double-slit experiment is  $I_0$ . Distance between the slits is  $d = 5\lambda$ , where  $\lambda$  is the wavelength of monochromatic light used in the experiment. What will be the intensity of light in front of one of the slits on a screen at a distance  $D = 10d$ ?  
 (A)  $\frac{I_0}{2}$  (B)  $\frac{3}{4}I_0$  (C)  $I_0$  (D)  $\frac{I_0}{4}$
10. The wave front of a light beam is given by the equation  $x + 2y + 3z = C$ , (where  $C$  is arbitrary constant) then the angle made by the direction of light with the  $y$ - axis is-  
 (A)  $\cos^{-1}\frac{1}{\sqrt{14}}$  (B)  $\sin^{-1}\frac{2}{\sqrt{14}}$  (C)  $\cos^{-1}\frac{2}{\sqrt{14}}$  (D)  $\sin^{-1}\frac{3}{\sqrt{14}}$
11. The contrast in the fringes in any interference pattern depends on -  
 (A) Fringe width (B) Wavelength  
 (C) Intensity ratio of the sources (D) Distance between the sources
12. In a YDSE experiment,  $I_0$  is given to be the intensity of the central bright fringe &  $\beta$  is the fringe width. Then, at a distance  $y$  from central bright fringe, the intensity will be -  
 (A)  $I_0 \cos\left(\frac{\pi y}{\beta}\right)$  (B)  $I_0 \cos^2\left(\frac{\pi y}{\beta}\right)$  (C)  $I_0 \cos\left(\frac{2\pi y}{\beta}\right)$  (D)  $I_0 \cos^2\left(\frac{\pi y}{2\beta}\right)$
13. A vessel is filled with a gas at a pressure of 76 cm of mercury at a certain temperature. The mass of the gas is increased by 50 % by introducing more gas in the vessel at the same temperature. The resultant pressure, in cm of Hg, is -  
 (A) 76 (B) 152 (C) 114 (D) 1117

Space For Rough Work

14. Container below are filled with three different gases as shown. Piston is made to oscillate in below three cases. Time Period of oscillation is  $T_A, T_B, T_C$ . Then:



- (A)  $T_A > T_B > T_C$       (B)  $T_C > T_A > T_B$       (C)  $T_C > T_B > T_A$       (D)  $T_B > T_A > T_C$

15. An ideal gas is expanded so that amount of heat given is equal to the decrease in internal energy. The gas undergoes the process  $TV^{1/5} = \text{constant}$ . The adiabatic compressibility of gas when pressure is  $P$ , is –

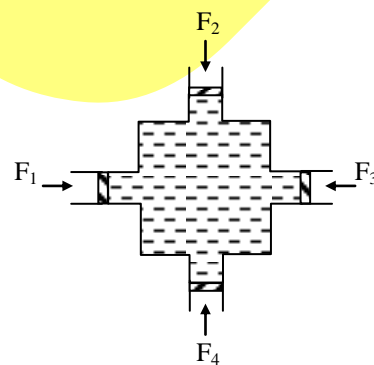
- (A)  $\frac{7}{5P}$       (B)  $\frac{5}{7P}$       (C)  $\frac{2}{5P}$       (D)  $\frac{7}{3P}$

16. A mixture of 8gm of helium and 14gm of nitrogen is enclosed in a vessel of constant volume at 300K. The quantity of heat absorbed by the mixture to double the root mean velocity of its molecules is: ( $R = \text{universal gas constant}$ )

- (A) 2725 R      (B) 3630 R      (C) 3825 R      (D) 5625 R

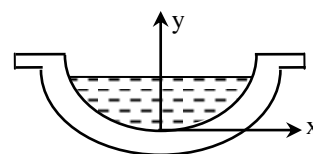
17. In the figure shown water is filled in a symmetrical container. Four pistons of equal area  $A$  are used at the four opening to keep the water in equilibrium. Now an additional force  $F$  is applied at each piston. The increase in the pressure at the centre of the container due to this addition is:

- (A)  $\frac{F}{A}$       (B)  $\frac{2F}{A}$   
 (C)  $\frac{4F}{A}$       (D) 0



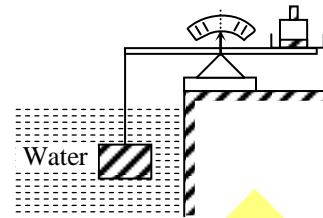
18. A small hole is made at the bottom of a symmetrical jar as shown in figure. A liquid is filled into the jar upto a certain height. The rate of descension of liquid is independent of the level of the liquid in the jar. Then the surface of the jar is a surface of revolution of the curve

- (A)  $y = kx^4$       (B)  $y = kx^2$       (C)  $y = kx^3$       (D)  $y = kx^5$

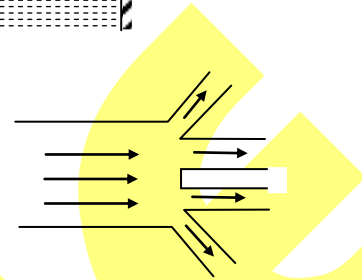


Space For Rough Work

19. The volume of brick is 2.197 litres. The submerged brick is balanced by a 2.54 kg mass on the beam scale. The weight of the brick is –  
 (A) 46 N (B) 50 N  
 (C) 56 N (D) 72 N

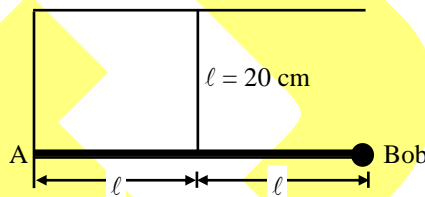


20. Water is flowing through a channel that is 12 m wide with a speed of 0.75 m/s. The water then flows into four identical channels that have a width of 4.0m. The depth of the water does not change as it flows into the four channels. What is speed of the water in one of the smaller channels?  
 (A) 0.56 m/s (B) 2.3 m/s (C) 0.25 m/s (D) 0.75 m/s

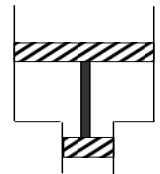


**PART-B**  
**Numerical Type**

1. A weightless rigid rod with a small iron bob at the end is hinged at point A to the wall so that it can rotate in all directions. The rod is kept in the horizontal position by a vertical inextensible string of length 20 cm, fixed at its mid point. The bob is displaced slightly, perpendicular to the plane of the rod and string. Find period of small oscillations of the system in the form  $\frac{\pi x}{10}$  sec. and fill value of x. ( $g = 10 \text{ m/s}^2$ )

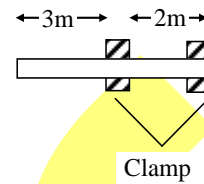


2. A smooth vertical conducting tube have two different section is open from both ends and equipped with two piston of different areas. Each piston slides in respective tube section. 1 liter of ideal gas at pressure  $1.5 \times 10^5 \text{ Pa}$  is enclosed between the piston connected with a light rod. The cross section area of upper piston is  $10\pi \text{ cm}^2$  greater than lower one. Combined mass of two piston is 1.5 kg. If the piston is displaced slightly. Time period of oscillation will be (in  $10^{-1}$  sec).



Space For Rough Work

3. A wire of length '2m' is clamped horizontally between two fixed support. A mass  $m = 5 \text{ kg}$  is hanged from middle of wire. The vertical and depression in wire (in cm) in equilibrium is (Young modulus of wire =  $2.4 \times 10^9 \text{ N/m}^2$ , cross-sectional area =  $1 \text{ cm}^2$ )
4. A metal rod of length 5 m is clamped by two rigid support separation between which is 2 m as shown in figure. Longitudinal standing wave are set up in the rod using a device having frequency range 10 Hz – 10 kHz. Velocity of wave in rod is 4000 m/s. Numbers of natural longitudinal oscillation that can be setup in rod is
5. A diatomic molecule can be modelled as two rigid ball connected with spring such that the ball can vibrate with respect to centre of mass of the system (spring + balls). Consider a diatomic gas contain such diatomic molecule. If gas performs 20 Joule work under isobaric condition, then heat given to the gas (in Joule) is:



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.

- Which of the following is not isoelectronic series?  
 (A)  $\text{Cl}^-$ ,  $\text{P}^{3-}$ , Ar (B)  $\text{N}^{3-}$ , Ne,  $\text{Mg}^{2+}$   
 (C)  $\text{B}^{3+}$ , He,  $\text{Li}^+$  (D)  $\text{N}^{3-}$ ,  $\text{S}^{2-}$ ,  $\text{Cl}^-$
- The correct sequence of the electron affinity of C, N, O and F is  
 (A)  $\text{C} > \text{N} < \text{O} < \text{F}$  (B)  $\text{O} > \text{N} > \text{C} > \text{F}$   
 (C)  $\text{C} < \text{N} > \text{O} < \text{F}$  (D)  $\text{C} > \text{N} > \text{O} > \text{F}$
- $\text{H}_3\overset{1}{\text{C}}-\overset{2}{\text{C}}\text{H}=\overset{3}{\text{C}}=\overset{4}{\text{C}}\text{H}_2$   
 In the given compound which carbon atom will show maximum electronegativity?  
 (A) Fourth  
 (B) First  
 (C) Third  
 (D) Electronegativity of all the carbon atoms is same
- Which species have maximum magnetic moment?  
 (A)  $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$  (B)  $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$   
 (C)  $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$  (D)  $[\text{CoCl}_4]^{2-}$
- Which of the following is the correct structure of dien(diethylenetriamine)?  
 (A)  $\text{NH}_2 - (\text{CH}_2)_2 - \text{NH} - (\text{CH}_2)_2 - \text{NH}_2$  (B)  $\text{NH}_2 - \text{CH}_2 - \text{NH} - \text{CH}_2 - \text{NH}_2$   
 (C)  $\text{H}_2\text{N} - \text{CH} = \text{CH} - \text{NH} - \text{CH} = \text{CH} - \text{NH}_2$  (D)  $\begin{array}{c} \text{CH}_2 - \text{CH}_2 - \text{CH} - \text{CH}_2 \\ | \qquad \qquad | \qquad | \\ \text{NH}_2 \qquad \qquad \text{NH}_2 \qquad \text{NH}_2 \end{array}$
- Which of the following ligands does not form metal-nitrogen bond when bonded with metal?  
 (A)  $\text{EDTA}^{4-}$  (B) en  
 (C)  $\text{GLy}^-$  (D)  $\text{acac}^-$
- Which of the following pairs of molecule have identical shape?  
 (A)  $[\text{NiCl}_4]^{2-}$  and  $\text{XeF}_4$  (B)  $[\text{Zn}(\text{H}_2\text{O})_4]^{2+}$  and  $\text{SiCl}_4$   
 (C)  $[\text{Fe}(\text{CO})_5]$  and  $\text{XeOF}_4$  (D)  $[\text{Ag}(\text{NH}_3)_2]^+$  and  $\text{SF}_2$

Space For Rough Work

8. The two compounds pentaamminesulphatocobalt(III) bromide and pentaamminesulphatocobalt(III) chloride represent?  
(A) Linkage isomerism (B) Ionization isomerism  
(C) Co-ordination isomerism (D) No isomerism
9. Which orbital of phosphorus participate in the hybridization  $sp^3d$  in  $PCl_5$ ?  
(A)  $d_{x^2-y^2}$  (B)  $d_{z^2}$   
(C)  $d_{xy}$  (D)  $d_{yz}$  or  $d_{zx}$
10. Equal concentration of the four electrolytes solution are prepared which will have the highest molar conductance?  
(A) NaCl (B) KCl  
(C) HCl (D) LiCl
11. In which ion, number of unpaired electrons are not equal to four?  
(A)  $Fe^{2+}$  (B)  $Cr^{2+}$   
(C)  $Mn^{3+}$  (D)  $Co^{2+}$
12. The intense purple colour of  $MnO_4^-$  arises due to the absorption of visible light for  
(A) promotion of electron from  $t_{2g}$  to  $e_g$  orbital  
(B) promotion of electron from  $e_g$  to  $t_{2g}$  orbital  
(C) d-d transition  
(D) charge transfer
13. Lanthanide contraction is due to  
(A) strong shielding by 4f electrons  
(B) poor shielding by 5f electrons  
(C) decreasing  $Z_{eff}$  on outer electrons of 4f elements  
(D) increasing  $Z_{eff}$  on outer electrons of 4f elements
14. Which of the following is correct about basic strength of hydroxide?  
(A)  $Sc(OH)_3 > Y(OH)_3 > La(OH)_3$  (B)  $La(OH)_3 > Y(OH)_3 > Sc(OH)_3$   
(C)  $La(OH)_3 = Y(OH)_3 > Sc(OH)_3$  (D)  $Y(OH)_3 > La(OH)_3 > Sc(OH)_3$
15. Which of the following substance can intensify the blue colour of aqueous  $CuSO_4$  solution?  
(A) NaOH (B)  $NH_4OH$   
(C)  $Al(OH)_3$  (D)  $ClOH$

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Space For Rough Work



16. The reduction potential of four electrodes follows the following order:  
 $M^{2+}/M > N^{2+}/N > O^{2+}/O > P^{2+}/P$   
 Choose correct statement  
 (A) 'M' is the strongest reducing agent  
 (B) 'P' is the strongest oxidizing agent  
 (C) 'N' can displace 'O<sup>2+</sup>' from its aqueous solution  
 (D) 'O' can displace 'N<sup>2+</sup>' from its aqueous solution
17. How much silver will be deposited at cathode by passing 0.1 Faraday of electricity through aqueous solution of AgNO<sub>3</sub>?  
 (A) 10 mole (B) 1 mole (C) 10.8 g (D) 1.08 g
18. Which of the following electronic configuration of the metal ion, in its octahedral complex, provides maximum paramagnetic property according to crystal field theory?  
 (A)  $t_{2g}^6 e_g^2$  (B)  $t_{2g}^4 e_g^2$  (C)  $t_{2g}^3 e_g^2$  (D)  $t_{2g}^5 e_g^2$
19.  $[Cr(NH_3)_6]^{3+} + L \longrightarrow [CrL_6]^{3+} + 6NH_3$   
 The entropy change of above reaction will be maximum if the ligand 'L' is  
 (A) H<sub>2</sub>O (B) en (C) N<sub>2</sub>H<sub>4</sub> (D) PPh<sub>3</sub>
20. Which 3d-series metal has the lowest value of heat of atomization?  
 (A) Ti (B) Mn (C) Fe (D) Cr

**PART-B**  
**Numerical Type**

1. How many electron(s) is/are present in the  $t_{2g}$  orbital of iron ion in the complex  $[Fe(CN)_6]^{3-}$  according to crystal field theory?
2. How many maximum number of ionization isomers are possible for the octahedral complex which formula is given below :  
 $Co(NH_3)_4(CN)(Cl)(Br)$
3. How many moles of  $O_2^+$  contain 7.5 mole antibonding electrons?
4.  $M(s) | M^{2+}(1 M) || H^+(1 M) | H_2(g) | Pt(s)$   
1 atm  
 If the standard potential of  $M^{2+}/M$  is -0.72 volt, what will be the emf of the cell in volt unit?
5.  $Zn(s) | Zn^{2+}(1 M) || Cu^{2+}(1 M) | Cu(s)$   
 The standard electrode potential of above cell is 1.2 volt. If the change in standard free energy ( $\Delta G^\circ$ ) of the cell is  $-x \text{ kJ mol}^{-1}$ , what is x?

*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.

- A bag  $B_1$  has 3 white balls and 2 red balls. Another bag  $B_2$  has 4 white and 6 red balls. A ball is drawn randomly from bag  $B_1$  and without seeing its colour, is being put in bag  $B_2$ . Now a ball is drawn from bag  $B_2$ . The probability of both the drawn balls, of being same colour, is:

(A)  $41/55$  (B)  $31/55$   
(C)  $29/55$  (D) None of these
- For two events A and B,  $P(A \cap B') = \frac{1}{5}$ ,  $P(A' \cap B) = \frac{3}{20}$ ,  $P(A' \cap B') = \frac{1}{10}$ . The value of  $P(A|B)$  is:

(A)  $\frac{5}{14}$  (B)  $\frac{11}{14}$   
(C)  $\frac{9}{14}$  (D)  $\frac{2}{7}$
- If  $A = \text{diagonal}(d_1, d_2, \dots, d_n)$ , then  $A^n$  is

(A)  $\text{diagonal}(d_1^{n-1}, d_2^{n-2}, \dots, d_n^{n-1})$  (B)  $\text{diagonal}(d_1^n, d_2^n, \dots, d_n^n)$   
(C) A (D) none
- The value of  $\lambda$  and  $\mu$  for which the system of equation  $x + y + z = 6$ ,  $x + 2y + 3z = 10$ ,  $x + 2y + \lambda z = \mu$  have unique solution are

(A)  $\lambda = 3, \mu \in \mathbb{R}$  (B)  $\lambda = 3, \mu = 10$   
(C)  $\lambda \neq 3, \mu = 10$  (D)  $\lambda \neq 3, \mu \neq 10$
- In the Binomial expansion of  $(a - b)^n$ ,  $n \geq 5$ , the sum of the 5<sup>th</sup> and 6<sup>th</sup> terms is zero, then  $\frac{a}{b}$  equals

(A)  $\frac{n-5}{6}$  (B)  $\frac{n-4}{5}$   
(C)  $\frac{5}{n-4}$  (D)  $\frac{6}{n-5}$

Space For Rough Work

6. If  $A^2 - 3A + 2I = 0$ , then
- (A) A is singular (B)  $A^{-1} = \frac{3I + A}{2}$
- (C)  $A^{-1} = \frac{I - 3A}{2}$  (D)  $A^{-1} = \frac{3I - A}{2}$
7. If  $\sin^{-1} x + \sin^{-1} y = \frac{2\pi}{3}$ , then  $\cos^{-1} x + \cos^{-1} y$  is equal to
- (A)  $\frac{2\pi}{3}$  (B)  $\frac{\pi}{3}$
- (C)  $\frac{\pi}{6}$  (D)  $\pi$
8. If  $\tan^{-1} x = \frac{\pi}{12}$ , then  $\cot^{-1} x$  is equal to
- (A)  $11\pi/12$  (B)  $3\pi/12$
- (C)  $7\pi/12$  (D)  $5\pi/12$
9. Let  $A = \{2, 3, 4, \dots, 20\}$ . A number is chosen at random from the set A and it is found to be a prime number. The probability that it is more than 10, is
- (A)  $\frac{9}{10}$  (B)  $\frac{1}{10}$
- (C)  $\frac{1}{5}$  (D)  $\frac{1}{2}$
10. The most general solutions of the equation  $\sec^2 x = \sqrt{2}(1 - \tan^2 x)$  are given by
- (A)  $n\pi + \frac{\pi}{8}$  (B)  $n\pi \pm \frac{\pi}{4}$
- (C)  $n\pi \pm \frac{\pi}{8}$  (D) none of these
11. If  $\sin 2\theta(4\cos^2 \theta - 3)(3 - 4\sin^2 \theta) = \frac{1}{\sqrt{2}}$  then least positive value of  $\theta$  is equal to
- (A)  $\frac{\pi}{4}$  (B)  $\frac{\pi}{12}$
- (C)  $\frac{\pi}{24}$  (D) None

Space For Rough Work

12. If  ${}^{72}C_{7r} = {}^{72}C_{2r+9}$ , then the value of 'r' is  
 (A) 7 (B) 8  
 (C) 6 (D) 9
13. In how many ways 5 delegates can be put in 6 hotels of a city if there is no restriction is  
 (A)  $6^5$  (B)  $5^6$   
 (C)  ${}^6P_5$  (D)  $\frac{6!}{5!}$
14.  $\frac{\cos \theta}{\sin(90 + \theta)} + \frac{\sin(-\theta)}{\sin(180 + \theta)}$  is  
 (A) 0 (B) 1  
 (C) 2 (D) None of these
15. The value of  $\left(\frac{1}{2\sin 10^\circ} - 2\sin 70^\circ\right)$  is  
 (A)  $-\frac{\sqrt{3}}{2}$  (B) -1  
 (C) 1 (D)  $\frac{\sqrt{3}}{2}$
16. If  $\cos(\theta + \phi) = m\cos(\theta - \phi)$ , then  $\tan \theta$  is equal to  
 (A)  $\left[\frac{1+m}{1-m}\right] \tan \phi$  (B)  $\left[\frac{1-m}{1+m}\right] \tan \phi$   
 (C)  $\left[\frac{1-m}{1+m}\right] \cot \phi$  (D)  $\left[\frac{1+m}{1-m}\right] \cot \phi$
17. Two persons are selected at random from n persons seated in a row ( $n \geq 3$ ). The probability that the selected persons are not seated consecutively is equal to:  
 (A)  $\frac{n-2}{n}$  (B)  $\frac{n-1}{n}$   
 (C)  $\frac{n+2}{n+3}$  (D)  $\frac{n-2}{n-1}$

Space For Rough Work

18. Total number of 5 digit numbers having all different digits and divisible by 4 that can be formed using the digits  $\{1, 3, 2, 6, 8, 9\}$ , is equal to  
 (A) 192 (B) 32  
 (C) 1152 (D) 288
19. If  $\tan(\alpha + \beta) = \frac{5}{12}$  and  $\cot(\alpha - \beta) = \frac{4}{3}$ , then  $\tan 2\beta$  is equal to  
 (A)  $-\frac{16}{63}$  (B)  $\frac{12}{35}$   
 (C)  $-\frac{9}{28}$  (D) None of these
20.  $\cos\left(\frac{\pi}{15}\right) \cdot \cos\left(\frac{2\pi}{15}\right) \cdot \cos\left(\frac{4\pi}{15}\right) \cdot \cos\left(\frac{8\pi}{15}\right)$  is  
 (A)  $\frac{1}{8}$  (B)  $\frac{1}{4}$   
 (C)  $\frac{1}{16}$  (D)  $-\frac{1}{16}$

**PART-B**  
**Numerical Type**

1. If  $p = \begin{bmatrix} 1 & \alpha & 3 \\ 1 & 3 & 3 \\ 2 & 4 & 4 \end{bmatrix}$  is the adjoint of a  $3 \times 3$  matrix A and  $|A| = 4$ , then  $\alpha$  is equal to
2. If  $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = \frac{3\pi}{2}$  then the value of  $x + 2y + 3z =$
3. A college offers 7 courses in the morning and 5 in the evening. Find the possible number of choices with the student if he wants to study one course in the morning and one in the evening.
4. The coefficient of  $x^7$  in the expression  $(1+x)^{10} + x(1+x)^9 + x^2(1-x)^8 + \dots + x^{10}$  is:
5. The remainder when  $2^{2003}$  is divided by 17 is

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Space For Rough Work

# FIITJEE INTERNAL TEST

## BATCH: NWCMSW425A1\_PT-3

### PHYSICS, CHEMISTRY & MATHEMATICS

#### JEE MAIN-PHASE

Paper Code  
100882

#### ANSWER KEY

##### SECTION – I

##### (PHYSICS)

##### PART – A

- |       |       |       |       |
|-------|-------|-------|-------|
| 1. B  | 2. B  | 3. D  | 4. A  |
| 5. A  | 6. A  | 7. A  | 8. C  |
| 9. A  | 10. C | 11. C | 12. B |
| 13. C | 14. B | 15. B | 16. C |
| 17. A | 18. A | 19. A | 20. A |

##### PART – B

- |        |      |      |      |
|--------|------|------|------|
| 1. 4   | 2. 5 | 3. 5 | 4. 5 |
| 5. 140 |      |      |      |

##### SECTION – II

##### (CHEMISTRY)

##### PART – A

- |       |       |       |       |
|-------|-------|-------|-------|
| 1. D  | 2. A  | 3. C  | 4. C  |
| 5. A  | 6. D  | 7. B  | 8. D  |
| 9. B  | 10. C | 11. D | 12. D |
| 13. D | 14. B | 15. B | 16. D |
| 17. C | 18. C | 19. B | 20. A |

##### PART – B

- |          |      |        |         |
|----------|------|--------|---------|
| 1. 5     | 2. 5 | 3. 1.5 | 4. 0.72 |
| 5. 231.6 |      |        |         |

##### SECTION – III (MATHEMATICS)

##### PART – A

- |       |       |       |       |
|-------|-------|-------|-------|
| 1. C  | 2. B  | 3. B  | 4. C  |
| 5. B  | 6. D  | 7. B  | 8. D  |
| 9. D  | 10. C | 11. C | 12. A |
| 13. A | 14. C | 15. C | 16. C |
| 17. A | 18. A | 19. A | 20. D |

##### PART – B

- |       |      |       |        |
|-------|------|-------|--------|
| 1. 11 | 2. 6 | 3. 35 | 4. 330 |
| 5. 8  |      |       |        |