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JEE Advanced | JEE Main | NTSE | KVPY | Olympiads

IPEC Explorer Meticulous Test Admission Cum Scholastic Aptitude Test (Zenith Course: X to XI Moving Students)

Time Allowed: 3 Hours

Maximum Marks: 300

Student's Name: _____

Reg. No. :

School Name: _____

Exam Centre: _____

Contact No. :

Invigilator's Sig. _____

Candidate Sig. _____

INSTRUCTIONS FOR MARKING ON ANSWER SHEET

1. The booklet is your Question Paper. Do not break the seal of this booklet before being instructed to do so by the invigilator.
2. Candidate should check the test paper carefully, in case of any discrepancy, the candidate should report immediately to the invigilator for replacement of the both i.e. the test booklet and answer-sheet.
3. Use only **Black / Blue** ball point pen to darken the appropriate circle.
4. Blank papers, clipboards, calculators, slide rules, calculators, cameras, cellular phones, pagers and electronic gadgets are **NOT** allowed inside the examination hall.
5. The answer sheet, a machine-readable Optical Response Sheet (**ORS**), is provided separately.
6. Mark should be dark and completely fill the circle. Darken **ONLY ONE CIRCLE** for each question.
7. The question paper consists of **2 parts**.

Part-I: Mental Ability (10) – 30 Questions

Part-II: Physics – 15 Questions

Part-III: Chemistry – 15 Questions

Part-IV : Mathematics – 15 Questions

8. Marking Scheme :

For each question, you will be awarded **+4** marks if you darken the bubble corresponding to the correct answer and **-1** for wrong answer. zero mark if no bubbles are darkened.

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PART-I [IQ]**[ONLY ONE IS CORRECT TYPE]**

This Part contains 30 Single choice questions. Each question has four choices(A), (B), (C) and (D) out of which Only one is correct.

Directions (Q.1 to Q.2) : Read the following information and answer the questions given below:

A is the son of B. C, B's sister has a son D and a daughter E. F is the maternal uncle of D.

1. How is A related to D ?
 (A) Cousin (B) Nephew (C) Uncle (D) Brother
2. How is E related to F ?
 (A) Sister (B) Daughter (C) Niece (D) Wife
3. A clock is so placed that at 12 noon its minute hand points towards north-east. In which direction does its hour hand point at 1. 30 p. m. ?
 (A) North (B) South (C) East (D) West

Directions (Q.4 to Q.7) : Read the following information carefully and answer the question given below it:

- (i) Eight persons E, F, G, H, I, J, K and L are seated around a square table two on each side.
- (ii) There are three lady members and they are not seated next to each other.
- (iii) J is between L and F.
- (iv) G is between I and F.
- (v) H, a lady member, is second to the left of J.
- (vi) F, a male member is seated opposite E, a lady member.
- (vii) There is a lady member between F and I.

4. Who among the following is seated between E and H :
 (A) F (B) I (C) Cannot be determined (D) None of these
5. How many persons are seated between K and F :
 (A) One (B) Two (C) Three (D) Cannot be determined
6. Who among the following are the three lady members :
 (A) E, G and J (B) E, H and G (C) G, H and J (D) Cannot be determined
7. Who among the following is to the immediate left of F :
 (A) G (B) I (C) J (D) Cannot be determined

(Space for rough work)

Directions (Q.8 & Q.9) : These questions consist of a number series which contains a wrong term.

This term is given as one of the four alternatives among the four numbers given below. The wrong term is :

8. 89, 78, 86, 80, 85, 82, 83
 (A) 83 (B) 82 (C) 86 (D) 78
9. 1, 1, 3, 9, 6, 36, 10, 100, 16, 225
 (A) 225 (B) 16 (C) 10 (D) 9

Directions (Q.10 to Q.11) : Words in capital letters in column-I are written in small letters in a code language in column-II. Decode the Language and find out the correct alternative for the given word in each question.

Column-I

HERO
 JOIN
 LAZY
 MINE
 PART
 SAURY
 BLUE
 CIGAR
 WRIT
 VIRUS
 QUACK
 PIRL

Column-II

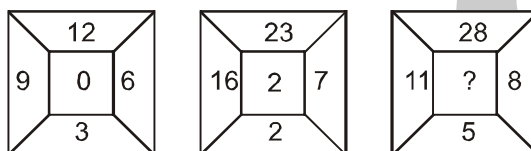
tbfw
 bakp
 nsvg
 pdkt
 rwsx
 wveos
 egt
 vsqwp
 wpxy
 pzwoe
 jqems
 wprg

10. Code for letters in the word ULCER are:
 (A) ggwmr (B) teqwp (C) ktegp (D) gteqw
11. Code for letters in the word SINE are :
 (A) ptkl (B) toka (C) ptok (D) optb
12. Two buses start from the opposite points of a main road, 150 km apart. The first bus runs for 25 km and takes a right turn and then runs for 15 km. It, then turns left and runs for another 25 km and takes the direction back to reach the main road. In the meantime, due to the minor breakdown the other bus has run only 35 km along the main road. What would be the distance between the two buses at this point
 (A) 65 km (B) 80 km (C) 75 km (D) 85 km

(Space for rough work)

Directions (Q.13 & Q. 14) : A, B and C are playing a game. When they start, they have 46 points between the 3 of them. They play 3 games. A wins the first, C the second and B the third game. When A wins, he gets 3 points from B and 3 points from C. When B wins, his points double and he gets some of these points from A and some from C. When C wins, he gets 2 points from A and 4 points from B. After the 3 games, all three of them have the same points with each of them that they had started with.

13. How many points did B start with ?
 (A) 12 (B) 16 (C) 14 (D) cannot be determined
14. When B wins, how many points does he get from C ?
 (A) 5 (B) 3 (C) either 3 or 4 (D) 4
15. Insert the missing character



- (A) 15 (B) 14 (C) 20 (D) 12

Directions (Q. 16 & Q. 17) : In each of the following questions, the two rows of numbers are given. Resultant number in each row is to be worked out separately based on the following rules and the question below the row of numbers is to be answered. The operations of numbers progress from left to right.

Rules :

- (i) If an even number comes before a prime number, they are to be multiplied.
 (ii) If an even number comes before a composite odd number, odd number is to be subtracted from even number.
 (iii) If a composite odd number comes before a prime number, the first number is to be divided by the second number.
 (iv) If an odd number comes before an even number which is a perfect square, they are to be added.
 (v) If an odd number comes before another odd number they are to be added.

16.

36	21	5	16
27	3	16	5

 What is the sum of the resultants of the two rows?
 (A) 25 (B) 24 (C) 125 (D) 81

(Space for rough work)

17. $\begin{array}{cccc} 39 & 13 & 11 & 17 \\ 24 & 5 & 55 & 13 \end{array}$

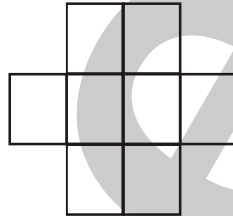
What is the difference between the resultants of the two rows ?

- (A) 14 (B) 9 (C) 243 (D) 233

Direction (Q. 18 to Q. 19) : Refer to the data below and answer the questions that follow—

In a survey of 1000 households, washing machines, vacuum cleaners, and refrigerators were counted. Each house had at least one of these appliances, 400 had no refrigerator, 380 no vacuum cleaners, and 542 no washing machines. 294 had both a vacuum cleaner and a washing machine, 277 both a refrigerator and a vacuum cleaner, 120 both a refrigerator and a washing machine.

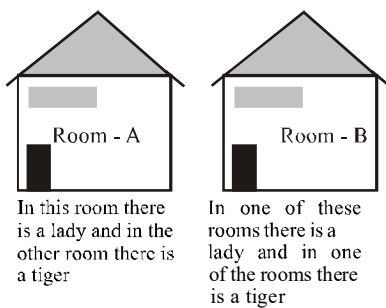
18. How many had at least two of the three appliance ?
 (A) 529 (B) 652 (C) 665 (D) None of these
19. How many had exactly one appliances?
 (A) 550 (B) 500 (C) 216 (D) 335
20. Six X's have to be placed in the square of the adjacent figure such that each row contains at least one X. In how many different ways can this be done?



- (A) 20 (B) 24 (C) 26 (D) 30

(Space for rough work)

21. You are seeing two statements on the doors of two rooms. If



only one statement is true, in which room is the lady present ?

- (A) Room A (B) Room B (C) None of the rooms (D) Can not be determined

Direction (Q.22 & Q.23) :

Code Relationship

$P \div Q$ means 'P' is son of Q

$P \times Q$ means 'P' is sister of Q

$P + Q$ means 'P' is brother of Q

$P - Q$ means 'P' is mother of Q

22. How is S related to T in expression $T + R - V + S$

- (A) Uncle (B) Nephew (C) Son (D) Can't be determined

23. Which of following that S is husband of T ?

- (A) $T \times R - V + S$ (B) $T - R \div V \times S$ (C) $T - R + V \div S$ (D) $T \div R \times V + S$

Direction (Q.24 & Q.25) :

Each letter always stands for the same digit.

$$\begin{array}{r} \text{NINE} \\ +\text{THREE} \\ +\text{SEVEN} \\ \hline \text{TWELVE} \end{array}$$

Given $I = 9, R = 2, N = 6$

24. For which digit W stands?

- (A) 0 (B) 4 (C) 6 (D) 3

(Space for rough work)

25. For which digit L stands?
(A) 5 (B) 6 (C) 7 (D) 8
26. P, Q, R and S are four men. P is the oldest but not the poorest. R is richest but not the oldest. Q is older than S but not than P or R. P is richer than Q but not than S. The four men can be arranged (descending) in respect of age & richness, respectively as :-
(A) PQRS, RPSQ (B) PRQS, RSPQ (C) PRQS, RSQP (D) PRSQ, RSPQ
27. Six persons A, B, C, D, E and F are standing in a row. C & D are standing close to each other alongsides E. B is standing beside A only. A is fourth from F. Who are standing on the extremes ?
(A) A and F (B) B and D (C) B and F (D) None
28. A man fills a basket with eggs in such a way that the number of eggs added on each successive day is the same as the number already present in the basket. This way the basket gets completely filled in 24 days. After how many days the basket was $1/4^{\text{th}}$ full?
(A) 6 (B) 12 (C) 17 (D) 22

(Space for rough work)

Direction (Q. 29 to Q. 30) :

The president of a club is appointing 9 officials A, B, C, D, E, F, G, H & I to serve on 3 committees to study 3 different aspects of activities of the club. There will be a games committee, a food service committee & an entertainment committee. The appointments must respect the following :

- Each committee must have exactly 3 members
- No person can serve on more than one committee
- H must serve on entertainment committee
- C & D must serve on the same committee
- A & B cannot serve on the same committee
- E cannot serve on the same committee as I
- F must serve on the same committee as B or H or both B & H

29. If B and G serve on Games committee, which of the following must serve on the food service committee?

- (A) A (B) D (C) E (D) F

30. If A is assigned to the food service committee & C is appointed to entertainment committee, then which of the following must be true ?

- (I) G is appointed to Food service committee
(II) E is appointed to Games committee
(III) I is appointed to Entertainment committee
- (A) I only (B) III only (C) II & III Only (D) I & III only

(Space for rough work)

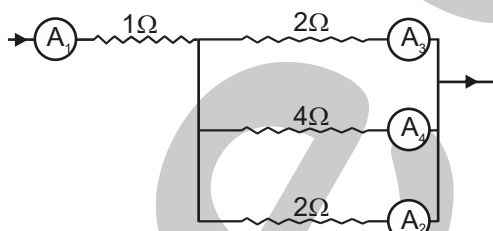
PART-II [PHYSICS]**[ONLY ONE IS CORRECT TYPE]**

This Part contains 15 Single choice questions. Each question has four choices(A), (B), (C) and (D) out of which Only one is correct.

31. Three equal resistors connected in series across a source of e.m.f. together dissipate 10W of power. What should be the power dissipated if the same resistors are connected in parallel across the same source of e.m.f?
(A) 9 W (B) 90W (C) 10W (D) 100W
32. A safety device that is used to protect an electric circuit from overloading is called
(A) switch (B) insulator (C) fuse (D) conductor
33. A piece of wire is cut into four equal parts and the pieces are bundled together side by side to form a thicker wire. Compared with that of the original wire, the resistance of the bundle is
(A) the same (B) 1/4 as much (C) 1/8 as much (D) 1/16 as much
34. A length of wire of resistance R is stretched uniformly so that its length is doubled. Then the resistance of the stretched wire will be
(A) 2R (B) R/2 (C) 4R (D) R/4
35. In a three pin socket (shoe) the bigger hole is connected to
(A) Any wire (B) Live wire (C) Neutral wire (D) Earth wire
36. A rectangular coil of copper wires is rotated in a magnetic field. The direction of the induced current changes once in each
(A) Two revolutions (B) One revolution (C) Half revolution (D) One-fourth revolution
37. Electromagnetic induction was discovered by
(A) Oersted (B) maxwell (C) Thomson (D) Faraday
38. When the current is passing through the straight wire then, the associated magnetic field is
(A) Straight (B) Elliptical (C) Circular (D) Parabolic
39. With respect to air the refractive indices of water and glass are 4/3 and 3/2 respectively. The refractive index of glass with respect to water is
(A) 2 (B) 8/9 (C) 9/8 (D) 1
40. The speed of light in air is
(A) $3 \times 10^8 \text{ mms}^{-1}$ (B) $3 \times 10^8 \text{ cms}^{-1}$ (C) $3 \times 10^8 \text{ ms}^{-1}$ (D) $3 \times 10^8 \text{ kms}^{-1}$

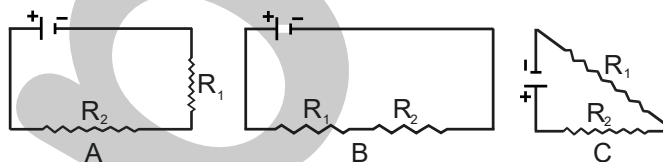
(Space for rough work)

41. Which of the following statements is true?
 (A) A convex lens has 4 dioptre power having a focal length 0.25 m
 (B) A convex lens has - 4 dioptre power having a focal length 0.25 m
 (C) A concave lens has 4 dioptre power having a focal length 0.25 m
 (D) A concave lens has -4 dioptre power having a focal length 0.5 m
42. In torches, search lights and headlights of vehicles the bulb is placed
 (A) between the pole and the focus of the reflector
 (B) very near to the focus of the reflector
 (C) between the focus and centre of curvature of the reflector
 (D) at the centre of curvature of the reflector
43. The name of the device which converts mechanical energy into electrical energy is
 (A) electric generator (B) electric cell (C) microphone (D) electric motor
44. Four ammeter A_1, A_2, A_3 and A_4 are connected to different resistors in a circuit given here. Maximum current will be recorded by the ammeter:



- (A) A_1 (B) A_2 (C) A_3 (D) A_4

45. Two resistances R_1 and R_2 are to be connected in series combination. Out of the following the correct combination is shown in



- (A) only A (B) only B (C) only C (D) all of them, A, B and C

(Space for rough work)

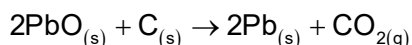
PART-III [CHEMISTRY]**[ONLY ONE IS CORRECT TYPE]**

This Part contains 15 Single choice questions. Each question has four choices(A), (B), (C) and (D) out of which Only one is correct.

46. An element with atomic number 26, is below which element in the periodic table?
(A) Calcium (B) Iron (C) Argon (D) Magnesium
47. What would be the atomic number of the next halogen element, if discovered in future?
(A) 103 (B) 115 (C) 117 (D) 121
48. Choose the correct sets which represent the oxides as acidic : basic : neutral : amphoteric
(A) CO_2 : MgO : N_2O : H_2O (B) SO_2 : NO : CO : Al_2O_3
(C) P_2O_5 : ZnO : NO : Al_2O_3 (D) None of these
49. Soaps do not clean clothes in hard water because
(A) hard water contains sodium and potassium ions
(B) soluble soap is formed in hard water
(C) the precipitate of soap adheres onto the fibre of the cloth as gummy mass
(D) Sodium or potassium soap is formed in hard water
50. Unsaturated fatty acids contain
(A) one double bond (B) two double bonds
(C) one or more double bonds (D) no double bond
51. Which among the following organic compounds is likely to have more than one possible structure?
(A) CH_4 (B) C_3H_8 (C) C_2H_4 (D) C_4H_8
52. Which of the following reactions is used in white washing walls?
(A) $2\text{Ca} + \text{O}_2 \rightarrow 2\text{CaO}$ (B) $\text{Ca}(\text{OH})_2 \xrightarrow{\text{Heat}} \text{CaO} + \text{H}_2\text{O}$
(C) $\text{Ca}(\text{OH})_2 + \text{CO}_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$ (D) $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2$

(Space for rough work)

53. Which of the statements about the reaction below are correct?



- (i) Lead is getting reduced.
- (ii) Carbon dioxide is getting oxidised.
- (iii) Carbon is getting oxidised.
- (iv) Lead oxide is getting reduced.

(A) (iii) and (iv) (B) (i) and (iii) (C) (i), (ii) and (iii) (D) All of these

54. $\text{Zn}_{(aq)}^{2+} + 2e^{-} \rightarrow \text{Zn}_{(s)}$. This is

- (A) oxidation (B) reduction (C) redox reaction (D) none of these

55. Plaster of Paris is obtained

- (A) by adding water to calcium sulphate
- (B) by adding sulphuric acid to calcium hydroxide
- (C) by heating gypsum to a very high temperature
- (D) by heating gypsum to 120°C

56. A blue litmus paper was first dipped in dil.HCl and then in dil.NaOH solution. It was observed that the colour of the litmus paper

- (A) changed to red
- (B) changed first to red and then to blue
- (C) changed blue to colourless
- (D) remained blue in both the solutions

57. For dilution of concentrated acid we should add

- (A) water into concentrated acid
- (B) concentrated acid into water
- (C) first water into acid and then more acid
- (D) both (A) and (B) are correct

(Space for rough work)

58. An alloy which does not contain copper is
(A) solder (B) bronze (C) brass (D) bell metal
59. Which ore contains both iron and copper?
(A) Cuprite (B) Chalcocite (C) Chalcopyrite (D) Malachite
60. Minimum number of carbon required to form first member of Alkyne ?
(A) 1 (B) 2 (C) 3 (D) 0

(Space for rough work)

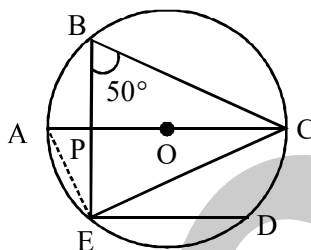
PART-IV [MATHEMATICS]**[ONLY ONE IS CORRECT TYPE]**

This Part contains 15 Single choice questions. Each question has four choices(A), (B), (C) and (D) out of which Only one is correct.

61. Which of the following is/are always true ?
 (A) Every irrational number is a surd.
 (B) Any surd of the form $\sqrt[n]{a} + \sqrt[n]{b}$ can be rationalised by a surd of the form $\sqrt[n]{a} - \sqrt[n]{b}$, where $\sqrt[n]{a}$ and $\sqrt[n]{b}$ are surds.
 (C) Both (A) and (B)
 (D) Neither (A) nor (B)
62. Find the remainder when the square of any prime number greater than 3 is divided by 6.
 (A) 1 (B) 3 (C) 2 (D) 4
63. Simplify: $\frac{x^2 - (y - 2z)^2}{x - y + 2z} + \frac{y^2 - (2x - z)^2}{y + 2x - z} + \frac{z^2 - (x - 2y)^2}{z - x + 2y}$.
 (A) 0 (B) 1 (C) $x + y + z$ (D) None of these
64. The LCM of the polynomials $(x^2 - 8x + 16)(x^2 - 25)$ and $(x^2 - 10x + 25)(x^2 - 2x - 24)$ is _____.
 (A) $(x^4 - 41x + 400)(x - 6)$ (B) $(x^4 + 41x + 400)(x^2 - 9x + 20)$
 (C) $(x^4 - 41x + 400)(x^2 - 9x + 20)(x - 6)$ (D) $(x^4 - 41x + 400)(x^2 - 9x + 20)(x + 6)$
65. If (p, p) is the solution of system of equations $ax + by + (t - s) = 0$ and $bx + ay + (s - r) = 0, (a \neq b)$, then which of the following must be true ?
 (A) $2r = s + t$ (B) $2r = r + s$ (C) $2s = r + t$ (D) $r + s + t = 0$

(Space for rough work)

66. A told B, "when I was as old as you are now, then your age was four years less than half of my present age". If the sum of the present ages of A and B is 61 years, what is B's present age? (in years)
 (A) 9 (B) 25 (C) 43 (D) 36
67. For what value of k is one root of the quadratic equation $9x^2 - 18x + k = 0$ double the other?
 (A) 36 (B) 9 (C) 12 (D) 8
68. If the sum of the squares of three consecutive odd natural numbers is 155, then their product will be equal to
 (A) 99 (B) 105 (C) 693 (D) 315
69. The chord ED is parallel to the diameter AC, as shown in the figure.

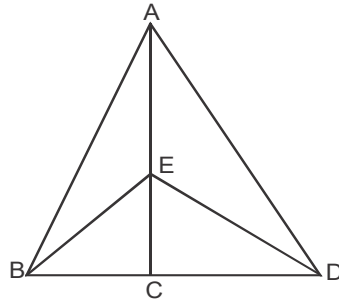


The magnitude of $\angle CED$ is equal to

- (A) 30° (B) 40° (C) 50° (D) 60°
70. $3 \cos^2 30^\circ + \sec^2 30^\circ + 2 \cos 0^\circ + 3 \sin 90^\circ - \tan^2 60^\circ =$
 (A) $\frac{65}{12}$ (B) $\frac{67}{12}$ (C) $\frac{69}{12}$ (D) $\frac{71}{12}$
71. If $P_n = \cos^n \theta + \sin^n \theta$, then $P_n - P_{n-2} = KP_{n-4}$, then
 (A) $K = 1$ (B) $K = -\sin^2 \theta \cos^2 \theta$ (C) $K = \sin^2 \theta$ (D) $K = \cos^2 \theta$

(Space for rough work)

72. If $x^2 + x - 1$ is a factor of $x^4 + px^3 + qx^2 - 1$, then the values of p and q can be
(A) 2, 1 (B) 1, -2 (C) -1, -2 (D) -2, -1
73. If $BC : CD = 2 : 3$, $AE : EC = 3 : 4$ and $BC : AE = 2 : 3$, then find the ratio of the area of $\triangle ECD$ to the area of $\triangle AEB$.



- (A) 2 : 1 (B) 2 : 3 (C) 3 : 5 (D) 4 : 3
74. If $7\operatorname{cosec}\theta - 3\cot\theta = 7$, then the value of $7\cot\theta - 3\operatorname{cosec}\theta$ is
(A) 1 (B) 2 (C) 3 (D) 4
75. One of the factor of $(a + 2b)^3 + (2a - c)^3 - (a + 2c)^3 + 3(a + 2b)(2a - c)(a + 2c)$ is
(A) $2a + 2b - 3c$ (B) $2a - 2b + 3c$ (C) $2a + 2b + 3c$ (D) $-2a - 2b - 3c$

(Space for rough work)