



# IITian's TAPASYA

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JEE (MAIN & ADV.) / XI & XII / NTSE / KVPY / OLYMPIAD

## TALENT SEARCH EXAMINATION

Time : 2 Hours

(Class X) PATNA STAGE - 1

Maximum Marks : 180

Name :

Reg. No.:

### INSTRUCTIONS

Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.  
You are not allowed to leave the examination hall before the end of the test.

#### [A] General :

1. Attempt ALL the questions. Answer have to be marked on the **OMR** sheets
2. This question paper contains 45 questions.
3. The question paper consists of **FIVE Parts Physics (Q.No. 1 to 5), Chemistry (Q.No.6 to 10), Biology (Q.No. 11 to 15), Mathematics (Q.No. 16 to 30), & Mental Ability (Q.No. 31 to 45)**
4. Blank spaces are provided at the bottom of each page for rough work. No additional sheets will be provided for rough work.
5. Bank paper, clipboard, log tabs, slide rules, calculators, cellular phones, pagers and electronic gadgets in any form are **NOT** allowed.
6. Do not Tamper / mutilate the **OMR sheet** or this booklet.
7. Do not break the seals of the question-paper booklet before instructed to do so by the invigilator.
8. **SUBMIT** the OMR sheet to the invigilator after completing the test & take away the test paper with you.

#### [B] Filling of OMR Sheet

9. In all the parts, each question will have 4 choices out of which **only one choice is correct**
10. Use only Black/Blue ball point pen for filling the OMR sheet.
11. On the OMR sheet, darken the appropriate bubble for each character of your name, Registration No., Phone No. etc.

#### [C] Marking Scheme

12. For each correct response you will **be awarded 4 marks** and **zero mark** in all other cases
13. There is no negative marking in STAGE-1 exam.

**Best of Luck**

**PART - I (PHYSICS)**

This section contains (1-5) multiple choice questions.

Each questions has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.

Q.1 A 100 watt electric bulb is lighted for 2 hours daily, and four 40 watt bulbs are lighted for 4 hours everyday. The energy consumed (in kWh) in 30 days is

- (A) 24.2 kWh                      (B) 25.2 kWh                      (C) 20 kWh                      (D) 27 kWh

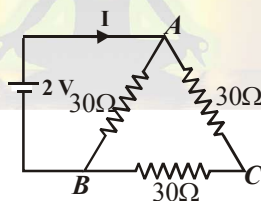
Q.2 An electron is moving with velocity  $10^3$  m/s parallel to the magnetic field of intensity 15 Tesla. The force on the electron is

- (A)  $-1 \times 10^{-15}$  N                      (B)  $-16 \times 10^5$  N                      (C)  $-8 \times 10^{-19}$  N                      (D) Zero

Q.3 A positively charged particle projected towards east is deflected towards north by a magnetic field. The field may be

- (A) towards west                      (B) towards south                      (C) downward                      (D) upward

Q.4 The value of the current  $I$  in the circuit shown in figure below is :



- (A) 0.1A                      (B) 0.5A                      (C) 1.5A                      (D) 0.2A

Q.5 The rise in temperature of 10 litres of water when it is heated for 30 minutes by an immersion rod rated 220 V & 1.5 kW will be, (Sp. heat of water =  $4200 \text{ J/kg}^\circ\text{C}$ )

(Assume no loss of heat to surroundings)

- (A)  $60.2^\circ\text{C}$                       (B)  $64.2^\circ\text{C}$                       (C)  $62.5^\circ\text{C}$                       (D)  $58.7^\circ\text{C}$

**Space for rough work**

**PART - II (CHEMISTRY)**

This section contains (6-10) multiple choice questions.

Each questions has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.

- Q.6 Plaster of Paris  $\left(\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}\right)$  on mixing with water sets to form.
- (A)  $\text{CaSO}_4 \cdot \text{H}_2\text{O}$       (B)  $\text{CaSO}_4 \cdot 1\frac{1}{2}\text{H}_2\text{O}$       (C)  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$       (D)  $\text{CaSO}_4 \cdot 2\frac{1}{2}\text{H}_2\text{O}$
- Q.7 The raw materials required for the manufacture of  $\text{NaHCO}_3$  by Solvay process are
- (A)  $\text{CaCl}_2, (\text{NH}_4)_2\text{CO}_3, \text{NH}_3$       (B)  $\text{NH}_4\text{Cl}, \text{NaCl}, \text{Ca}(\text{OH})_2$   
(C)  $\text{NaCl}, (\text{NH}_4)_2\text{CO}_3, \text{NH}_3$       (D)  $\text{NaCl}, \text{NH}_3, \text{CaCO}_3, \text{H}_2\text{O}$
- Q.8 Anode mud is obtained in which process ?
- (A) Roasting      (B) Zone refining  
(C) Electrolytic refining      (D) Calcination
- Q.9 In thermite process, reducing agent is
- (A) C      (B) CO      (C) Al      (D) None of these
- Q.10 Which of the following statement is correct
- (A) Bauxite is an ore of aluminium      (B) Magnetite is an ore of manganese  
(C) Haematite is an ore of mercury      (D) Pyrites is an ore of phosphorus

**PART - III (BIOLOGY)**

This section contains (11-15) multiple choice questions.

Each questions has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.

- Q.11 Dark reaction is also called -
- (A) Hill reaction      (B) Calvin-benson cycle  
(C) Both      (D) None of these

**Space for rough work**

- Q.12 Alcohol is produced in -  
(A) Aerobic respiration (B) Anaerobic respiration  
(C) Photosynthesis (D) None of these
- Q.13 Oxygenated blood is found in -  
(A) Right auricle (B) Pulmonary vein (C) Pulmonary artery (D) All the above
- Q.14 Ammonia is converted into urea in -  
(A) Heart (B) Spleen (C) Liver (D) Brain
- Q.15 The growth regulator that retards ageing of plant organ is—  
(A) Abscisic acid (B) Auxin (C) Cytokinin (D) Gibberellin

## PART - IV (MATHEMATICS)

This section contains (16-30) multiple choice questions.

Each questions has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.

- Q.16 If  $7x + 6y = 420$ ,  $x$  and  $y$  are natural numbers, then what can be said about  $x$  ?  
(A)  $x$  is always odd (B)  $x$  is always even  
(C)  $x$  is even only if  $y$  is odd (D)  $x$  is odd only if  $y$  is even
- Q.17 A number  $N$  gives 5 as remainder when divided by 148. When the same is divided by 37 the remainder is  
(A) 6 (B) 5 (C) 4 (D) 0
- Q.18 Which of the following is true  
(A)  $\sqrt{11} - \sqrt{5} > \sqrt{19} - \sqrt{15}$  (B)  $\sqrt{11} - \sqrt{5} < \sqrt{19} - \sqrt{15}$   
(C)  $\sqrt{11} - \sqrt{5} = \sqrt{19} - \sqrt{15}$  (D)  $\sqrt{11} - \sqrt{5} \leq \sqrt{19} - \sqrt{15}$
- Q.19  $P = a^4 - ab$  and  $Q = b^2 - a^4$ ,  $a$  and  $b$  are natural numbers and  $a$  is factor of  $b$  ( $a > 1, b > 1$ ). Find HCF of  $P$  and  $Q$ .  
(A)  $a^3$  (B)  $b^2$  (C)  $ab$  (D)  $a^2$

**Space for rough work**

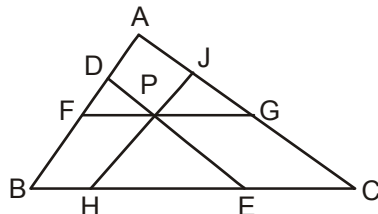
- Q.20  $\frac{(\sin^2 1^\circ + \sin^2 2^\circ + \sin^2 3^\circ + \dots + \sin^2 90^\circ)}{(\cos^2 1^\circ + \cos^2 2^\circ + \cos^2 3^\circ + \dots + \cos^2 90^\circ)} =$
- (A)  $\tan^2 1^\circ + \tan^2 2^\circ + \dots + \tan^2 90^\circ$  (B) 1  
(C)  $\frac{90}{89}$  (D)  $\frac{91}{89}$
- Q.21 Which of the following is incorrect
- (A) If  $x = \frac{2\sin\theta}{1+\cos\theta+\sin\theta}$ , then  $\frac{1-\cos\theta+\sin\theta}{1+\sin\theta} = x$   
(B) If  $\sec x - \cos x = 2$ , then  $\sec^8 x + \cos^8 x = 2$   
(C)  $\operatorname{cosec}^2\theta + \sec^2\theta = \operatorname{cosec}^2\theta \cdot \sec^2\theta$   
(D) If  $a^2 + 2a + \operatorname{cosec}^2 x = 0$ , then  $a = -1$
- Q.22 Construction of a cumulative frequency table is useful in determining the
- (A) mean (B) median  
(C) mode (D) all three measures as given in A, B, C
- Q.23 Mean of  $n$  numbers  $x_1, x_2, \dots, x_n$  is  $m$ . If  $x_n$  is replaced by  $x$ , then the new mean is
- (A)  $m - x_n + x$  (B)  $\frac{nm - x_n + x}{n}$  (C)  $\frac{(n-1)m + x}{n}$  (D)  $\frac{m - x_n + x}{n}$
- Q.24 The number  $\sqrt{18} + \sqrt{308}$  can be written in the form  $\sqrt{a} + \sqrt{b}$  where  $a$  and  $b$  are whole numbers and  $a > b$ . The value of  $(a - b)$ , is
- (A) 4 (B) 12 (C) 16 (D) 18
- Q.25 In an equilateral triangle ABC, the side BC is trisected at D. Find value of  $AD^2$  :
- (A)  $\frac{9}{7} AB^2$  (B)  $\frac{7}{9} AB^2$  (C)  $\frac{3}{4} AB^2$  (D)  $\frac{3}{4} AB^2$
- Q.26 If  $a \sin x + b \cos x = 1$  and  $a^2 + b^2 = 1$  ( $a, b > 0$ ), then consider the following statements:
- I  $\sin x = a$       II  $\tan x = a/b$       III  $\tan x = b$
- (A) only III is false (B) only I is true  
(C) All of I, II, III must be true (D) None of I, II or III is correct.

**Space for rough work**

Q.27 A test has 50 questions. A student scores 1 mark for a correct answer,  $-\frac{1}{3}$  for a wrong answer and  $-\frac{1}{6}$  for not attempting a question. If net score of a student is 32, the number of questions answered wrongly by that student can not be less than

- (A) 10 (B) 12 (C) 3 (D) 9

Q.28 Find area of  $\triangle ABC$  where  $FG \parallel BC$ ,  $DE \parallel AC$ ,  $HJ \parallel AB$  and area ( $\triangle FDP$ ) = 16, area ( $\triangle JPG$ ) = 25, area  $\triangle (PHE) = 49$ .



- (A) 144  
(B) 128  
(C) 256  
(D) 90

Q.29 A polynomial  $ax^3 + bx^2 + cx + d$  intersects x-axis at 1 and  $-1$  and y-axis at 2, The value of b is

- (A)  $-2$  (B) 0 (C) 1 (D) 2

Q.30 Consider the expression  $\frac{(a^2 + a + 1)(b^2 + b + 1)(c^2 + c + 1)(d^2 + d + 1)(e^2 + e + 1)}{abcde}$  where a, b, c, d, e are positive numbers. The minimum value of the expression is

- (A) 3 (B) 1 (C) 243 (D) 81

**PART - V (MENTAL ABILITY)**

This section contains (31-45) multiple choice questions.

Each questions has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct

Q.31 Which sequence of letters when placed at the blank space, one after other will complete the given letter series \_ ha \_ hach \_ c \_ \_

- (A) c c a h a (B) a c h a c (C) c h a a a (D) a a a c h

Q.32 In a certain code language 389 means "run very fast". 964 means "come back fast" and 487 means "run and come". Which number in the language means "come fast"

- (A) 44 (B) 94 (C) 74 (D) 87

*Space for rough work*

Q.33 If  $>$  denote  $+$ ,  $<$  denote  $-$ ,  $=$  denote  $\div$ ,  $\wedge$  denotes  $\times$ ,  $-$  denotes  $=$ ,  $\times$  denotes  $>$  and  $=$  denotes  $<$ , choose correct statement

- (A)  $1 > 8 + 3 = 1 + 4 < 9$  (B)  $4 > 3 \wedge 8 < 1 - 6 + 2 > 24$   
 (C)  $3 < 6 \wedge 4 > 25 = 8 + 4 > 1$  (D)  $12 < 9 \wedge 3 < 6 \times 25 + 5 > 6$

**Directions (Questions 34 to 36) :**

There are four diagrams A, B, C, D are given below. In the following questions, three objects / subjects are given. Choose the diagram that best illustrates the relationship between them.

Q.34 Furniture, Table, Books

- (A)  (B)  (C)  (D) 

Q.35 Buses, Cars, Vehicles

- (A)  (B)  (C)  (D) 

Q.36 Lemons, Citrus fruits, Chocolates

- (A)  (B)  (C)  (D) 

**Directions : for Q.37 to Q.39**

Read the following information carefully and answer the questions give below :

- (i) Six flats on a floor in two rows-three on each row, facing north and south are allotted to P, Q, R, S, T and U.
- (ii) Q gets a north facing flat and is not next to S.
- (iii) S and U get diagonally opposites flats.
- (iv) R next to U, gets a south facing flat and T gets a north facing flat.

Q.37 Whose flat is between Q and S ?

- (A) T (B) U (C) R (D) P

**Space for rough work**

- Q.38 The flats of which of the other pairs than SU is diagonally opposite to each other ?  
(A) PT (B) QP (C) QR (D) TS
- Q.39 If the flats of T and P are interchanged, whose flat will be next to that of U ?  
(A) Q (B) T (C) P (D) R

**Directions : for Q.40 to Q.42**

Read the following information carefully and answer the questions that follow :

Five professors A, B, C, D and E residing at five different cities, teach five different subjects.

- (i) A does not stay at either Bangalore or Lucknow. He teaches philosophy.  
(ii) B does not stay at either Hyderabad or Lucknow. He teaches mathematics.  
(iii) D stays at Jaipur and does not teach economics.  
(iv) E does not stay either at Bangalore or at Delhi. He teaches geography.  
(v) C does not teach history and he stays at Delhi.

- Q.40 Who stays at Bangalore ?  
(A) A (B) B (C) C (D) D
- Q.41 Which of the following subjects does C teach ?  
(A) Philosophy (B) Mathematics (C) History (D) None of these
- Q.42 At which of the following places does E stay ?  
(A) Bangalore (B) Hyderabad (C) Lucknow (D) Delhi
- Q.43 Poonam said to her friend, "Yesterday, I attended the birthday party of the son of the only son-in-law of my mother's mother." How is Poonam related to the man, whose birthday party she attended ?  
(A) Father (B) Sister (C) Brother (D) Mother
- Q.44 'A + B' means 'A is the father of B', 'A - B' means 'A is the wife of B', 'A × B' means 'A is the brother of B', 'A ÷ B' means 'A is the daughter of B'. Which of the following means "P is the Aunt of Q" ?  
(A)  $P + R - S + Q$  (B)  $P ÷ R - S + Q$  (C)  $P - R × S + Q$  (D) None of these
- Q.45 If all the capital letters are substituted with small letters placed at even places in the following alphabetical series, then how would write the name of the month following NOVEMBER ?  
A B C D E F ..... Z.  
(A) D E c E b M E r (B) d e C e M b e r  
(C) d E c E M b E R (D) d E C E M b E r

**Space for rough work**



## TALENT SEARCH EXAM 2016 -17

(Class X)\_STAGE - 1

### ANSWER KEY FINAL

- |         |         |         |         |         |
|---------|---------|---------|---------|---------|
| 1. (B)  | 2. (D)  | 3. (C)  | 4. (A)  | 5. (B)  |
| 6. (C)  | 7. (D)  | 8. (B)  | 9. (C)  | 10. (A) |
| 11. (B) | 12. (B) | 13. (B) | 14. (C) | 15. (C) |
| 16. (B) | 17. (B) | 18. (A) | 19. (D) | 20. (D) |
| 21. (B) | 22. (B) | 23. (B) | 24. (A) | 25. (B) |
| 26. (A) | 27. (C) | 28. (C) | 29. (A) | 30. (C) |
| 31. (A) | 32. (B) | 33. (B) | 34. (D) | 35. (A) |
| 36. (D) | 37. (A) | 38. (B) | 39. (D) | 40. (B) |
| 41. (D) | 42. (C) | 43. (C) | 44. (C) | 45. (D) |

*Space for rough work*