



**IIT**

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**KALRASHUKLA**

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*A Class Apart*

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**CLASS – 10<sup>th</sup> (ENGINEERING)**

**Time : 90 minutes**

**Maximum Marks : 180**

**-: Important Instructions :-**

- (i) Use only Black Ball Point pen.
- (ii) This test booklet contains 3 Sections of question paper consisting of
  - SECTION - I → PHYSICS (10 Questions)
  - SECTION - II → CHEMISTRY (10 Questions)
  - SECTION - III → MATHS (10 Questions)
  - SECTION - IV → MENTAL ABILITY & REASONING (15 Questions)
- (iii) Each question is allotted **4 marks for correct response**.
- (iv) **1 mark will be deducted** for marking incorrect or multiple responses.
- (v) No deduction will be made from total marks for unattempted questions.
- (vi) For each question, there is **only 1 correct** response.

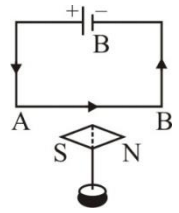
**Name of Student (in Capital Letter) :** \_\_\_\_\_

**Candidate Signature :** \_\_\_\_\_

**Invigilator Signature :** \_\_\_\_\_

**SECTION - I****PHYSICS**

1. When a small magnetic needle is placed below a horizontal conductor carrying a strong current from west to east, its north pole will point in the direction of
- (A) West – East (B) South - West  
(C) North- South (D) East – West

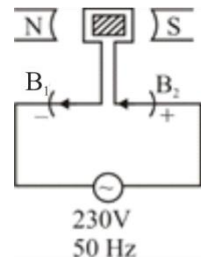


2. If you hear a gunshot 2 seconds after it is fired, how far away from the gun are you? (speed of sound in air = 330 m/s)
- (A) 660 m (B) 335 m (C) 330 m (D) 325 m
3. If there are three resistances each of 2 ohm and generate the effective resistance of 3 ohm so how will the connection of the three resistances in the circuit?
- (A) A parallel combination of two resistances and one in series  
(B) A series combination of two resistances and one in parallel  
(C) Three are in series  
(D) Three are in parallel
4. When light is refracted into a denser medium,
- (A) its wavelength and frequency both increase  
(B) its wavelength increases but frequency remains unchanged.  
(C) its wavelength decreases but frequency remains unchanged.  
(D) its wavelength and frequency both decrease.
5. A screen is placed at a distance 40 cm away from an illuminated object. A converging lens is placed between the source and the screen and it is attempted to form the image of the source on the screen. If no position could be found, the focal length of the lens.
- (A) must be less than 10 cm (B) must be greater than 20 cm  
(C) must be greater than 10 cm (D) must not be less than 10 cm

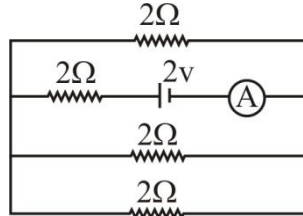
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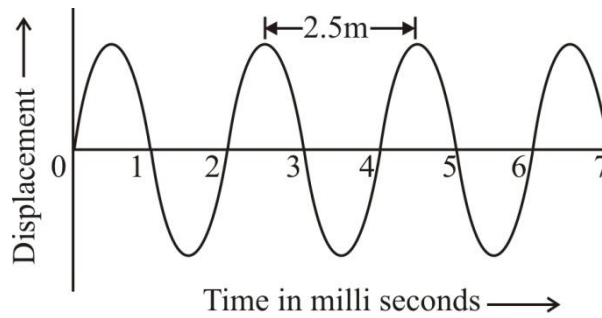
6. What is wrong with the D.C. motor connections shown in the figure?  
 (A) Supply voltage is not correct  
 (B) Polarity of the magnets is wrong.  
 (C) Polarity of the carbon brushes  $B_1$  and  $B_2$ , is not correct.  
 (D) Nothing is wrong with it.



7. The reading of the ammeter as per given circuit shown in figure,



- (A)  $\frac{1}{8}$  A      (B)  $\frac{3}{4}$  A      (C)  $\frac{1}{2}$  A      (D) 2A
8. Find the velocity of the wave shown in the figure below :



- (A) 1250 m/s      (B) 250 m/s      (C) 2500 m/s      (D) 125 m/s
9. Which one of the following can be used as a box type solar cooker?  
 (A) A double walled cooker made of plastic and its inner wall is painted white.  
 (B) A double walled cooker made of copper and its inner wall is painted black.  
 (C) A double walled cooker made of plastic and its inner wall is painted black.  
 (D) A single walled cooker made of copper and its both sides are painted white.
10. How many grams of  $U^{235}$  is required to produce  $8 \times 10^{11}$  J of energy, if 200 MeV of energy is released when one  $U^{235}$  atom undergoes fission?  
 (A) 98 gram      (B) 9.8 gram      (C) 0.8 gram      (D) 0.98 gram

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**SECTION - II****CHEMISTRY**

11. Indicate the nature of bonding in  $\text{CCl}_4$  and  $\text{CaH}_2$   
(A) Covalent in  $\text{CCl}_4$  and electrovalent in  $\text{CaH}_2$   
(B) Electrovalent in both  $\text{CCl}_4$  and  $\text{CaH}_2$   
(C) Covalent in both  $\text{CCl}_4$  and  $\text{CaH}_2$   
(D) Electrovalent in  $\text{CCl}_4$  and covalent in  $\text{CaH}_2$
12. Which of the following is not a Lewis acid  
(A)  $\text{BF}_3$  (B)  $\text{FeCl}_3$  (C)  $\text{SiF}_4$  (D)  $\text{C}_2\text{H}_4$
13. Aqueous solution of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  changes blue litmus paper to red due to  
(A) Presence of  $\text{Cu}^{++}$  ions (B) Presence of  $\text{SO}_4^{--}$  ions  
(C) Hydrolysis taking place (D) Reduction taking place
14. Diagonal relationship is shown by  
(A) Elements of first period (B) Elements of second period  
(C) Elements of third period (D) (B) and (C) both
15. The order of the magnitude of first ionisation potentials of Be, B, N and O is  
(A)  $\text{N} > \text{O} > \text{Be} > \text{B}$  (B)  $\text{N} > \text{Be} > \text{O} > \text{B}$  (C)  $\text{Be} > \text{B} > \text{N} > \text{O}$  (D)  $\text{B} > \text{Be} > \text{O} > \text{N}$
16. Gobar salt is  
(A)  $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$  (B)  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  (C)  $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$  (D)  $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$
17. Only two isomers of monochloro product is possible of  
(A) *n*-butane (B) 2,4-dimethyl pentane  
(C) Benzene (D) 1-methyl propane
18. Natural gas contains mainly  
(A) Methane (B) *n*-butane (C) *n*-octane (D) Mixture of octane
19. Which statement is not true concerning alkanes  
(A) Large number alkanes are soluble in water  
(B) All alkanes have a lower density than water  
(C) At room temperature some alkanes are liquids, some solids and some gases  
(D) All alkanes burn
20. Which of the following is a good conductor of heat of electricity  
(A) Diamond (B) Graphite (C) Anthracite (D) Charcoal

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**SECTION - III****MATHS**

21. If  $m$  is any positive integer, then the last two digits in the expression  $(81)^m(121)^m - 1$  are  
(A) 02 (B) 12 (C) 11 (D) 00
22. If  $a^2 = b + c$ ;  $b^2 = c + a$ ;  $c^2 = a + b$ , then the value of  $\frac{1}{a+1} + \frac{1}{b+1} + \frac{1}{c+1}$  is equal to  
(A) 4 (B) 3 (C) 2 (D) 1
23. The area of a regular hexagon (in sq. m) of side 4 metres is  
(A)  $6\sqrt{3}$  (B)  $9\sqrt{2}$  (C)  $12\sqrt{6}$  (D)  $24\sqrt{3}$
24. The number of real roots of the equation  $(x-1)^2 + (x-2)^2 + (x-3)^2$  is  
(A) 2 (B) 1 (C) 0 (D) 3
25. If  $\sin \theta + \sin^2 \theta = 1$ , then the value of  $\cos^2 \theta + \cos^4 \theta$  is  
(A) 1 (B) 2 (C) 1.5 (D) -1
26. The angles of elevation of the top of the tower from two points at distances 'a' and 'b' from the base and in the same straight line with it are complementary. The height of the tower is  
(A)  $a + b$  (B)  $\sqrt{ab}$  (C)  $a \times b$  (D)  $a\sqrt{b}$
27. If the sum of first  $n$  terms of an A.P. is  $3n^2 - 2n$ , then its 19<sup>th</sup> term is  
(A) 123 (B) 118 (C) 109 (D) 107
28. The mean of 100 observations is 50. If one of the observations which was 50 is replaced by 150, the resulting mean will be  
(A) 50.5 (B) 52 (C) 51.5 (D) 51
29. If points  $(a, 0)$ ,  $(0, b)$  and  $(1, 1)$  are collinear, then  $\left(\frac{a+b}{ab}\right)$  equals  
(A) 1 (B) -1 (C) 2 (D)  $\sqrt{2}$
30. From a pack of 52 cards, one card is drawn at random. What is the probability that the card drawn is a ten or a spade?  
(A)  $4/13$  (B)  $1/4$  (C)  $1/13$  (D)  $1/26$

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**SECTION -IV****MENTAL ABILITY & REASONING**

31. If 'FRIEND' is coded as 'HUMJTK', how is 'CANDLE' written in that code?  
(A) EDRIRL (B) ESJFME (C) DCQHJK (D) DEQJQM
32. If 'air' is called 'green', 'green' is called 'blue', 'blue' is called 'sky', 'sky' is called 'yellow', 'yellow' is called 'water' and 'water' is called 'pink', then what is the colour of clear sky?  
(A) Blue (B) Sky (C) Yellow (D) Water
33. 1, 8, 27, 64, ..., 216  
(A) 127 (B) 125 (C) 124 (D) 128
34. How many such 9s are there in the following number sequence which are either immediately preceded by or immediately followed by an even number in the series?  
3 9 5 4 9 7 8 3 9 2 1 8 9 7 3 1 5 6 9 9 5 1 6 9 7 2  
(A) Two (B) Three (C) Four (D) More than four

*Passage for Q. (35-36): Study the following information carefully to answer these questions.*

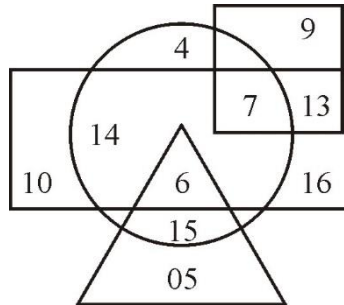
Adhir Mishra has three children- Urmila, Raghu and Sumit. Sumit married Roma, the eldest daughter of Mr. and Mrs. Mohan. The Mohan married their youngest daughter to the eldest son of Mr. and Mrs. Sharma and they had two children Sandeep and Shaifali. Mohan has two more children, Roshan and Bimla, both elder to Sheila. Sohan and Shivendar are sons of Sumit and Roma. Leela is the daughter of Sandeep.

35. What is the surname of Leela?  
(A) Sharma (B) Mohan (C) Mishra (D) Data insufficient
36. How is Shivendar related to Roma's father?  
(A) Son-in-law (B) Cousin (C) son (D) Grandson
37. One evening before sunset, two friends Ram and Shyam were talking to each other face to face. If Shyam's shadow was exactly to his right side, which direction was Ram facing?  
(A) North-East (B) South (C) South-West (D) South-East
38. Sixty students were there in a mental ability test. Ten students did not qualify, out of remaining Yogesh ranked 25<sup>th</sup> from the last. What was his rank from top?  
(A) 27<sup>th</sup> (B) 26<sup>th</sup> (C) 29<sup>th</sup> (D) 28<sup>th</sup>

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39. Divide Rs. 320 among A, B and C, so that A may have Rs. 30 more than B and C may have Rs. 20 more than A.  
 (A) Rs. 110, Rs. 80 and Rs. 130 (B) Rs. 110, Rs. 150 and Rs. 70  
 (C) Rs. 80, Rs. 120 and Rs. 120 (D) Rs. 100, Rs. 100 and Rs. 120
40. If  $(a * b)$  stands for  $(a + b)^2$  and  $(a \oplus b)$  stands for  $(a - b)^2$ , then the value of  $(a * b) + (a \oplus b)$  is  
 (A)  $2a^2 + b^2$  (B)  $a^2 + 2b^2$  (C)  $2(a^2 + b^2)$  (D)  $4(a^2 + b^2)$
41. If 17<sup>th</sup> January of a year was Monday, what will be the day on 19<sup>th</sup> June of the same year? (February has 28 days.)  
 (A) Sunday (B) Monday (C) Tuesday (D) Wednesday
42. How many times are the hands of a clock is at right angle in a day?  
 (A) 22 (B) 24 (C) 44 (D) 48

**Passage for Q. (43-45): The following questions are based on the diagram given below.**



- (i) Rectangle represents females.
  - (ii) Triangle represents uneducated persons.
  - (iii) Circle represents urban.
  - (iv) Square represents government servants.
- In different regions in the diagram some numbers are indicated which corresponds to the persons.
43. How many persons are uneducated female?  
 (A) 6 (B) 5 (C) 15 (D) 21
44. How many persons are Government servants but not females as well as uneducated?  
 (A) 13 (B) 7 (C) 9 (D) 20
45. How many persons are urban females but not uneducated and Government servants?  
 (A) 14 (B) 4 (C) 7 (D) 6

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10<sup>th</sup> CLASS (Engineering) TEST I.D.: 19103  
ANSWERS

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**SECTION - I****PHYSICS**

- |        |        |        |        |         |
|--------|--------|--------|--------|---------|
| 1. (C) | 2. (A) | 3. (A) | 4. (C) | 5. (C)  |
| 6. (A) | 7. (B) | 8. (A) | 9. (C) | 10. (B) |

**SECTION - II****CHEMISTRY**

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|---------|---------|---------|---------|---------|
| 11. (A) | 12. (D) | 13. (C) | 14. (D) | 15. (A) |
| 16. (D) | 17. (A) | 18. (A) | 19. (A) | 20. (B) |

**SECTION - III****MATHS**

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|---------|---------|---------|---------|---------|
| 21. (D) | 22. (D) | 23. (D) | 24. (C) | 25. (A) |
| 26. (B) | 27. (C) | 28. (D) | 29. (A) | 30. (A) |

**SECTION -IV****MENTAL ABILITY & REASONING**

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|---------|---------|---------|---------|---------|
| 31. (A) | 32. (B) | 33. (B) | 34. (D) | 35. (A) |
| 36. (D) | 37. (B) | 38. (B) | 39. (A) | 40. (C) |
| 41. (A) | 42. (C) | 43. (A) | 44. (C) | 45. (A) |