

# MENIIT

## NEET • IIT-JEE



## MTSE SAMPLE PAPER

**Standard - XII**  
**(Moving to Standard - XII Pass)**

**Code : EM-SP**

# MERIT & APTITUDE TEST

## (CODE: EM)

Time: 90 Minutes

Maximum Marks: 220

### Instructions

#### (A) GENERAL

1. This booklet is your Question Paper. It contains **FOUR sections**. **Section-(A)** has **12 questions of Physics**, **Section-(B)** has **12 questions of Chemistry**, **Section-(C)** has **16 questions of Biology** and **Section-(D)** contains **15 questions from Mental Aptitude**.
2. This booklet contains **55 questions of four mark each in all**. All the questions are **COMPULSORY**.
3. Blank papers, clip boards, log tables, slide rule, calculators, cellular phones and electronic gadgets in any form, are not allowed.
4. Write your **Name and Roll No.** in the space provided at the bottom of this sheet.

#### (B) FILLING IN THE OMR SHEET

5. On the OMR sheet, **write in ink** your Name, Roll No., name of the centre and put your signature in the appropriate boxes.
6. Every question has **four choices** for its answer (A), (B), (C) & (D). Only **one** of them is the right answer.
7. On the OMR sheet, for each question number, darken **only one** bubble with pen only corresponding to what you consider to be the most appropriate answer.

#### (C) MARKING SCHEME

8. (i) You will be awarded **4 marks** if you have darkened the bubble corresponding to the right answer.  
(ii) In case you have darkened the wrong bubble, **1 mark will be deducted** for that response. **There is NEGATIVE MARKING for all incorrectly marked responses.**

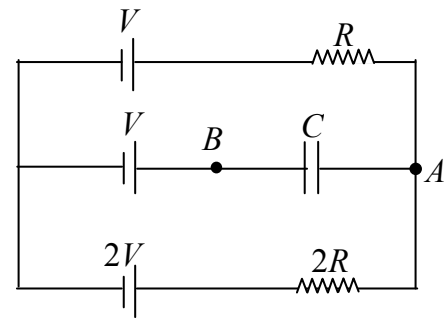
**Name of the Candidate** :

**Roll Number** :

**Date of Examination** :      **Centre:**

**SECTION – (A) PHYSICS**

1. In the given circuit as shown in figure, with steady current, the potential difference across the capacitor must be  
 (a)  $V$  (b)  $V/2$   
 (c)  $V/3$  (d)  $2V/3$

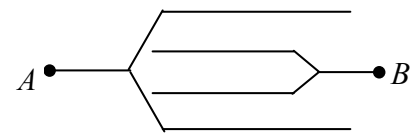


2. If electric field is given by  $\vec{E} = \left(\frac{1}{x^2}\right)\hat{i}$  V/m, the potential difference between points  $x = 10$  cm and  $x = 20$  cm is  
 (a) 1 V (b) 2 V (c) 5 V (d) 10 V

3. Two concentric thin metallic spheres of radii  $R_1$  and  $R_2$  ( $R_1 > R_2$ ) bear charges  $Q_1$  and  $Q_2$  respectively. Then the potential at radius  $r$  between  $R_1$  and  $R_2$  will be

- (a)  $\left(\frac{Q_1 + Q_2}{r}\right) \frac{1}{4\pi\epsilon_0}$  (b)  $\left(\frac{Q_1}{R_1} + \frac{Q_2}{r}\right) \frac{1}{4\pi\epsilon_0}$   
 (c)  $\left(\frac{Q_1}{R_1} + \frac{Q_2}{R_2}\right) \frac{1}{4\pi\epsilon_0}$  (d)  $\left(\frac{Q_1}{R_2} + \frac{Q_2}{R_1}\right) \frac{1}{4\pi\epsilon_0}$

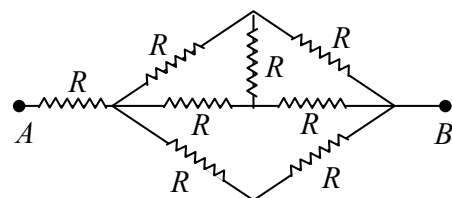
4. Four metallic plates each with a surface area of one side  $A$ , are placed at a distance  $d$  from each other. The two outer plates are connected to one point  $A$  and the two other inner plates to another point  $B$  as shown in the figure. Then the capacitance of the system between  $A$  and  $B$  is



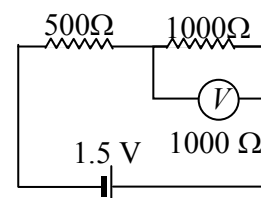
- (a)  $\frac{\epsilon_0 A}{d}$  (b)  $\frac{2\epsilon_0 A}{d}$  (c)  $\frac{3\epsilon_0 A}{d}$  (d)  $\frac{4\epsilon_0 A}{d}$

5. In the network of resistances as shown in figure, the effective resistance between points  $A$  and  $B$  is

- (a)  $8R$  (b)  $5R$   
 (c)  $(5/3)R$  (d)  $(8/3)R$

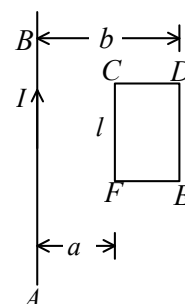


6. The resistances  $500\ \Omega$  and  $1000\ \Omega$  are connected in series with a battery of  $1.5\ \text{V}$ . The voltage across the  $1000\ \Omega$  resistance is measured by a voltmeter having a resistance of  $1000\ \Omega$ . The reading in the voltmeter would be
- (a)  $1.5\ \text{V}$  (b)  $1.0\ \text{V}$   
 (c)  $0.75\ \text{V}$  (d)  $0.5\ \text{V}$

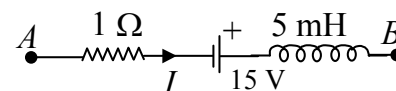


7. A milliammeter of range  $10\ \text{mA}$  has a coil of resistance  $1\ \Omega$ . To use it as an ammeter of range  $1\ \text{A}$ , the required shunt must have a resistance of
- (a)  $\frac{1}{101}\ \Omega$  (b)  $\frac{1}{100}\ \Omega$  (c)  $\frac{1}{99}\ \Omega$  (d)  $\frac{1}{9}\ \Omega$

8. The long straight wire  $AB$  in the figure carries a current  $I$ . The total flux through the rectangle  $CDEF$  is



- (a)  $\frac{\mu_0 I l}{2\pi} \log_e \frac{b}{a}$  (b)  $\frac{\mu_0 I a}{2\pi b}$   
 (c)  $\frac{\mu_0 I b}{2\pi a}$  (d)  $\frac{\mu_0 I l}{2\pi a b}$
9. The network shown in the figure is part of a complete circuit. If at a certain instant, the current  $I$  is  $5\ \text{A}$ , and is decreasing at a rate  $10^3\ \text{A/s}$  then  $V_B - V_A$  is
- (a)  $20\ \text{V}$  (b)  $15\ \text{V}$   
 (c)  $10\ \text{V}$  (d)  $5\ \text{V}$



10. Flux  $\phi$  (in weber) in a closed circuit of resistance  $10\ \text{ohm}$  varies with time  $t$  (in sec) according to the equation  $\phi = 6t^2 - 5t + 1$ . What is the magnitude of the induced current at  $t = 0.25\ \text{s}$ ?
- (a)  $1.2\ \text{A}$  (b)  $0.8\ \text{A}$  (c)  $0.6\ \text{A}$  (d)  $0.2\ \text{A}$
11. The equation of an alternating voltage is  $E = 220 \sin(\omega t + \pi/6)$  and the equation of the current in the circuit is  $I = 10 \sin(\omega t - \pi/6)$ . What is the impedance of the circuit?
- (a)  $22\ \Omega$  (b)  $20\ \Omega$  (c)  $18\ \Omega$  (d)  $17\ \Omega$
12. Two capacitors of capacitance  $3\ \mu\text{F}$  and  $6\ \mu\text{F}$  are charged to a potential of  $12\ \text{V}$  each. They are now connected to each other, with the positive plate of one to the negative plate of the other. The potential difference across  $3\ \mu\text{F}$  is
- (a) zero (b)  $3\ \text{V}$  (c)  $4\ \text{V}$  (d)  $6\ \text{V}$

**SECTION – (B) CHEMISTRY**

13. A  $0.1\ \text{M}$   $\text{NaCl}$  solution is found to be isotonic with  $1.10\%$  of urea solution at  $27^\circ\text{C}$ . The degree of dissociation of  $\text{NaCl}$  for this solution will be
- (a)  $60\%$  (b)  $70\%$  (c)  $80.4\%$  (d)  $83.3\%$
14. Pressure cooker reduces cooking time because
- (a) The heat is more evenly distributed inside the cooker  
 (b) A large flame is used (c) Boiling point of water is elevated  
 (d) Whole matter is converted to steam
15. Number of faradays required to produce one equivalent of  $\text{Ca}$  from molten  $\text{CaCl}_2$  is
- (a)  $1$  (b)  $2$  (c)  $4$  (d)  $+4$
16. Molar conductance of an electrolyte can be increased by

- (a) Increasing the amount of salt      (b) Increasing the amount of water  
 (c) Decreasing the temperature      (d) Increasing the pressure
17. Which of the following is true for the reaction  $N_2 + 3H_2 \longrightarrow 2NH_3$
- (a)  $\frac{d[N_2]}{dt} = 3 \frac{d[H_2]}{dt}$       (b)  $-\frac{d[N_2]}{dt} = +\frac{1}{3} \frac{d[H_2]}{dt}$   
 (c)  $-\frac{2}{3} \frac{d[H_2]}{dt} = +\frac{d[NH_3]}{dt}$       (d)  $-3 \frac{d[H_2]}{dt} = 2 \frac{d[NH_3]}{dt}$
18.  $t_{1/2}$  of first order reactions is given by  $\frac{0.693}{k}$ ,  $t_{3/4}$  would be equal to
- (a)  $\frac{0.693}{k}$       (b)  $\frac{0.346}{k}$       (c)  $\frac{1.386}{k}$       (d)  $\frac{0.924}{k}$
19. A graph of  $\ln k$  vs  $\left(\frac{1}{T}\right)$  has slope equal to
- (a)  $+\frac{E_a}{2.303R}$       (b)  $+\frac{E_a}{R}$       (c)  $-\frac{E_a}{2.303R}$       (d)  $-\frac{E_a}{R}$
20. The rate constant for a first order reaction is  $1 \times 10^{-2} \text{ s}^{-1}$ . The concentration of the reactants would be reduced from 1 mole to 0.25 mole in
- (a)  $10^2$       (b) 69.3 sec      (c)  $0.5 \times 10^2 \text{ sec}$       (d) 138.6 sec
21. Lanthanoids are
- (a) 14 elements in the sixth period (atomic no. = 58 to 71) that are filling  $4f$  sublevel  
 (b) 14 elements in the seventh period (atomic no. = 58 to 71) that are filling  $4f$  sublevel  
 (c) 14 elements in the sixth period (atomic no. = 90 to 103) that are filling  $4f$  sublevel  
 (d) 14 elements in the seventh period (atomic no. = 90 to 103) that are filling  $4f$  sublevel
22. The lanthanide contraction is responsible for the fact that
- (a) Zr and Y have about the same radius  
 (b) Zr and Nb have similar oxidation state  
 (c) Zr and Hf have about the same radius  
 (d) Zr and Zn have the same oxidation state
23. Of the following complex ions, the one which exhibits optical isomerism is:
- (a)  $\text{cis-}[Co(en)_2Cl_4]^-$       (b)  $[Co(NH_3)_4Cl_2]^+$   
 (c)  $[Co(NH_3)_2Cl_4]^-$       (d)  $\text{trans-}[Co(en)_2Cl_2]^+$
24. The crystal field-splitting for  $Cr^{3+}$  ion in octahedral field increases for ligands  $I^-, H_2O, NH_3, CN^-$  and the order is
- (a)  $I^- < H_2O < NH_3 < CN^-$       (b)  $CN^- < I^- < H_2O < NH_3$   
 (c)  $CN^- < NH_3 < H_2O < I^-$       (d)  $NH_3 < H_2O < I^- < CN^-$

**SECTION – (C) BIOLOGY**

25. Which structure in a flower is responsible for the development of the seed coat?

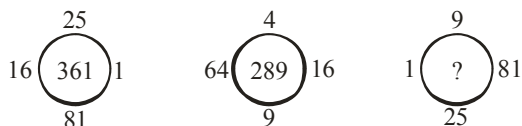
- (a) Integuments of the ovule      (b) Micropyle  
(c) Nucellus      (d) Funicle
26. Which of the following is true about the leading and lagging strands during DNA replication?
- (a) Both strands are synthesized continuously.  
(b) The leading strand is synthesized discontinuously.  
(c) The lagging strand is synthesized in Okazaki fragments.  
(d) The leading strand is synthesized in the 3' to 5' direction.
27. What is the role of microbes in bioremediation?
- (a) Enhancing soil fertility      (b) Degrading pollutants and toxins  
(c) Producing antibiotics      (d) Fermenting food products\
28. Which of the following statements about linkage is correct?
- (a) Linked genes are always located on different chromosomes.  
(b) Linked genes show independent assortment.  
(c) The closer two genes are on a chromosome, the higher the probability of recombination.  
(d) Linked genes are usually inherited together because they are close to each other on the same chromosome.
29. Which of the following processes occurs during post-transcriptional modification in eukaryotes?
- (a) Splicing of introns      (b) Addition of a 5' cap  
(c) Addition of a poly-A tail      (d) All of the above
30. Which type of mutation involves the insertion or deletion of a nucleotide that changes the reading frame of the genetic code?
- (a) Point mutation      (b) Missense mutation  
(c) Frameshift mutation      (d) Silent mutation
31. Which component of the lac operon is responsible for producing the repressor protein?
- (a) Promoter      (b) Operator  
(c) Structural genes      (d) Regulatory gene
32. What is the role of the middle layer in the anther's structure?
- (a) To produce pollen      (b) To support the anther during dehiscence  
(c) To nourish the developing pollen  
(d) To aid in the formation of the endothecium
33. In human, the unpaired male reproductive structure is
- (a) Testis      (b) Seminal vesicle  
(c) Bulbourethral gland      (d) Prostate gland
34. Secretion of progesterone by corpus luteum is initiated by
- (a) MSH      (b) LH  
(c) Testosterone      (d) Thyroxine
35. The non-medicated IUD is
- (a) Copper T      (b) Progestasert  
(c) Lippes loop      (d) LNG-20'

36. ZIFT is transfer of  
 (a) Zygote intra fallopian tube (b) Embryo into uterus  
 (c) Mixture of sperm and ova into fallopian tube  
 (d) Mixture of sperm and ova into uterus
37. BCG vaccine is a preventive measure against  
 (a) Tuberculosis (b) Typhoid  
 (c) AIDS (d) Cholera
38. Full form of MALT is  
 (a) Macrophages associated lymphoid tissue  
 (b) Macrophages associated lymphoid tumor  
 (c) Mucosa associated lymphoid tumor  
 (d) Mucosa associated lymphoid tissue
39. Presence of gill slits in the embryos of all vertebrates supports the theory of  
 (a) Organic evolution (b) Biogenesis  
 (c) Metamorphosis (d) Recapitulation
40. Analogous organs have  
 (a) Different origin but similar functions  
 (b) Common origin and common functions  
 (c) Different origin and different functions  
 (d) Common origin but different function

**SECTION – (D) APTITUDE**

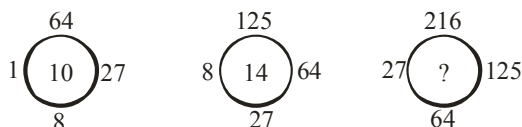
**Direction (Q. No. 41 – 42):** In each of the following circles, the first two circles show some operation on numbers around it and the result is given inside the circle. Based on these operations third circle is given find the inside number marked with (?).

41.



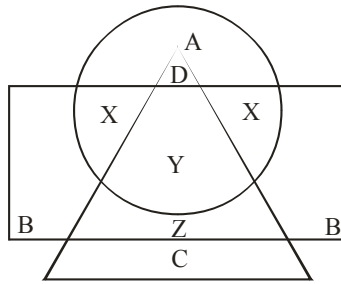
- (a) 260 (b) 269 (c) 324 (d) 429

42.



- (a) 2 (b) 9 (c) 17 (d) 18

**Directions: (Q. No. 43 – 46):** In the following diagram, the circle represents College, Professors, the triangle stands for Surgical Specialists, and Medical Specialists are represented by the rectangle:



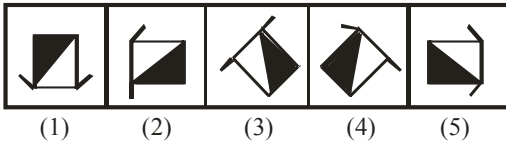
43. College Professors who are also Surgical Specialists are represented by  
 (a) A (b) B (c) C (d) D
44. Surgical Specialists who are also Medical Specialists but not Professors are represented by  
 (a) B (b) C (c) X (d) Z
45. C represents  
 (a) Medical Specialists (b) College Professors  
 (c) Surgical Specialists (d) Medical and Surgical Specialists
46. B represents  
 (a) Professors who are neither Medical nor Surgical Specialists  
 (b) Professors who are not Surgical Specialists  
 (c) Medical Specialists who are neither Professors nor Surgical Specialists  
 (d) Professors who are not Medical Specialists
47. If C denotes +, D denotes  $\times$ , E denotes  $\div$  and F denotes  $-$ , then which of the following statement is true?  
 (a)  $3 F 4 D 2 C 6 E 3 = 1\frac{1}{3}$  (b)  $3 C 16 E 4 F 2 D 9 = -11$   
 (c)  $16 E 9 C 2 D 5 F 4 = 1\frac{1}{3}$  (d)  $1 F 2 F 4 C 3 D 4 = 11$
48. If 'Ring' is called 'Necklace', 'Necklace' is called a 'Chain' is called 'Earring' and 'Earring' is called 'Wrist-band', which of the following would be worn in the finger?  
 (a) Ring (b) Necklace  
 (c) Wrist-band (d) Earring
49. If 'Book' is called 'Watch', 'Watch' is called 'Bag', 'Bag' is called 'Dictionary' and 'Dictionary' is called 'Window', which is used to carry the books?  
 (a) Dictionary (b) Bag  
 (c) Book (d) Watch
50. In a certain code language, 'sup na kol' means 'Fruit is good', 'Kol so hir' means 'Tree is tall' and 'Sup zp yop' means 'Eat good food', which of the following means fruit in that language?  
 (a) Sup (b) Na  
 (c) Kol (d) None of these

**Directions: (Q. No. 51 – 53): Each of the following questions consists of five figures marked A, B, C, D and E called the Problem Figures followed by five other figures marked 1, 2,**

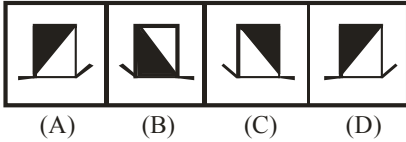


**3 and 4 called the Answer Figures. Select a figure from amongst the Answer Figures which will continue the same series as established by the five Problem Figure.**

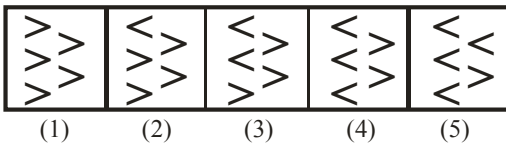
**51. PROBLEM FIGURES**



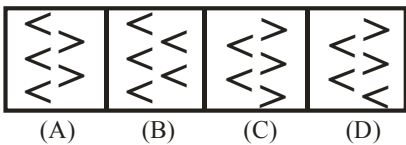
**ANSWER FIGURES**



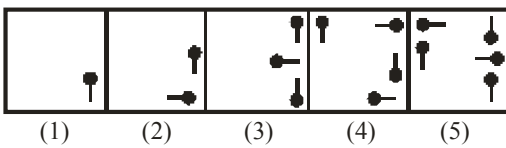
**52. PROBLEM FIGURES**



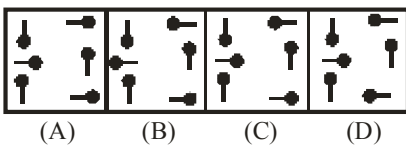
**ANSWER FIGURES**



**53. PROBLEM FIGURES**



**ANSWER FIGURES**



54. If GONE is written as ILPB, CRIB may then be written as

- (a) EYKO
- (b) EUKY
- (c) EKUY
- (d) EOKY

55. If LPPHGLDWH is written as IMMEDIATE, then, WRSVHFUHW may be written as

- (a) TOP SECRET
- (b) SACRIFICE
- (c) ROUND FIRE
- (d) TABLE HOOK

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**ANSWER KEY | SAMPLE PAPER (MED)****Standard XII (Moving to Standard XII Pass) • (Code : EM-SP)**

- |         |         |         |
|---------|---------|---------|
| 1. (c)  | 20. (d) | 39. (d) |
| 2. (c)  | 21. (a) | 40. (a) |
| 3. (b)  | 22. (c) | 41. (c) |
| 4. (b)  | 23. (a) | 42. (d) |
| 5. (d)  | 24. (a) | 43. (d) |
| 6. (c)  | 25. (a) | 44. (d) |
| 7. (c)  | 26. (c) | 45. (c) |
| 8. (a)  | 27. (b) | 46. (c) |
| 9. (b)  | 28. (d) | 47. (b) |
| 10. (d) | 29. (d) | 48. (b) |
| 11. (a) | 30. (c) | 49. (a) |
| 12. (c) | 31. (d) | 50. (b) |
| 13. (d) | 32. (b) | 51. (c) |
| 14. (c) | 33. (d) | 52. (b) |
| 15. (a) | 34. (b) | 53. (c) |
| 16. (b) | 35. (c) | 54. (d) |
| 17. (c) | 36. (c) | 55. (a) |
| 18. (c) | 37. (a) |         |
| 19. (d) | 38. (d) |         |