

Test Booklet Serial No.

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Total Number of Pages : 32

Number of Questions : 100

ESMC

Time Allowed : 3 Hours

Max. Marks : 400

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1. Each question carries 4 marks. For each correct response the candidate will get 4 marks. For each incorrect answer one mark will be deducted.
2. Use only HP Pencil for darkening the appropriate circle completely.
For Example : B C D
3. Rough work is to be done only on the Test Booklet and not on the answer sheet.
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7. At the end of the examination hand over the answer sheet (ORS) to the invigilator. However, the candidate can take away the test booklet after completion of examination.
8. Count the pages of the booklet on receipt. If any defect is found in the booklet ask the invigilator to provide a fresh copy.
9. Candidate may kind ensure that serial number of Test Booklet and ORS is same.
10. Only Numerical Part of Roll No. is to be entered on the OMR.

1. Which one of the following is false for a graph G with n vertices and e edges ?
- (A) If G is a tree, then $e = n - 1$
- (B) If $e = n - 1$, then G is a tree
- (C) If G is connected and has no circuits, then G is a tree
- (D) If G is tree, then G is connected and has no circuits
2. The Koenigsburg bridge problem has no solution because the underlying graph has :
- (A) Odd degree for all vertices
- (B) Hamiltonian circuit
- (C) A decomposition into disjoint circuits
- (D) Even number of vertices
3. A simple graph has six edges and five vertices. If the degree of each vertex is either 2 or 3, then the number of vertices of degree 2 is :
- (A) 1
- (B) 2
- ~~(C) 3~~
- (D) 4

4) The function

$$f(x) = \begin{cases} x, & x \text{ is rational} \\ 0, & x \text{ is irrational} \end{cases}$$

is

- ~~(A)~~ Continuous at all points in \mathbb{R}
- (B) Continuous nowhere
- (C) Continuous only at $x = 0$
- (D) Continuous at all rational x

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5. Then n^{th} derivative of xe^x is :

(A) $(x+n)e^x$

(B) $nx e^x$

(C) $x^n e^x$

(D) xe^{nx}

6. The Taylor series of $e^x \cos x$ is :

(A) $1 + x + \frac{x^3}{3} + \frac{x^4}{6} + \dots$

(B) $1 + x + \frac{x^2}{2} + \frac{x^3}{3} + \dots$

(C) $1 + x - \frac{x^3}{3} - \frac{x^4}{6} + \dots$

(D) $1 + x - \frac{x^2}{2} - \frac{x^3}{3} + \dots$

7. If a differentiable function $f: [0, 5] \rightarrow \mathbb{R}$ vanishes at $x = 0, 1, 2, 3, 4, 5$ then the equation $f'(x) = 0$ has :

(A) Exactly one solution

(B) No solution

(C) Five or more solutions

(D) Exactly six solutions

8. Which one of the following is countable ?

(A) $\mathbb{R} \setminus \mathbb{Q}$

(B) $\mathbb{Q} \setminus \mathbb{Z}$

(C) $\mathbb{R} \setminus \mathbb{Z}$

(D) $\mathbb{R} \setminus \mathbb{N}$

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Which one of the following is false in general ?

- (A) Monotonically increasing bounded sequence converges
- (B) Monotonically decreasing bounded sequence converges
- (C) Convergent monotone sequence is bounded
- (D) Monotonically increasing sequence is bounded

10. Consider the sequence of function $f_n : [0, 1) \rightarrow \mathbb{R}$ defined by $f_n(x) = \frac{1}{nx+1}$ ($n = 1, 2, 3, \dots$). Then

- (A) $\langle f_n \rangle$ does not converge
- (B) $\langle f_n \rangle$ converges but not uniformly
- (C) $\langle f_n \rangle$ converges uniformly
- (D) $\langle f_n \rangle$ converges monotonically and uniformly

11. The radius of convergence of the series $\sum_{n=0}^{\infty} \frac{x^n}{2^{n+1}}$ is :

- (A) 0
- (B) 1
- (C) 2
- (D) ∞

12. The series $\sum_{n=1}^{\infty} \frac{(-1)^n}{n}$ converges to :

- (A) $\log 2$
- (B) $-\log 2$
- (C) 0
- (D) $\pi/2$

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13. The set of natural numbers $\mathbb{N} = \{1, 2, 3, \dots\}$:
- (A) Is not closed under addition
 - (B) Has no identity element for multiplication
 - (C) Is commutative under both addition and multiplication
 - (D) Is a group under multiplication
14. The identity element in the group of positive rational numbers under the binary operation :

$$a * b = \frac{ab}{2}$$

is :

- (A) 0
 - (B) 1
 - (C) 2
 - (D) $\sqrt{2}$
15. Lagrange theorem is the following statement about a finite group G :
- (A) Order of an element divides order of G
 - (B) Order of any subgroup divides order of G
 - (C) Sum of orders of elements in G the order of G
 - (D) Order of G equals order of identity element
16. If H_1, H_2 are subgroups of a group G , then :
- (A) $H_1 \cup H_2$ is a subgroup of G
 - (B) $H_1 \cap H_2$ is a subgroup of G
 - (C) $H_1 \setminus H_2$ is a subgroup of G
 - (D) $H_1 H_2$ is a subgroup of G

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17. Let H be a subgroup of a group G . Then G/H is defined except possibly when :

- (A) G is abelian
- (B) G is cyclic
- (C) G is a group of prime order
- (D) G is non-abelian

18. Which one of the following is not a ring with respect to usual addition and multiplication ?

- (A) The set of even integers
- (B) The set of integers which are multiple of 3
- (C) The set of positive integers
- (D) The set of integers

19. In the ring \mathbb{Z}_{10} , the divisor of 0 is :

- (A) 1
- (B) 2
- (C) 3
- (D) 7

20. Which one of the following is not a field ?

- (A) \mathbb{Z}_2
- (B) \mathbb{Z}_3
- (C) \mathbb{Z}_4
- (D) \mathbb{Z}_5

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21. The remainder of 8^{103} when divided by 13 is :
- (A) 2
 - (B) 3
 - (C) 4
 - (D) 5
22. The dimension of the vector space spanned by the vectors $\{(1, 0, 0), (1, 1, 1), (1, 2, 0)\}$ is :
- (A) 0
 - (B) 1
 - (C) 2
 - (D) 3
23. Consider the linear transformation $T(f) = \frac{d^3f}{dt^3}$ on the space V of all real polynomials in t . What is the kernel of T ?
- (A) $\{f \in V : \deg f \leq 1\}$
 - (B) $\{f \in V : \deg f \leq 2\}$
 - (C) $\{f \in V : \deg f \leq 3\}$
 - (D) $\{f \in V : \deg f \leq 4\}$
24. The linear transformation $T : \mathbb{R}^3 \rightarrow \mathbb{R}^3$ defined by $T(x, y, z) = (x+y, y, z)$ is :
- (A) One-to-one but not onto
 - (B) Onto but not one-to-one
 - (C) Both one-to-one and onto
 - (D) Neither one-to-one nor onto

25. Which one of the following is linearly independent?
- (A) $\{(0, 0, 0), (1, 1, 1)\}$
- (B) $\{(0, 1, 1), (0, 2, 2), (0, 3, 3)\}$
- (C) $\{(1, 0, 0), (0, 1, 0), (1, 1, 1)\}$
- (D) $\{(0, 1, 1), (0, 2, 2)\}$
26. The equation $ax^2 + 3xy + 2y^2 - 5x + 5y + c = 0$ represents two straight lines perpendicular to each other if:
- (A) $a = 2, c = -5$
- (B) $a = -2, c = 3$
- (C) $a = -3, c = 2$
- (D) $a = 3, c = -2$
27. Which one of the following equations represent a circle?
- (A) $(x - 1)(x - 2) + (y - 3)(y - 4) = 0$
- (B) $2x + 3y = 0$
- (C) $9x^2 + 4y^2 = 36$
- (D) $y^2 - 4(x - 9) = 0$
28. The length of the latus rectum of the parabola $9x^2 + 24xy + 16y^2 + 8x - 6y + 3 = 0$ is:
- (A) $2/5$
- (B) $1/5$
- (C) $3/5$
- (D) $5/2$

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29. In the hyperbola $4x^2 - 9y^2 = 36$, the eccentricity e and the latus rectum l are :

(A) $e = 1/3, l = 8/3$

~~(B)~~ $e = \sqrt{13}/3, l = 8/3$

(C) $e = 8/3, l = \sqrt{13}/3$

(D) $e = -8/3, l = -\sqrt{13}/3$

30. A particle is moving along the parabola $y^2 = 12x$ at the uniform rate of 10 cm/sec, then the component of velocity (in cm) parallel to x-axis when the particle is at the point (3, 6) is :

(A) $5\sqrt{2}$

(B) $3\sqrt{2}$

(C) $2\sqrt{3}$

(D) $5\sqrt{3}$

31. The tangent to the curve ~~$y^2 = x(2-x)^2$~~ at (1, 1) meets the curve ~~again~~ at a point whose abscissa is :

~~(A)~~ $\frac{9}{4}$

~~(B)~~ $\frac{9}{2}$

(C) $\frac{3}{4}$

(D) $\frac{3}{2}$

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32. Let G be the set 3×3 matrices having integer entries and a nonzero determinant. Then, under matrix multiplication, G is :
- (A) A group
 (B) Not a group because closure property gets violated
 (C) Not a group because inverse of an element does not exist in it
 (D) Not a group because the identity element is not present in it
33. For which one of the following groups, the converse of Lagrange's Theorem is not generally satisfied ?
- (A) ~~Permutation~~ group S_4
 (B) All abelian groups
 (C) All groups of order 8
 (D) All groups of order 12

34. Let $G = \left\{ \begin{pmatrix} 1 & 0 & 0 \\ x & 1 & 0 \\ y & z & 1 \end{pmatrix} : x, y, z \in \mathbb{Z}_3 \right\}$, where \mathbb{Z}_3 denotes integer modulo 3. Then,

which of the following statement is NOT TRUE in group G ?

- (A) G is not an abelian group
 (B) ~~Order~~ of each element in G is 3
 (C) Order of G is 27
 (D) There exists $A, B \in G$ such that $(AB)^4 \neq A^4B^4$

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35. Which of the following statement is NOT TRUE for the polynomial $f(x) = x^2 + x + 1$?

- (A) It is irreducible over the field of integer modulo 2
- (B) It is reducible over the field of integers mod 3
- (C) It is reducible over the field of integers mod 5
- (D) It is reducible over the field of integers mod 7

36. The partial differential equation $\frac{\partial w}{\partial t} + \frac{\partial^2 w}{\partial x^3} - w \frac{\partial w}{\partial x} = 0$ is:

- (A) Nonlinear and first order
- (B) Nonlinear and third order
- (C) Linear and third order
- (D) Linear and first order

37. Consider the two differential equations

$$(D_1) x^2 + xy + (y^2 - xy)y' = 0, \quad (D_2) ye^{xy} - 2x + (xe^{2xy} + \cos y)y' = 0.$$

Statement I : (D_1) is exact.

Statement II : (D_2) is not exact.

Then :

- (A) Both statements are false
- (B) Both statements are true
- (C) Only statement I is true
- (D) Only statement II is true

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38. The value of $\left(\frac{1 + \sin\left(\frac{\pi}{8}\right) + i \cos\left(\frac{\pi}{8}\right)}{1 + \sin\left(\frac{\pi}{8}\right) - i \cos\left(\frac{\pi}{8}\right)} \right)^8$ is :

- (A) i
- (B) $-i$
- (C) -1
- (D) 1

39. If $(\sqrt{3} + i)^{100} = 2^{99}(a + ib)$, then $a^2 + b^2$ is equal to :

- (A) 1
- (B) 2
- (C) 3
- (D) 4

40. The locus of $z = x + iy$ satisfying $\left| \frac{z+1}{z-1} \right| = \sqrt{5}$, $z \neq 1$, is a circle with :

- (A) Center $(1.5, 0)$ and radius $\sqrt{3.5}$
- (B) Center $(1.5, 0)$ and radius 1
- (C) Center $(0, 1.5)$ and radius $\sqrt{3.5}$
- (D) Center $(0, 1.5)$ and radius 1

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41. Let $f : \mathbb{R} \rightarrow \mathbb{R}$ be given by

$$f(x) = \begin{cases} \frac{x}{x+1} & x \geq 0 \\ \frac{x}{1-x} & x < 0 \end{cases}$$

Then, which of the following statement is NOT TRUE ?

- (A) f is continuous
- (B) f is unbounded
- (C) $f(x) = 0$ has a unique solution
- (D) f is monotonically increasing

42. The area (in sq. units) of the region described by the set

$$A = \{(x, y) \in \mathbb{R}^2 : y \leq 2, y \geq |x - 2|\}, \text{ is :}$$

- (A) 1
- (B) 2
- (C) 4
- (D) 8

43. If the normal at one end of the latus rectum of the ellipse $\frac{x^2}{8} + \frac{y^2}{b^2} = 1$ passes through the extremity of its minor axis, then b^2 is equal to :

- (A) $3 - \sqrt{5}$
- (B) $6 - \sqrt{5}$
- (C) $2(3 - \sqrt{5})$
- (D) $4(3 - \sqrt{5})$

44. The directional derivative of $f(x, y, z) = x^2y - y^2z - xyz$ at the point $(1, -1, 0)$ in the direction given by $\hat{i} - \hat{j} + 2\hat{k}$ is :

(A) $-\sqrt{6}$

(B) $-\frac{\sqrt{6}}{2}$

(C) -3

(D) $\frac{\sqrt{6}}{2}$

45. The equation of the tangent plane to the surface $z = \sqrt{x^2 + y^2}$ at the point $(3, 4, 5)$ is :

(A) $3x + 4y - 5z = 0$

(B) $2x + y - 2z = 0$

(C) $7x + 6y - 9z = 0$

(D) $4x + 7y - 8z = 0$

46. Let $M(n, \mathbb{R})$ be the vector space of $n \times n$ matrices with real entries and $W = \{(a_{ij}) \in M(n, \mathbb{R}) : a_{11} + a_{22} + \dots + a_{nn} = 0\}$ be a subspace of $M(n, \mathbb{R})$. Then, dimension of W is :

(A) $n^2 - n$

(B) $n - 1$

(C) $n^2 - 1$

(D) $2n - 1$

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47. The length of the minor axis of the ellipse $2x^2 + 2xy + 2y^2 = 1$ is :

(A) $\frac{1}{3}$

(B) $\frac{2}{\sqrt{3}}$

(C) $\frac{2}{3}$

(D) $\frac{1}{\sqrt{3}}$

48. Which among the following is possible in a planar connected graph $G = (V, E)$?

(A) 5 components, 30 vertices, 20 edges

(B) 3 components, 20 vertices, 16 edges

(C) 6 vertices, 13 edges and more than one component

(D) 7 vertices, 10 edges and more than two components

49. The number of nodes in a complete graph with 720 distinct Hamilton circuits is:

(A) 6

(B) 7

(C) 8

(D) 9

50. The general solution of the partial differential equation $2yzp + zxq = 3xy$, where

$$p = \frac{\partial z}{\partial x} \text{ and } q = \frac{\partial z}{\partial y}, \text{ is :}$$

- (A) $3y^2 - z^2 = f(x^2 + 2y^2)$
 (B) $3y^2 + z^2 = f(x^2 + 2y^2)$
 (C) $3y^2 - z^2 = f(x^2 - 2y^2)$
 (D) $3y^2 + z^2 = f(x^2 - 2y^2)$

Direction for Q.51 – Q55 : Choose the correct sentences out of the given sentences.

51. (A) The Bank's fortunes seem to be in the wane.
 (B) She railed on him for his laziness.
 (C) Let me know whether she is on a level.
 (D) He was one of those who was punished.
52. (A) These are mine books.
 (B) It is a favorite place of their.
 (C) It is their favorite place.
 (D) You ought to be ashamed of self.
53. (A) She said that she will meet me now.
 (B) He told me the she would meet me today.
 (C) I said Alice might come today.
 (D) Sushma said that she can sing well.

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54. (A) Do not hinder me from doing this.
(B) Radha was married with Raja.
(C) Let him cover his face by his shawl.
(D) You were walking into the garden.
55. (A) They live in Aligarh. ✓
(B) They live at Calcutta.
(C) Many people died from starvation.
(D) I am proud of our culture.

Direction for Q.56 – Q.60 : Read following passage and based on it give the best possible answer to the questions.

Imagination shows itself when a child is still very young. This is the age of make-believe when children like to hear stories of impossible things such as magic carpets which carry their owners wherever they want to go, talking animals, &c. At this stage they have great difficulty in seeing any difference between real thing and imagined things, due to lack of experiences (sensations). A good teacher will not mistake this imagination for real lying, but will watch carefully for any tendency for it to develop that way, e.g.,

- (a) One asks a child if he took food from the kitchen, and he says, 'No, I did not,' although the food still shows around his mouth. *That is lying.*
- (b) One asks a child if he has seen one's pencil anywhere, and he, trying to be helpful, says, 'I think I saw a dog running away with it.' *That is imagination.*

Later, when children have had more experiences, they—particularly boys—tend to regard such make-believe stories as babyish, and profess to show a fine scorn for them. They want exciting stories of hunting, of brave men and women, and the like.

This is the ideal time to present to them, in an interesting way, History, Geography, and Literature: stories of people, their way of living, how they get their food, what their ancestors did, and great adventures of the past. The approach through facts and figures and dates will kill the natural interest provided by the development of their imagination. The teacher who knows a little about the working of the mind will not make this mistake. Much of the dislike for History and Geography that one often meets in children is due to the dull, plodding way in which many teachers tackle these subjects. They can be made very exciting.

56. When children are _____ they like to hear stories of impossible things.
- (A) Young
(B) ✓ Very young
(C) Grow up
(D) 8-10 years
57. The difficulty in seeing the difference between real and imagined things is due to :
- (A) Lack of understanding
(B) Lack of adventure
(C) ✓ Lack of experience
(D) Lack of imagination
58. The meaning of the word 'scorn' in the text is :
- (A) Reject
(B) Accept
(C) Snub
(D) Legal

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59. One hates History subject as it is.:

- (A) Not taught properly
- (B) Difficult to memorize the lessons
- (C) Has volumeness books
- (D) Has tough language

60. What is the best title of the paragraph ?

- (A) Experience
- (B) Imagination
- (C) Children
- (D) Skittle

61. If $a = 1$, $b = 0$, $c = 5$

What is the value of the expression $a \&\& b || c$?

- (A) 5
- (B) 6
- (C) 7
- (D) 0

62. Which of the following is not a logical operator ?

- (A) `||`
- (B) `!=`
- (C) `==`
- (D) `=`

63. How many times will the following loop execute ?

```
while(1)
    { printf("%d", 1);}
```

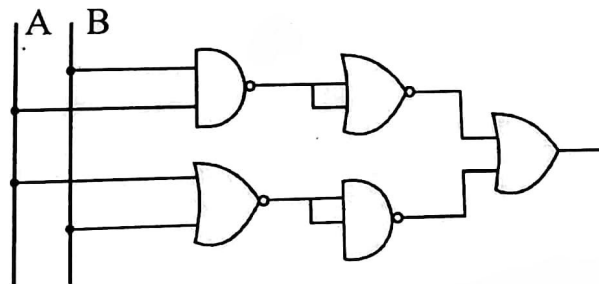
- (A) 0 time
- (B) 1 time
- (C) Infinite time
- (D) Finite time

64. What is the output of the following operation in C language ?

```
128 << 1
```

- (A) 16
- (B) 32
- (C) 64
- (D) 0

65. What is the output of the following circuit ?



- (A) $A + B$
- (B) AB
- (C) $\bar{A} + \bar{B}$
- (D) $\bar{A} \cdot \bar{B}$

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66. What will be the output of the following program code segment ?

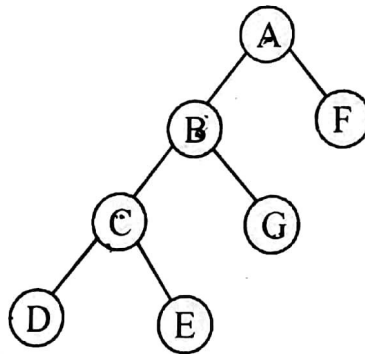
```
int x = 100;  
int *y = &x, **w = &y, ***z = &w;  
printf("%d", z[0][0][0]);
```

- (A) 10
- (B) 20
- (C) 100
- (D) None of the above

67. Which one of the following is not correct ?

- (A) Memory address + Number = Memory Address
- (B) Memory address1 + Memory address2 = Memory address3
- (C) Memory address1 * Memory address2 = Memory address3
- (D) Memory address - Number = Memory address

68. - Post order traversal of the Binary tree :



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

69. In the 2's complement system the number -45 is represented as :
- (A) 11010010
 - (B) 10101101
 - (C) 11010011
 - (D) 10101101
70. Hexadecimal representation of
11100010101011
- (A) 17 AC
 - (B) 83 AB
 - (C) 71 AC
 - (D) 38 AB
71. If KEDGY is coded as EKDYG then how will LIGHT be coded ?
- (A) ILHTG
 - (B) ILGHT
 - (C) ILGTH
 - (D) THGIL
72. In the question given below one word is different from the rest. Find out the word which does not belong to the group ?
- (A) GTSH
 - (B) BYXC
 - (C) ETUF
 - (D) LONM

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73. If the numbers which are divisible by 4, from 4 to 84 are written in reverse order then which number will be at the 7th place ?

- (A) 60
- (B) 28
- (C) 20
- (D) 32

74. Which conclusion on the basis of given statements is logically valid ?

Statements : All labourers are wrestlers.
All grocers are labourers.

Conclusions : I. All grocers are wrestlers.
II. Some wrestlers are grocers.
III. Some wrestlers are labourers.
IV. Some labourers are grocers.

- (A) All
- (B) Only I and IV
- (C) Only IV
- (D) Only II and III

75. If + means \div , \div means $-$, $-$ means \times and \times means $+$, then :

$$64 + 8 \div 6 - 4 \times 2 = ?$$

- (A) 34
- (B) 16
- (C) -14
- (D) 24

76. **Statement** – Training must be given to all the employees for increasing productivity and profitability.

Assumptions :

- I. Training is essential component of productivity.
- II. Employees can't function effectively without proper training.
- III. Profitability and Productivity are supplementary to each other.

- (A) None is implicit
- (B) All are implicit
- (C) Only III is implicit
- (D) Either I or II is implicit

77. **Danger** always involves :

- (A) Help
- (B) Attack
- (C) ~~Fear~~
- (D) Enemy

78. A man sold a chair and a table together for Rs. 1520 thereby making a profit of 25% on the chair and 10% on table. By selling them together for Rs. 1535, he would have made a profit of 10% on the chair and 25% on the table. The cost of a table is :

- (A) Rs. 500
- (B) Rs. 600
- (C) ~~Rs. 700~~
- (D) Rs. 800

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79. Manoj travels 600 km to his home partly by train and partly by car. He takes 8 hours if he travels 120 km by train and the rest by car. He takes 20 minutes longer if he travels 200 km by train and the rest by car. The speed of the car is :
- (A) 40 km/hr
(B) 60 km/hr
(C) 80 km/hr
(D) 100 km/hr
80. Rajan takes 3 hours more than Sanjay to walk 30 km. But, if Rajan doubles his pace, he is ahead of Sanjay by _____ hours when the ratio of speeds of Rajan and Sanjay is 2:3.
- (A) 1.5 hours
(B) 2 hours
(C) 2.5 hours
(D) 3 hours
81. Mohit and Sohan are friends and their ages differ by 2 years. Mohit's father Mf is twice old as Mohit and Sohan is twice as old as his sister Ss. The age of Mf and Ss differ by 40 years. The age of Sohan is :
- (A) 25 years 4 months
(B) 27 years 4 months
(C) 28 years 4 months
(D) 29 years 4 months

82. In a two digit number, the unit's digit is twice the ten's digit. If 27 is added to the number, the digits interchange their places. The number is :
- (A) 48
~~(B) 36~~
 (C) 24
 (D) 12
83. 90% and 97% pure acid solutions are mixed to obtain 21 liters of 95% pure acid solution. Find the amount of each type of acid to be mixed to form the mixture.
- (A) 6 litre, 15 litre
 (B) 8 litre, 20 litre
 (C) 10 litre, 25 litre
 (D) 12 litre, 20 litre
84. A man is engaged for 70 days. He is to receive Rs. 24 per day when he works but has to pay a fine of Rs. 6 for every day that he is absent. He receives altogether Rs. 1230. How many days he was absent ?
- (A) 5
 (B) 10
~~(C) 15~~
 (D) 20
85. Solve for x, $x = \frac{1}{1 - \frac{1}{2 - \frac{1}{2 - \frac{1}{2 - x}}}}$
- (A) 0.2
 (B) 0.3
 (C) 0.4
~~(D) None of the above~~

ESMC

86. The sum of all odd integers between 2 and 100 which are divisible by 3 is:

(A) 969

(B) 867

(C) 770

(D) 676

87. A golf ball has a diameter equal to 4.1 cm. Its surface has 150 dimples each of radius 2 mm. The total surface area exposed to the surroundings, assuming that the dimples are hemispherical, is :

(A) 68.72 sq cm

(B) 86.72 sq cm

(C) 71.68 sq cm

(D) 77.86 sq cm

88. Let r_1 and r_2 be the radii of the two solid metallic spheres and if they are melted into one solid sphere, then the radius of the new sphere is:

(A) $\sqrt[3]{r_1^3 + r_2^3}$

(B) $\sqrt[3]{r_1^2 + r_2^2}$

(C) $\sqrt{r_1^2 + r_2^2}$

(D) $\sqrt[3]{r_1^3 + r_2^3}$

ESMC

89. A solid metal sphere of 6 cm diameter is melted and a circular sheet of thickness 1 cm is prepared. The diameter of the sheet is :
- (A) 3 cm
 - (B) 6 cm
 - (C) 12 cm
 - (D) 15 cm
90. The 6th term of the series 1, 4, 11, 19, 29 is :
- (A) 35
 - (B) 45
 - (C) 55
 - (D) None of the above
91. If the second half of the series is written in the reverse order then which will be the 9th letter to the right of 7th letter from your left ?
- (A) Y
 - (B) Z
 - (C) P
 - (D) X
92. If SPANK is coded as PSNAK then how will THROW be coded ?
- (A) HTORW
 - (B) HTWOR
 - (C) HTWRO
 - (D) HTRWO

ESMC

93. In the question given below one word is different from the rest. Find out the word which does not belong to the group ?

- (A) BFD
- (B) NRP
- (C) HLG
- (D) QUS

94. As 'Football' is related to 'Field' in the same way, 'Tennis' is related to what ?

- (A) Court
- (B) Net
- (C) Field
- (D) Racket

95. In the series given below, which one of the alternatives will replace the question-mark (?) ?

HZF, IWH, K SJ, NNL, ?

- (A) SHM
- (B) RHN
- (C) THN
- (D) RGM

96. In the class of 40 students, if Sanju is at 30th place from one end, what is position from the other end ?

- (A) 9th
- (B) 12th
- (C) 10th
- (D) 11th

97. A person is walking with uniform speed and when he has completed half his journey, he increased his speed 20% and arrived at his destination. Last half part of his journey, he completed 30 minutes earlier than first half part of journey. How long was he walking the first half ?
- (A) 4 hours
(B) 3 hours 30 minutes
(C) 3 hours 15 minutes
(D) 3 hours
98. A man sold a chair and a table together for Rs. 1520, thereby making a profit of 25% on chair and 10% on table. By selling them together for Rs. 1535, he would have made a profit of 10% on chair and 25% on table. The cost of a chair and a table are :
- (A) Rs. 700 and Rs. 600 respectively
(B) Rs. 600 and Rs. 700 respectively
(C) Rs. 500 and Rs. 700 respectively
(D) Rs. 700 and Rs. 500 respectively
99. A fraction is such that if the numerator is multiplied by 2 and denominator is reduced by 5, we get $\frac{6}{5}$. But if the numerator is increased by 8 and the denominator is doubled, we get $\frac{2}{5}$. The fraction is :
- (A) $\frac{3}{10}$
(B) $\frac{2}{5}$
(C) $\frac{12}{25}$
(D) $\frac{6}{25}$
100. The Binomial coefficients ${}^n C_r$ satisfy $\sum_{r=0}^n {}^n C_r = k^n$ where k is equal to :
- (A) 2
(B) 3
(C) 4
(D) 5