MRET

Test Booklet Serial No. **2085**

> ## PLEASE DO NOT BREAK THE SEAL, UNTIL ASKED TO DO SO BY INVIGILATOR.

Number of Pages : 36

Time Allowed : 3 Hours

Number of Questions : 120

M. Marks : 480

Blank pages are available for rough calculations at the end of the Test Paper.

Do not use your own Blank Pages for Rough Work.

Use only **1** to **120** ovels in ORS Sheet for answering **1** to **120** questions.

Name of the Candidate ....

Roll No. .... *Signature of the Candidate's* ....

Center .... *Signature of the Invigilator* ....

SOME IMPORTANT INSTRUCTIONS TO THE CANDIDATES

1. **OPENING & CHECKING OF THE QUESTION PAPER BOOKLET AND ORS (OMR Response Sheet) :**

   Break open the seal of the Question Paper Booklet only when the announcement is made by the Invigilator. The ORS is placed inside the Booklet. After breaking the seal and before attempting the questions, candidate should immediately check for :

   (1) The number of the printed pages in the Question Paper Booklet is the same as mentioned on the cover page of the Booklet and printing error in the Booklet pages & ORS, if any, and

   (2) The serial number of the Question Paper Booklet and the ORS are same.

   Any discrepancy or error should be brought to the notice of the Invigilator who will then replace the Booklet/ORS. No additional time will be given for this. In no case should a candidate use an ORS which has a different serial number than the one given on the Booklet.

2. No candidate, without the special permission of the Superintendent, or the Invigilator concerned, is to leave his/her seat or the Examination Room until he/she is permitted by the Invigilator. It is the responsibility of the Candidate to handover the ORS and Question Paper Booklet to the Invigilator on duty and in no case candidate should leave the Hall without handing over their Question Paper Booklet and the ORS to the Invigilator on duty.

3. **Candidate found in possession of Cellular Phone/Mobile Phone/Cordless Phone/ Communication device/Pager/Scanner whether using or not using will be liable to be debarred for taking examination(s) either permanently or for a specified period or/and dealt with as per law or/and ordinance of the university according to the nature of offence, or/and he/she may be proceeded against and shall be liable for prosecution under the relevant provision of the Indian Penal Code.**

4. There will be negative marking for every wrong answer, (one mark will be deducted for each incorrect answer.)

5. Only numberic part of roll no. is to be entered in ORS.

1

:

2

Directions for the questions 1–2 :

A sentence or a part of a sentence followed by four alternatives words has been given. Select the word from the given alternatives which could substitute the same so as to communicate the same meaning.

1. A remedy for all diseases :

   (A) Panacea   (B) Antiseptic

   (C) Antibiotic   (D) Drug

2. To make a wrong interpretation of someone's words :

   (A) Misunderstand   (B) Misnomer
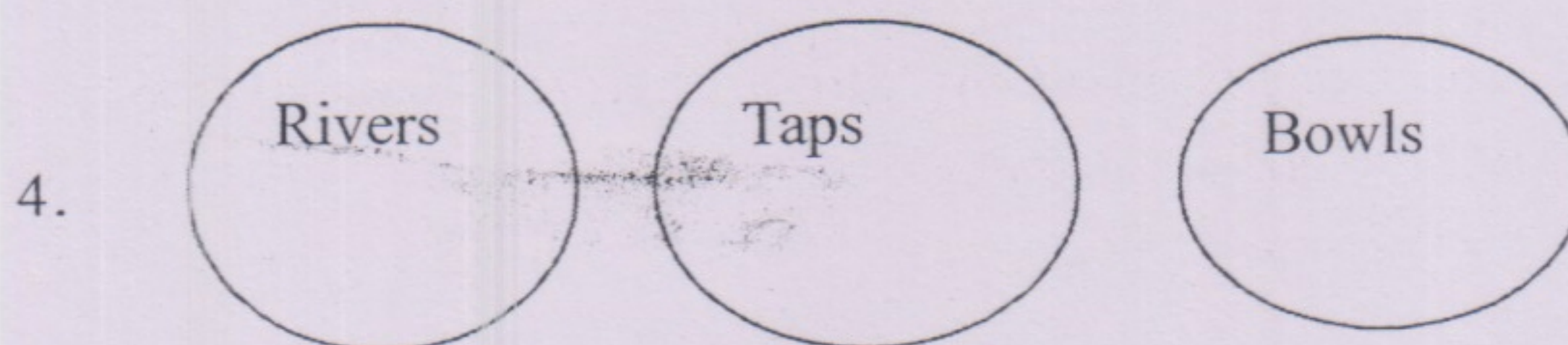
   (C) Mistake   (D) Misconstrue

Directions for the questions 3–4 :

Study the diagrams below and indicate which one of the choices gives the valid conclusion.

3.
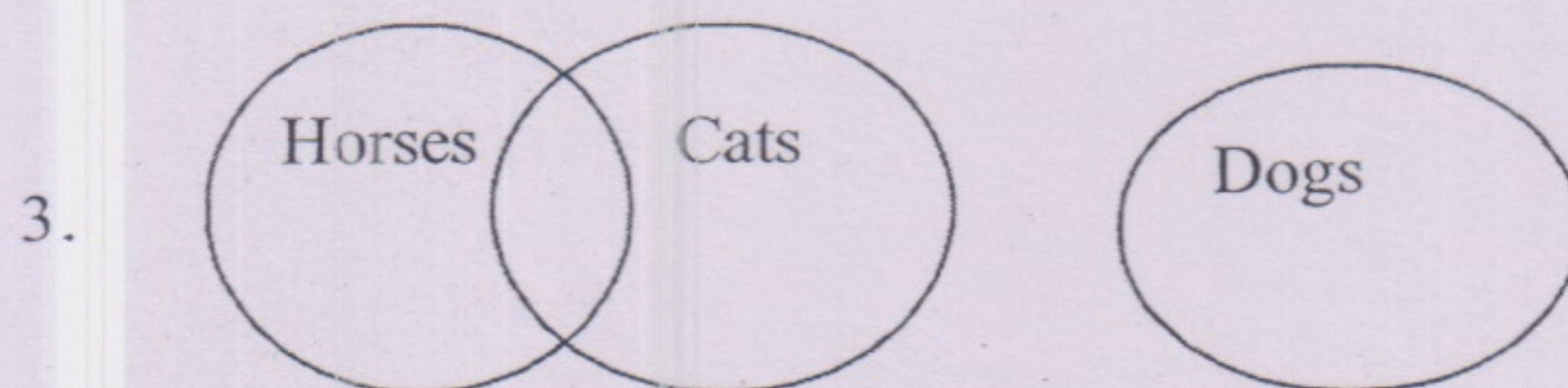
   (A) No Horses are Dogs.
       Some Cats are Horses.

   (B) All Horses are Cats.
       Some Cats are Dogs.

   (C) All Dogs are Horses.
       All Horses are Dogs.

   (D) Some Cats are Dogs.
       Some Dogs are not Horses.

3

4.

Rivers　　Taps　　Bowls

(A)　No Rivers are Taps.

　　　No Taps are Bowls.

(B)　All Rivers are Bowls.

　　　No Taps are Rivers.

(C)　No Bowls are Taps.

　　　All Bowls are Rivers.

(D)　Some Rivers are Taps.

　　　No Rivers are Bowls.

Directions for the questions 5–6 :

A word followed by four alternative words has been given. You are to select the alternative word which is almost opposite to the meaning of the word given in question.

5.　Collision :

(A)　Dissent　　　　　　　　(B)　Harmony

(C)　Conflict　　　　　　　　(D)　Admonish

6.　Spurious :

(A)　Duplicate　　　　　　　(B)　Dissipate

(C)　Misty　　　　　　　　　(D)　Genuine

4

7. If the following letters are arranged in the reverse alphabetical order starting with Z and every alternate letter is removed from the series, then which letter will lie in the centre of the resulting series ?

A	B	C	D	E	F	G	H	I	J	K	L
M	N	O	P	Q	R	S	T	U	V	W	
X	Y	Z									

(A) N

(B) N or O

(C) M or O

(D) M

8. How many times you will write the numeral 2 if you write all the numbers from 201 to 300 ?

(A) 9

(B) 20

(C) 100

(D) 119

Directions for the questions 9–10 :

In each of the questions 9-10, four alternative spellings of a correct English word marked as A, B, C, and D are given. One of these alternatives is correct. You are to mark the correct alternative.

9. (A) mysterius

(B) misterious

(C) mysterious

(D) mysterous

10. (A) pronounciation

(B) pronunciation

(C) pronounceation

(D) pronunciation

11. How many times 3's in the following series are preceded by 6's and followed by 2's ?

156   327   263   362   362   576   328

(A) 2

(B) 3

(C) 4

(D) 5

12. There are five houses ABCDO in a row. A is on the right side of B and left side of C. O is on the right side of A, B is on the right side of D. Which house is in the middle ?

(A) O   (B) A

(C) B   (D) D

13. How many different colours are required to paint the following figure such that no two adjacent regions have the same colour ?
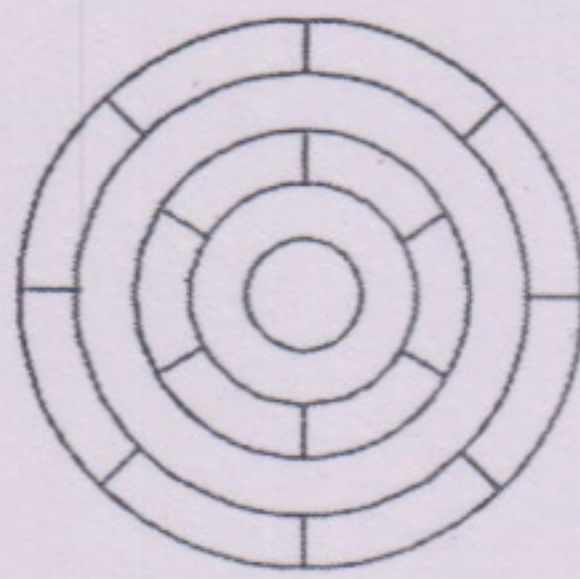
(A) 4   (B) 3

(C) 2   (D) 5

Directions for the questions 14–15 :

Homophones are words that sound the same but have different meanings. For question 14-15, choose the correct word to complete the question.

14. I paid two hundred rupees for the _____ .

(A) Fair   (B) Fare

(C) Fire   (D) Far

15. A.V. Ramachandran wrote the _____ to Bhaskar's book.

(A) Foreword   (B) Forward

(C) Forword   (D) Foreward

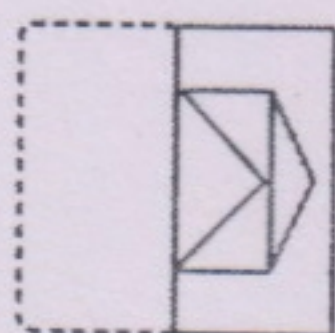16. Carefully examine the pattern, and then choose which pair comes next

    12   5   11   18   8   17   24

(A) 12 23   (B) 9 17

(C) 11 21   (D) 11 23
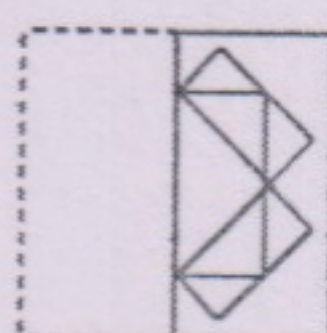
17. Find out amongst the four alternatives as to how the pattern (X) would appear when the transparent sheet is folded at the dotted line.
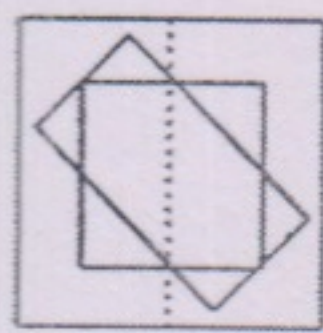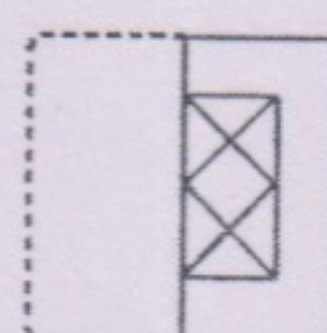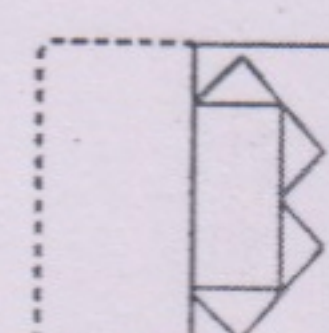

(X)   (1)   (2)   (3)   (4)

(A) 1   (B) 2

(C) 3   (D) 4

Direction for questions 18–19 :

Read the following passage carefully and answer the questions that follow. Identify and indicate your choice by selecting (A), (B), (C), or (D).

A few minutes ago, walking back from lunch, I started to cross the street when I heard the sound of a coin dropping. It wasn't much but, as I turned, my eyes caught the heads of several other people turning too. A woman had dropped what appeared to be a coin of fifty paisa.

The tinkling sound of a coin dropping on pavement is an attention-getter. It can be nothing more than a penny. Whatever the coin is, no one ignores the sound of it. It got me thinking about sounds again.

We are besieged by so many sounds that attract the most attention. People in a city like Delhi seldom turn to look when a fire engine, a police car or an ambulance comes

7

screaming along the street. When I'm in Delhi, I'm a Delhite. I don't turn either. Like the natives, I hardly hear a siren there.

At home in my little town in Haridwar, it's different. The distant wail of a police car, an emergency vehicle or a fire siren brings me to my feet if I'm seated and brings me to the window if I'm in bed.

It's the quietest sounds that have most effect on us, not the loudest. In the middle of the night, I can hear a dripping tap a hundred yards away through three closed doors. I've been hearing little creaking noises and sounds which my imagination turns into footsteps in the middle of the night for twenty-five years in our house. How come I never hear those sounds in the daytime ?

I'm quite clear in my mind what the good sounds are and what the bad sounds are. I've turned against whistling, for instance. I used to think of it as the mark of a happy worker but lately I've been associating the whistler with a nervous person making compulsive noises.

18. The sound of the dropping coins makes people ....

    (A) think of money

    (B) look at each other

   (C) pay attention to it
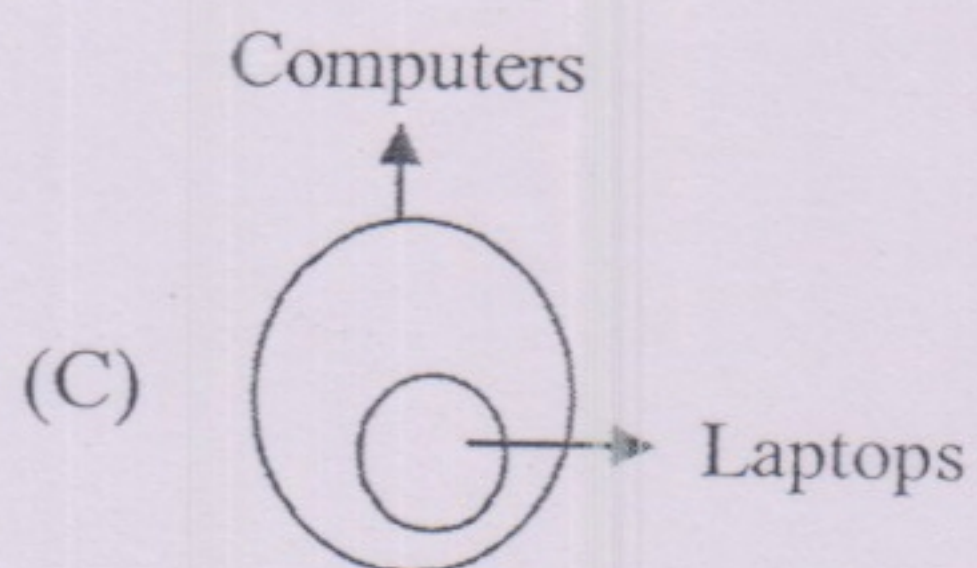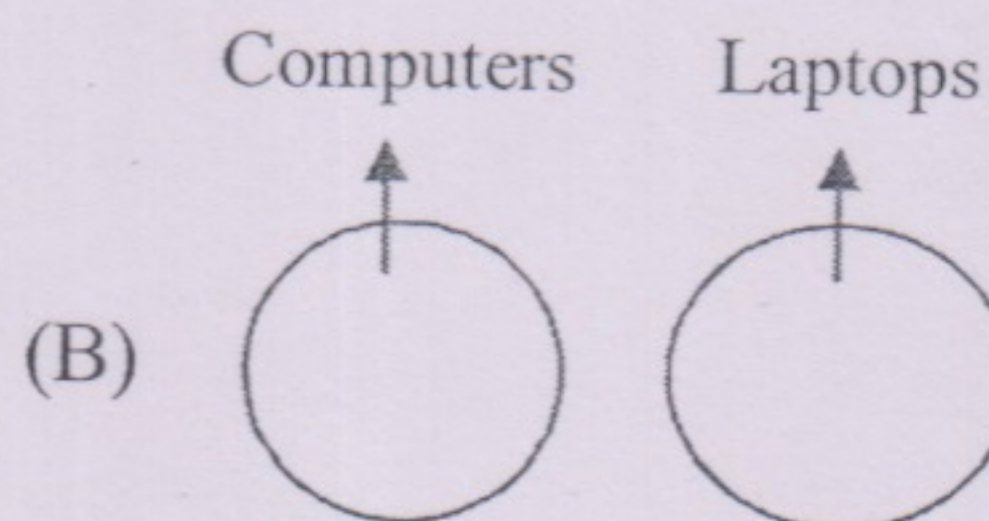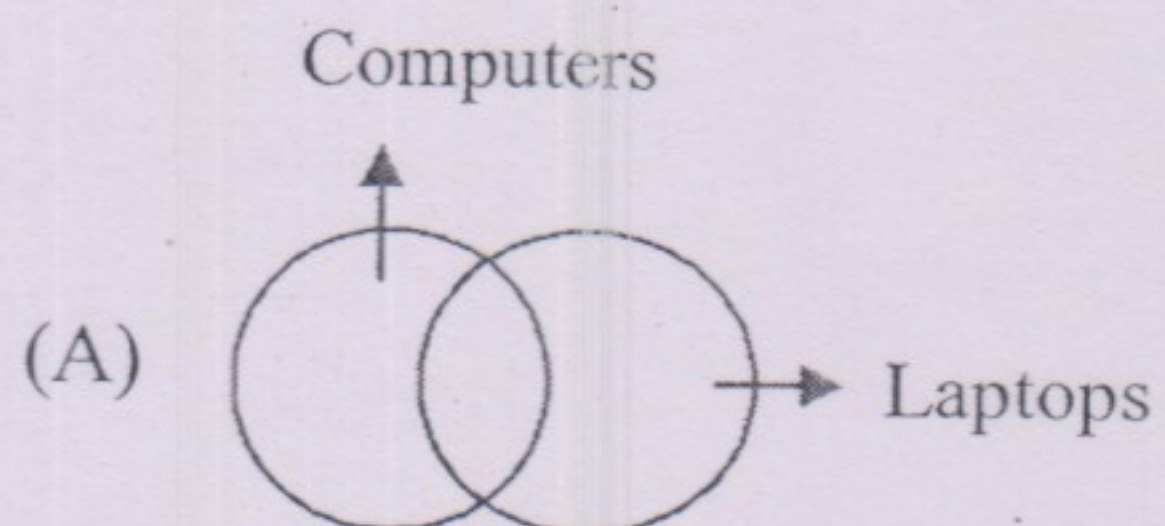
    (D) stop crossing the street

19. How does the writer feel about sounds in general ?

    (A) They make him feel at home.

    (B) He thinks they should be ignored.

    (C) He believes they are part of our lives.

    (D) He prefers silence to loud noises.

Directions for the question 20 :

Identify the logical diagrams that represent the given logical propositions.

20. All laptops are computers.
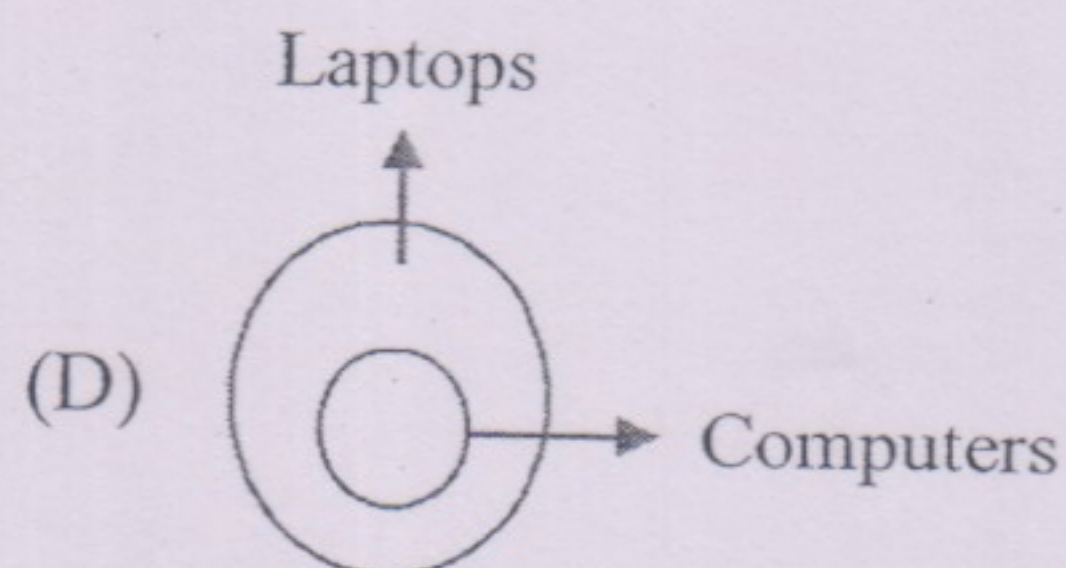
21. The trace of the matrix $\begin{bmatrix} 2 & 5 & 9 \\ 6 & 3 & 7 \end{bmatrix}$ is

(A) 2

(B) 5

(C) 12

(D) Not defined

22. If $u = \sin^{-1}\left(\dfrac{x+y}{\sqrt{x}+\sqrt{y}}\right)$ then $x\dfrac{\partial u}{\partial x} + y\dfrac{\partial u}{\partial y}$ is equal to

(A) $\dfrac{1}{2}u$

(B) $\dfrac{1}{2}\sin u$

(C) $\dfrac{1}{2}\tan u$

(D) None of these

9

23. Which of the following is not a valid octal number ?

   (A) 231
   (B) 876
   (C) 335
   (D) 452

24. $\displaystyle \lim_{x \to 0} \frac{1 - \cos 2ax}{1 - \cos 2bx}$ is equal to

   (A) $\dfrac{a}{b}$
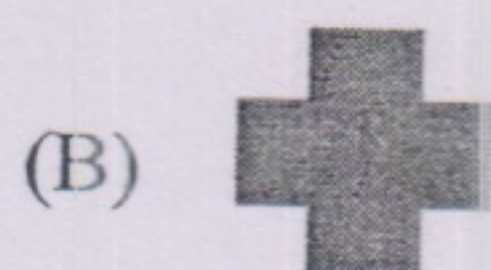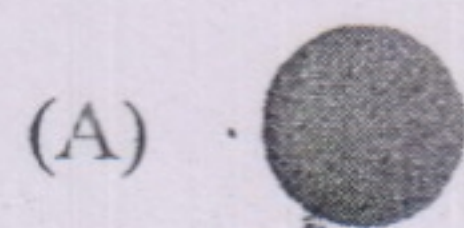   (B) $\dfrac{b}{a}$
   (C) $\dfrac{a^2}{b^2}$
   (D) $\dfrac{2a}{b}$

25. Which among the following is not a convex set ?

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

26. If X follows Poisson distribution with parameter, λ, then the modes of X are

   (A) $\lambda - 1$ and λ
   (B) $\lambda + 1$ and $\lambda - 1$
   (C) λ and $\lambda + 1$
   (D) λ and 2λ

10

27. If the failure time density function of a system follows exponential distribution with parameter λ, then the reliability of the system will be,

   (A) $e^{-\lambda t}$

   (B) $1 - e^{-\lambda t}$

   (C) $e^{-\lambda}$

   (D) $1 - e^{-\lambda}$

28. $(A54B)_{16} = (\ ?\ )_8$

   (A) 122513

   (B) 315221

   (C) 512451

   (D) 154215

29. The rank of $\begin{bmatrix} 1 & 3 & 4 \\ 1 & 3 & 5 \\ 1 & 3 & 4 \end{bmatrix}$ is

   (A) 0

   (B) 1

   (C) 2

   (D) 3

30. What Boolean function does the following circuit represent at the output ?
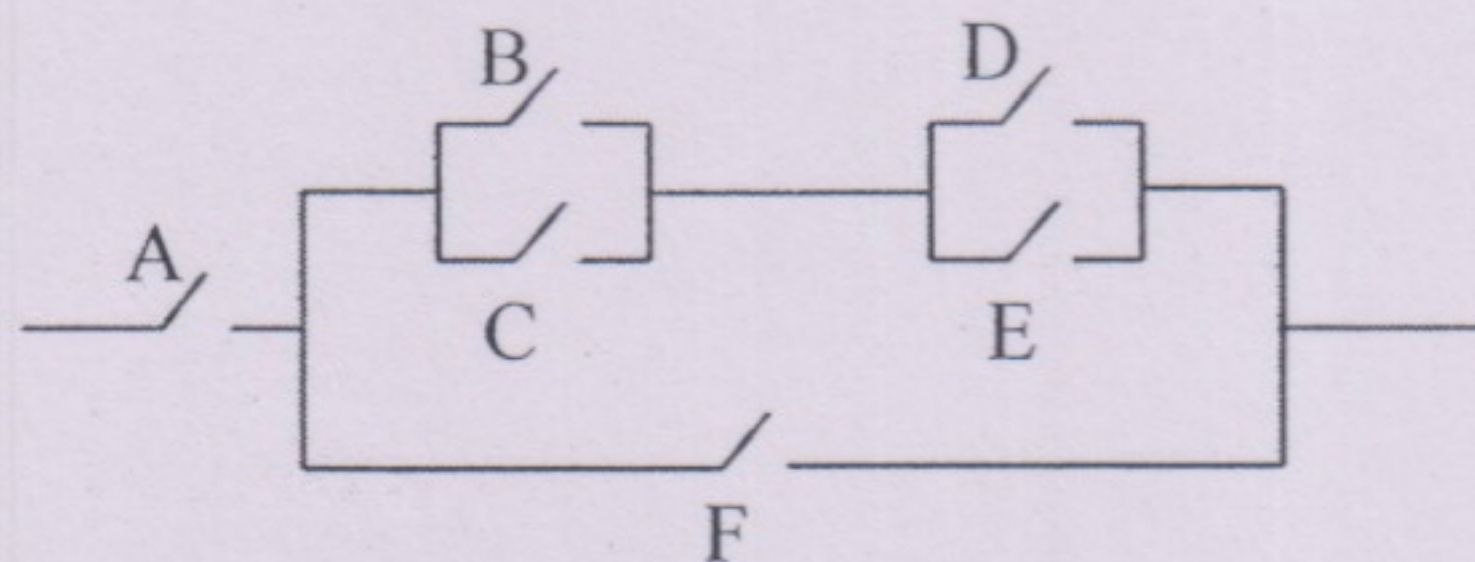
   (A) $A + (F \cdot (B + C)\, D \cdot E)$

   (B) $A + (F \cdot (B \cdot C + D \cdot E))$

   (C) $A \cdot (F + (B + C) \cdot D \cdot E)$

   (D) $A \cdot (F + (B + C) \cdot (D + E))$

11

31. The probability density curve of a normal distribution is symmetric about its :

    (A) Mean

    (B) Mean + S.D.

    (C) Mean – S.D.

    (D) None of these

32. Coefficient of correlation is

    (A) Arithmetic mean of the regression coefficients

    (B) Geometric mean of the regression coefficients

    (C) Harmonic mean of the regression coefficients

    (D) None

33. Let $Z_1, \ldots \ldots Z_n$ are independent standard normal random variables, then the random variable $Z_1^2 + Z_2^2 + \ldots \ldots + Z_n^2$ follow :

    (A) t-distribution

    (B) F-distribution

    (C) Chi-Square distribution

    (D) Normal distribution

34. If $y = 1 + x + \dfrac{x^2}{2!} + \dfrac{x^3}{3!} + \ldots$, then n^{th} derivative of $y(y_n)$ is equal to

    (A) 0

    (B) 1

    (C) y

    (D) None of these

35. Rolle's theorem is associated with his name. He is

    (A) An English mathematician

    (B) German mathematician

    (C) French mathematician

    (D) Russian mathematician

12

36. The 'c' of the mean value theorem for the function $f(x) = x(x-2)$, when $a = 0$, $b = 3/2$ is

   (A) 3/4

   (B) 1/2

   (C) 3/2

   (D) 1/4

37. For the curve $y^2(1 + x) = x^2(1 - x)$, the origin is a

   (A) Node

   (B) Cusp

   (C) Point of inflexion

   (D) None of these

38. At the end of phase-I in a two phase simplex method if one or more artificial vectors appears in the basis at a positive level then;

   (A) The problem has no feasible solution

   (B) The problem has unbounded solution

   (C) The problem has unique optimum solution

   (D) None of the above

39. Which of the following is not correct ?

   (A) In an M/M/1 queueing system the arrivals take place according to Poisson and the service time is exponentially distributed.

   (B) The necessary condition for the existence of the steady state solution in a queueing system is $\rho \leq 1$, where ρ is the traffic intensity of the system.

   (C) If the arrival processes follows Poisson the inter-arrival time follows exponential.

   (D) Given the steady state probability of a system the transient solution can easily be obtained.

13

40. If λ is the rate of arrival in a system and W & L denote the expected waiting time and the expected numbers of units in the system, then

    (A) $W = \lambda L$

    (B) $W = \lambda^{-1}L$

    (C) $L > W\lambda$

    (D) $L < W\lambda$

41. Annual demand for an item is 12100 units. Ordering cost is Rs. 2000 per order and the holding cost is Rs. 10 per unit per annum. What is the economic order quantity ?

    (A) 2200

    (B) 2100

    (C) 2000

    (D) 2300

42. What will be the output of the following code ?

```
for(j = 0; j <= 2; j++) {

    for(k = 0; k <= 2; k++) {

        if j == k)

            cout << "1";

        else

            cout << "0";

    }

}
```

    (A) 1 1 1 1 1 1 1 1 1

    (B) 1 0 0 1 1 0 1 1 1

    (C) 0 0 1 0 1 0 1 0 0

    (D) 1 0 0 0 1 0 0 0 1

14

43. Consider the following code

```
if(number >= 0)
    if(number > 0)
        cout << "Number is positive";
    else
        cout << "Number is negative";
```

What will be the output if *number* is equal to 0 ?

(A) Number is positive

(B) Number is negative

(C) Number is positive Number is negative

(D) Nothing is displayed

44. There are three members: x, y and z; in a committee. Issues are to be decided by a simple majority and a member says 'yes' to vote in favor and "no" otherwise. A question will be decided 'yes' if any one of the following is true :

x and y say "yes", x and z say "yes",

y and z say "yes" or all three x, y, z say "yes".

Which of the following Boolean expression represents the above problem ?

(A) x + y + z

(B) xy + xyz + yz

(C) xy + xz + yz

(D) xy + xz + xyz

45. If $X \sim N(\mu, \sigma^2)$, then $P[(\mu - 3\sigma < X < \mu + 3\sigma]$ is equal to

(A) 0.6826

(B) 0.9973

(C) 0.9544

(D) 0.9843

15

46. If the frequency distribution of a given data is skewed towards its left and the mean of the distribution is 40, then the modal value of the data will be –

(A) Equal to 40

(B) More than 40

(C) Less than 40

(D) Cannot be determined

47. If X is a Poisson random variable such that; P(X=2) = 9 P(X=4) + 90 P(X=6), then the variance of the random variable X is :

(A) 4

(B) 3

(C) 2

(D) 1

48. The order of the differential equation $\left[1+\left(\dfrac{d^3 y}{dx^3}\right)^2\right]^{4/3} = \dfrac{d^2 y}{dx^2}$ is given by

(A) 1

(B) 2

(C) 3

(D) 4

49. The curve $x = a\cos\theta$, $y = a\sin\theta$ is

(A) Circle

(B) Ellipse

(C) Parabola

(D) None of these

50. If $z = \log(x^2 + y^2)$, then $x\dfrac{\partial z}{\partial x} + y\dfrac{\partial z}{\partial y}$ is equal to

(A) 0

(B) 1

(C) 2

(D) 3

16

51. If $A = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$ then, which of the following is true

(A) $a_{11} A_{21} + a_{12} A_{22} + a_{13} A_{23} = A$

(B) $a_{21} A_{21} + a_{22} A_{22} + a_{23} A_{23} = A$

(C) $a_{31} A_{31} + a_{32} A_{32} + a_{33} A_{33} = 0$

(D) $a_{21} A_{31} + a_{22} A_{32} + a_{23} A_{33} = A$

52. The production department of a company requires 3600 kg of raw material for manufacturing a particular item per year. It has been estimated that the cost of placing an order is Rs. 36 and the cost of carrying inventory is 20% of the investment in the inventories. The price is Rs. 10 per kg. Then the EOQ will be

(A) 360 kg per order

(B) 350 kg per order

(C) 300 kg per order

(D) None of the above

53. Given an LPP Max $z = 3x_1 - 2x_2$ subject to $x_1 + x_2 \leq 1$, $2x_1 + 2x_2 \geq 4$ and $x_1, x_2 \geq 0$. Using graphical method we have

(A) unbounded solution

(B) unique optimum solution

(C) infeasible solution

(D) multiple optimum solution

17

P.T.O.

54. Consider the constraint :

$$5x + 3y - 4z \leq 7$$

Find the value of the slack variable (s) associated to this constraint for the point A(1, 2, 3).

(A) s = 8

(B) s = 6

(C) s = 0

(D) s = −1

55. What would be printed, when the following code segment is executed
x = 15; while (x < 10){ printf(x); x--}

(A) Nothing

(B) 15

(C) 14

(D) None of the above

56. Given the following truth table, which operation is represented ?

INPUT			OUTPUT
A	B	C	D
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	1

(A) A OR B OR C

(B) A XOR B OR C

(C) A OR B XOR C

(D) None of the above

57. The time that elapses from the moment a program is submitted until it is completed by the computer system, is termed as

    (A) Throughput

    (B) Turnaround time

    (C) Response time

    (D) None

58. For a distribution, β_2 is found to be 4. The distribution is

    (A) Mesokurtic

    (B) Platykurtic

    (C) Leptokurtic

    (D) Nothing can be said

59. If X is a random variable with m.g.f Mx(t) then

    I. X may have no moments although its m.g.f exists.

    II. Mx(t) will always exist.

    III. Mx(t) exists, yet the m.g.f does not generate the moments.

    (A) I and II are true

    (B) Only II is true

    (C) II and III are true

    (D) I and III are true

60. In a convex set a linear function attains its extrema at

    (A) Vertex

    (B) Boundary point

    (C) Interior point

    (D) None of these

61. The series $1 - \dfrac{1}{2} + \dfrac{1}{3} - \dfrac{1}{4} + \ldots$ is

    (A) Convergent

    (B) Divergent

    (C) Oscillatory

    (D) None of these

19

62. $\int \tan^3 x \, dx$ is equal to

(A) $\dfrac{1}{2}\tan^2 x - \log \sec x + c$

(B) $\dfrac{1}{2}\tan^2 x + \log \sec x + c$

(C) $\log \sec x - \dfrac{1}{2}\tan^2 x + c$

(D) $\log \sec x - \tan^2 x + c$

63. $\displaystyle\int_0^2 |1-x| \, dx$ is equal to

(A) 0

(B) $\dfrac{1}{2}$

(C) 1

(D) None of these

64. If $z = f(x,y)$ is a homogeneous function of degree n then

(A) $x\dfrac{dz}{dx} + y\dfrac{dz}{dy} = z^n$

(B) $x\dfrac{dz}{dx} + y\dfrac{dz}{dy} = 0$

(C) $x\dfrac{dz}{dx} + y\dfrac{dz}{dy} = nz$

(D) $x\dfrac{dz}{dx} + y\dfrac{dz}{dy} = \dfrac{z}{n}$

20

65. There are three coins in a box. One is a two headed coin, another is a fair coin, and the third is a biased coin that comes up heads 75 percentage of time. When one of the three coins is selected at random and flipped, it shows heads. What is the probability that it was the two headed coin ?

    (A) 1/9
    (B) 2/9
    (C) 1/3
    (D) 4/9

66. In an M/M/1 queueing system the arrivals take place with an average rate of 2/hr and the mean service time 15 mins, then the probability of having an empty system is

    (A) 0.333
    (B) 0.451
    (C) 0.500
    (D) 0.152

67. Which of the following is not an assumption underlying the fundamental problem of EOQ ?

    (A) Demand is known and uniform

    (B) Lead time is not zero

    (C) Holding cost per unit time is constant

    (D) Stock-out (shortages) are not permitted

68. Re-order level of an item is always

    (A) Less than or equal to its minimum stock

    (B) More than or equal to its minimum stock

    (C) More than its maximum stock

    (D) Less than its maximum stock

21

69. The decimal equivalent of the binary number 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

    (A) 32768

    (B) 32678

    (C) 32677

    (D) None

70. If x = −1, y = 0, z = 1, the value of the expression x < y > z is

    (A) 0 (False)

    (B) 1 (True)

    (C) Incorrect expression

    (D) None

71. If x = 1; y = 1 and z = 2; then after the execution of the following code segment, the values of variables z and y respectively are

    $$If (x == y)\{\{z\text{++};y\text{--};\} \text{ else } \text{--}z ;\}$$

    (A) 2, 0

    (B) 3, 1

    (C) 2, 1

    (D) 3, 0

72. The Normal distribution is limiting form of Binomial distribution if

    (A) $n \to \infty, p \to 0$

    (B) $n \to \infty, p \to q$

    (C) $n \to \infty, p \to \infty$

    (D) $n \to \infty$, neither p nor q is small

73. Let X and Y are independent Poisson random variables with means m_1 and m_2 respectively, then X + Y follows Poisson distribution with parameter

    (A) $m_1.m_2$

    (B) $m_1 + m_2$

    (C) $m_1 - m_2$

    (D) m_1/m_2

22

74. Which of the following is incorrect ?

(A) $\dfrac{1}{f\left(D^2\right)}\sin ax = \dfrac{1}{f\left(-a^2\right)}\sin ax,$ if $f\left(-a^2\right) \neq 0$

(B) $\dfrac{1}{f\left(D\right)}e^{ax} = \dfrac{1}{f\left(a\right)}e^{ax},$ if $f\left(a\right) \neq 0$

(C) $\dfrac{1}{f\left(D\right)}e^{ax}V\left(x\right) = e^{ax}\dfrac{1}{f\left(D-a\right)}V\left(x\right)$

(D) None of the above

75. The volume of the solid generated by revolving the astroid $x^{2/3} + y^{2/3} = a^{2/3}$ about the x axis is equal to

(A) $\dfrac{16}{35}\pi a^3$

(B) $\dfrac{106}{105}\pi a^3$

(C) $\dfrac{32}{105}\pi a^3$

(D) None of these

76. The surface of the sphere obtained by revolving the circle $x = r\cos\theta,$ $y = r\sin\theta$ about x axis is equal to

(A) $4\pi r^2$

(B) $\dfrac{4}{3}\pi r^3$

(C) $4\pi r^3$

(D) πr^3

P.T.O.

77. The curve $y = x^3 - 3x^2 - 9x + 9$ has a point of inflexion at

(A) $x = -1$　　　　　　　　　　(B) $x = 1$

(C) $x = -3$　　　　　　　　　　(D) $x = 3$

78. The solution of the differential equation $\dfrac{dy}{dx} + \dfrac{y}{x} = x^2$ under the condition that $y = 1$ when $x = 1$, is

(A) $4xy = x^3 + 3$

(B) $4xy = y^4 + 3$

(C) $4xy = x^4 + 3$

(D) $4xy = y^3 + 3$

79. If α, β, γ are the roots of a cubic equation with $\alpha + \beta + \gamma = 1$, $\alpha^2 + \beta^2 + \gamma^2 = 2$ and $\alpha^3 + \beta^3 + \gamma^3 = 3$, then $\alpha^4 + \beta^4 + \gamma^4$ equals

(A) 0

(B) 4

(C) $\dfrac{25}{6}$

(D) $1^4 + 2^4 + 3^4$

80. In case of perfect correlation, the two lines of regression Y on X and X on Y

(A) are perpendicular to each other

(B) are parallel to each other

(C) coincide

(D) intersect each other at an angle other than 90°

24

81. If $F(n_1, n_2)$ is a F-variate with n_1 and n_2 d.f. then $F(n_2, n_1)$ is distributed as

   (A) $\dfrac{1}{F(n_2, n_1)}$ variate

   (B) $\dfrac{1}{F(n_1, n_2)}$ variate

   (C) $\dfrac{1}{F(n_1 + n_2, n_2)}$ variate

   (D) $\dfrac{1}{F(n_1, n_1 + n_2)}$ variate

82. For the inventory model with planned shortages, the optimal order quantity results in

   (A) Annual holding cost = annual ordering cost.

   (B) Annual holding cost = annual backordering cost.

   (C) Annual ordering cost = annual holding cost + annual backordering cost.

   (D) Annual ordering cost = annual holding cost − annual backordering cost.

83. The volume of the solid generated by the revolution of the cycloid
   $$x = a(\theta + \sin\theta), \quad y = a(1 - \cos\theta) \text{ about x-axis, is}$$

   (A) $\pi^2 a^2$

   (B) $2\pi^2 a^3$

   (C) $\pi^2 a^3$

   (D) $2\pi^2 a^2$

84. The particular integral of the differential equation $\dfrac{d^2 y}{dx^2} + 4y = 16x\, e^{2x}$ is

   (A) $x(e^{2x} - e^x)$

   (B) $\dfrac{1}{12} e^{2x}$

   (C) $(8x^2 + 4x + 2)\, e^{2x}$

   (D) $(2x - 1)\, e^{2x}$

25

85. Which of the following is not an Operating System ?

    (A) MS-DOS

    (B) Microsoft Windows

    (C) Linux

    (D) Internet Explorer

86. The _____ is the pictorial representation of the logic of the program using special symbols.

    (A) Algorithm   (B) Flowchart

    (C) ER diagrams   (D) Pseudocode

87. Which is the largest unit of storage among the following ?

    (A) Terabyte   (B) Megabyte

    (C) Kilobyte   (D) Gigabyte

88. If $z = \cos\theta + i\sin\theta$, then $\dfrac{z^{2n} - 1}{z^{2n} + 1}$ equals

    (A) $i\tan n\theta$ (B) $\tan n\theta$

    (C) $\cot n\theta$ (D) $i\cot n\theta$

89. A function f(x,y) defined on domain D is a homogeneous function of degree 2 if

    (A) $f(\lambda x, \lambda y) = \lambda^2 f(x, y) \ \forall \ \lambda \in R$

    (B) $f(x^2, y^2) = (f(x, y))^2$

    (C) $f(2x, 2y) = 2f(x, y)$

    (D) $f(x^2, y^2) = 2f(x, y)$

26

90. The value of the integral $\int_0^\pi \dfrac{x \sin x}{1 + \cos^2 x}\, dx$ is

(A) $\dfrac{\pi^2}{2}$

(B) $\dfrac{\pi^2}{3}$

(C) $\dfrac{\pi^2}{4}$

(D) π^2

91. If $u = \log \dfrac{x^2 + y^2}{x + y}$ then $x\dfrac{du}{dx} + y\dfrac{du}{dy}$ equals

(A) 0

(B) e^u

(C) 1

(D) $\log u$

92. The number of persons arriving in an M/M/1 queueing system has

(A) Erlang distribution

(B) Exponential distribution

(C) Binomial distribution

(D) Poisson distribution

93. Which of the following is not considered to be a part of inventory holding costs ?

(A) Opportunity cost of blocked capital

(B) Maintenance cost of warehouse used for this inventory

(C) Obsolescence

(D) Cost of postage and telephone for placing order

94. In an M/M/2 queueing system if $\lambda = 4$ and $\mu = 3$, then the traffic intensity ρ of the system is

    (A) 0.67

    (B) 1.33

    (C) 0.75

    (D) None of the above

95. Which is the following is not a magnetic storage media ?

    (A) Magnetic tapes

    (B) Hard Disk

    (C) DVD

    (D) Floppy

96. It is possible to move from one page to another on the World Wide Web with a single click of mouse using

    (A) text processing packages

    (B) spreadsheets

    (C) databases

    (D) hyperlinks

97. How many times will the body of loop be executed ?

    ```
    x = 5;
    y = 50;
    while(x <= y){
        x = y/x;
        cout<< x; }
    ```

    (A) 0

    (B) 10

    (C) 11

    (D) infinite

28

98. Let X be a random variable with probability density function

$$f(x) = \begin{cases} c(1-x^2), & -1 < x < 1 \\ 0 & \text{otherwise} \end{cases}$$

the value of c is –

(A) 1/4

(B) 1/2

(C) 3/4

(D) 1

99. The Moment Generating Function (MGF) of the sum of independent random variables is –

(A) Sum of individual MGF

(B) Difference of individual MGF

(C) Product of individual MGF

(D) None of the above

100. If $u_n = \int_0^{\pi/4} \tan^n\theta \, d\theta$ then $u_n + u_{n-2}$ equals

(A) 1

(B) n

(C) $\dfrac{1}{n}$

(D) $\dfrac{1}{n-1}$

101. Which of the following is not implied when average inventory is Q/2, where Q is the order quantity ?

(A) An entire order quantity arrives at one time.

(B) The previous order quantity is entirely depleted when the next order arrives.

(C) An order quantity is depleted at a uniform rate over time.

(D) Backorders are permitted.

29

102. The general solution of the differential equation $(3x^2 + 4xy)dx + (2x^2 + 2y)dy = 0$.

    (A) $3x^3 + 4x^2y + 2xy^2 + y^2 = c$

    (B) $x^3 + 2x^2y + y^2 = c$

    (C) $\frac{5}{3}x^3 + 2x^2y + 2xy^2 + y^2 = c$

    (D) None of the above

103. Consider the following linear programming model :

    Max $X_1 + X_2$

    Subject to :

    $X_1 + X_2 \leq 2$

    $X_1 \geq 1$

    $X_2 \geq 3$

    $X_1, X_2 \geq 0$

    This linear programming model has

    (A) alternate optimal solution

    (B) unbounded solution

    (C) redundant constraint

    (D) infeasible solution

104. A redundant constraint is eliminated from a linear programming model. What effect will this have on the optimal solution ?

    (A) Feasible region will decrease in size

    (B) Feasible region will increase in size

    (C) A decrease in objective function value

    (D) No change

30

105. The number of constraints in the dual problem of a linear programming problem (primal) is

    (A) equal to number of variables in primal

    (B) equal to number of constraints in primal

    (C) less than number of variables in primal

    (D) more than number of constraints in primal

106. In a flowchart the symbol ⬦ is used for

    (A) Decision   (B) Processing

    (C) Input/output   (D) Start/stop

107. The solution of the differential equation

    $$x \sin y\, dx + (x^2 + 1)\cos y\, dy = 0, \quad y(1) = \pi/2$$

    (A) $(x^2 + 1)\sin^2 y = 2$

    (B) $-x \cos y + (x^2 + 1)\sin y = 2$

    (C) $(x + 1)\sin y + (x^2 + 2)\cos y = 3$

    (D) None of the above

108. If X_i $(i = 1, 2, \dots, n)$ are n independent normal variates with mean μ_i and variance σ_i^2, then $\sum_{i=1}^{n} \left(\dfrac{X_i - \mu_i}{\sigma_i} \right)^2$ is a

    (A) Chi-square variate with 1 d.f

    (B) Chi-square variate with n d.f

    (C) Chi-square variate with n–1 d.f

    (D) Chi-square variate with n–2 d.f

109. The mode of F-distribution is

    (A) Equal to unity   (B) Greater than unity

    (C) Less than unity   (D) Not defined

31

110. For the EOQ model, which of the following relationships is incorrect ?

(A) As the order quantity increases, the number of orders placed annually decreases.

(B) As the order quantity increases, annual holding cost increases.

(C) As the order quantity increases, annual ordering cost increases.

(D) As the order quantity increases, average inventory increases.

111. F-distribution is

(A) Highly negatively skewed

(B) Moderately positively skewed

(C) Moderately negatively skewed

(D) Highly positively skewed

112. If $u = f\left(\dfrac{y}{x}\right)$ then $x\dfrac{du}{dx} + y\dfrac{du}{dy}$ equals

(A) 0

(B) 1

(C) x

(D) y

113. The hexadecimal equivalent of the binary number 10101110101101 is

(A) AEB4

(B) AEAD

(C) 2BAD

(D) 2BB4

114. Reliability of a component

(A) can have a value between 0 and 100

(B) can have a value between −1 and +1

(C) can have a value between −0.1 and 0.1

(D) can have a value between 0 and 1

32

115. The failure time distribution of a component is $F(t) = 1 - e^{-5t}$. Then its failure rate is

(A) 0.2

(B) 5

(C) 0.5

(D) 10

116. If A is a square matrix of order n with $|A| \neq 0$ then $|adj\ A|$ equals

(A) $|A|$

(B) $|A|^n$

(C) $|A|^{n-1}$

(D) $1/|A|$

117. $\lim_{x \to a} \left(2 - \dfrac{x}{a}\right)^{\tan \frac{\pi x}{2a}}$ equals

(A) 1

(B) 0

(C) $e^{2/\pi}$

(D) $\dfrac{\pi}{2}$

118. Cayley – Hamilton theorem states that

(A) Every square matrix can be reduced to normal form

(B) Every square matrix satisfies its characteristic equation

(C) Every square matrix can be written as sum of a symmetric and a skew symmetric matrix

(D) Not every square matrix is invertible

119. Reneging refers to customers in a queue who

(A) do not join a queue

(B) switch queues

(C) join a queue but leave before getting served

(D) join a queue but are dissatisfied

120. A family has two children. What is the conditional probability that both are boys given that at least one of them is a boy ?

(A) 0

(B) 0.25

(C) 0.33

(D) 0.50

33

Space for Rough Work

Space for Rough Work

Space for Rough Work

Space for Rough Work

Space for Rough Work

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