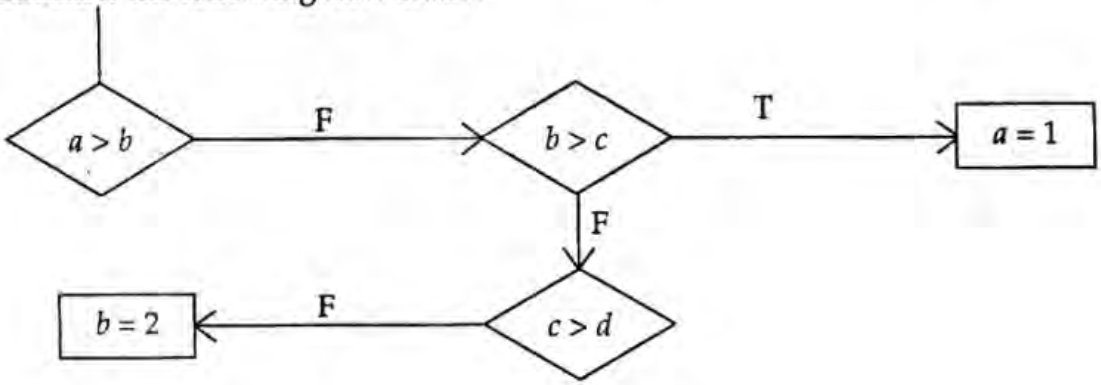
Question Paper of BHU MCA - 2012 (SET - 2)

1. Consider the following flow chart :



Which of the following is **not** eqquivalent to the aboves flow chart ?

(a) if (a > b)
    if (b > c)
    a = 1;
    b = 2;

(b) if (a < = b)
    if (b > c)
    a = 1;
    else if (c < = d)

(c) if (a > b)
    ;
    else if (b > c)
    a = 1;
    else if (c < = d)
    b = 2;

(b) if (a > b)
    ;
    else if (b > c)
    a = 1;
    else if (c > d)
    else b = 2;

2. The following program gragment

```
if (a = 0)
printf ("a is zero") ;
else
printf ("a is not zero") ;
```

result in the printing of

(a) a is zero (b) a is not zero (c) nothing (d) garbage

3. If y is of integer then the expressions

$3 * (y - 8)/9$ and $(y - 8)/9*3$

yield the same value if :

(a) y is an even number (b) y is an odd number

(c) $y - 8$ is an integral multiple of 9 (d) $y - 8$ is an integral multiple of 3

4. If the integer needs two bytes of storage, then maximum value of an unsigned integer is :

(a) $2^{16} - 1$ (b) $2^{15} - 1$ (c) 2^{16} (d) 2^{15}

5. The minimum number of temporary variables needed to swap the contents of two variables is :

(a) 1 (b) 2 (c) 3 (d) 0

6. Which is true of conditional compilation ?

(a) It is taken care of by the compilier (b) It is setting the compiler option on a condition

(c) It is compiling a program based on a condition (d) It is operation taken by the compiler

7. The basic arithmetic operation performed by a Computer is :

(a) addition (b) multiplication (c) subtraction (d) division

8. The base of the binary number system is :

(a) 2 (b) 16 (c) 8 (d) 10

9. Main memory unit of computer :

(a) performs arithmatic (b) stores a small amount of data and instructions

(c) stores bulk of data and instructions (d) supervises the working of all the units

10. A Central Processing Unit (CPU) consist of :
    (a) input, output unit
    (b) memory unit
    (c) arithmetic and logical unit, central unit
    (d) keyboard, printer

Directions : (Question No. 11 & 12) : On prepositions may be taken as a drill in the use of prepositions. Select the most appropriate preposition carefully and then put your cross against the right answer :

11. He was heart broken ..... her indifference ..... him.
    (a) at, to
    (b) by, for
    (c) by, to
    (d) at, on

12. Do not look down ..... the poor.
    (a) do
    (b) upon
    (c) at
    (d) in

Directions : (Question Nos. 13 - 15) : In the following questions you have passage, with questions following poassages. Read passage carefully and choose the best answer to each question and mark it in the Answer Sheet :

But alas, in 1964, when I was nine, my young life shattered into pieces once again. My mother passed away after an illness of just 15 days. She had been the anchor of my life. And how I missed her. But little children are resilient. My maternal grandmother was staying with us and my mother's widowed younger sister came to help out with us. So well did my aunt fit into our household that in two years my father had married her : she become our mother and her only daughter become our sister.

13. The tone of the passage is :
    (a) gloomy
    (b) humorous
    (b) ironical
    (d) lyrical

14. The writer's response to his father marrying again is that of :
    (a) indifference
    (b) disdain
    (c) approval
    (d) disapproval

15. The writer's life got 'shattered into pieces' when :
    (a) his father married again
    (b) he lost his mother
    (c) he fell seriously ill
    (d) a sister was born to him

16. In which of the following countries did the decimal system of numbers originate ?
    (a) England
    (b) France
    (c) India
    (d) Greece

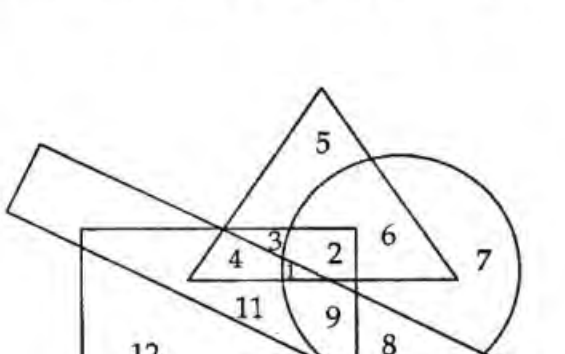
17. A place which has 2 as the first digit in its PIN Code must be situated in which of the following states ?
    (a) Uttar Pradesh
    (b) Maharashtra
    (c) Gujarat
    (d) Andhra Pradesh

18. The southernmost point of India territory is in which of the following States/Union Territories ?
    (a) serpentina
    (b) tulsi
    (c) turmeric
    (d) garlic

19. The southernmost point of India territory is in which of the following State/Union Territories ?
(a) Tamil Nadu (b) Lakshadweep
(c) Kerala (d) Andaman and Nicobar Islands

20. Which of the following diseases usually spreads through air ?
(a) Plague (b) Tuberculosis (c) Typhoid (d) Cholera

Directions : (Question Nos. 21 & 25) : The questions (21 to 25) are based on the following diagram in which circle stands for the educated, the square for hard working, the triangle for urban and the rectangle for honest, the diagram are numbered from 1 to 12. Study the diagram and answer each question :



21. Hard working and non-urban people who are neither educated nor honest are indicated by :
(a) 7 (b) 8 (c) 10 (d) 12

22. Uneducated, urban, hard working and honest people are indicated by :
(a) 2 (b) 3 (c) 4 (d) 5

23. Urban hard working who are neither educated nor honest are indicated by :
(a) 2 (b) 3 (c) 4 (d) 5

24. Non-urban educated hard working and honest people are indicated by :
(a) 7 (b) 8 (c) 9 (d) 10

25. Non-urban people who are honest and hard working but not educated are indicated by :
(a) 11 (b) 10 (c) 9 (d) 3

26. People should drink more milk because :
    (a) It would help the farmers
    (b) It does not keep fit for a long time
    (c) It is sold in many schools
    (d) It is a good food

27. Motorists must have driving mirrors in their cars so that :
    (a) Their lady passengers can use them
    (b) They can see the traffic behind them
    (c) Other motorists can see them
    (d) Their head lamps will not dazzle oncoming traffic

28. Glass is used for window's because :
    (a) Glass is cheap
    (b) You can see through glass
    (c) A broken window is easily replaced
    (d) Glass is easily cut to the right size

29. Many people send Christmas cards to their friends because :
    (a) They are pretty
    (b) It is a cheaper to send them, through post
    (c) It is the custom to send good wises to friends at Christmas time in that way
    (d) It provides the work for postman

30. A, B, C, D are standing at the corners of a square field. They walk along the sides of the square in the clockwise direction. They stop after covering four sides which one of the following statement is true ?
    (a) C is North - East of B
    (b) D is East - West of A
    (c) A is West of B
    (d) B is East - South of D

31. A's mother is sister of B and has a daughter C. How is A related to B ?
    (a) Niece (b) Uncle (c) Daughter (d) Father

32. A is brother of B and C; D is C's mother. D is B's sister and E is B's sister. How is C related to E ?
    (a) Niece (b) Cousin (c) Aunt (d) Mother

33. Out of five friends A is shorter than B but taller than E. C is tallest and D is little shorter than A. Which one is the shortest ?
    (a) A (b) E (C) C (d) D

34. In a row at a bus stop A is 7th from the left and B is 9th from the right. They both interchange their positions. A becomes 11th from the left. How many people are there in the row ?

(a) 18 (b) 19 (c) 20 (d) 21

35. A man drove his car straight towards east for 5 km. Then the turn right and drove for 3 km and and then the turned to his south and drove for 3 km. How far was he from the starting point ?

(a) 6 km (b) 5 km (c) 7 km (d) 8 km

Directions : (Question Nos. 36 - 40) : A and B are good at hockey and Volley ball. C and A are good at Hockey and Baseball. D and B are good at Cricket and Volley ball. D and E are good as Football and Baseball. Study the above given information and answer the following questions :

36. Who is good of the largest number of games ?

(a) E (b) D (c) C (d) B

37. Who is good at Cricket, Hockey and Volley ball ?

(a) E (b) D (c) C (d) B

38. Who is good at Baseball, Volley ball and Hockey ?

(a) E (b) D (c) C (d) B

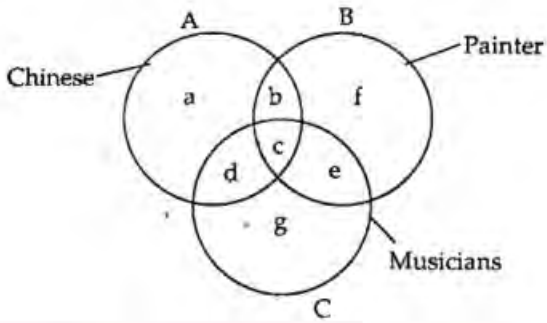
39. Who is good at Cricket, Baseball and Volley all ?

(a) E (b) D (c) C (d) B

40. Who of the following is good at all the four games ?

(a) E (b) D (c) C (d) B

Directions : (Question Nos. 41 - 44) : In the figure given below, there are three intersecting circles each representing certain section of people. Different regions are marked a-g. Read the statements in each of the following questions and choose the letter of the region which correctly represents the statement :



41. Chinese who are painters as well as musicians :

(a) a (b) b (c) c (d) d

42. Chinese who are musicians but not painters :

(a) d (b) c (c) b (d) a

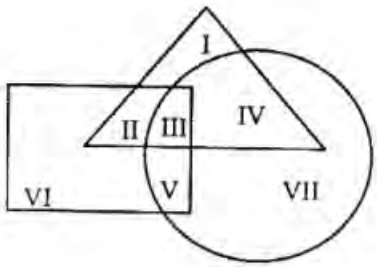
43. Painters who are neither Chinese nor musicians :

(a) b (b) c (c) f (d) g

44. Chinese who are painters but not musicians :

(a) b (b) c (c) d (d) g

45. The triangle, square and circle shown below respectively repectively represent the urban, hard working and educated people. Who one of the areas marked I-VII is represented by the urban educated people who are not hard working ?



(a) II (b) I (c) IV (d) III

Directions : (Question Nos. 46 - 50) : Vijay starts from his home with his wife at 9.30 a.m. on his scooter. He goes 1 km east, drop his wife at her office, turns left, goes another km then right, and after a km reaches the bank where he spends five minutes. Then the turn towards north and reaches hospital which is one km from the bank.

After taking to a doctor friend for five minutes he turns towards west and reaches his office, which is 2 km from the hospital at 9.58 a.m.

Now answer the following questions :

46. At what time did Vijay reach the bank ?

(a) 9.42 a.m. (b) 9.39 a.m. (c) 9.45 a.m. (d) 9.36 a.m.

47. What is the average speed ?

(a) 18 km per hour (b) 25 km per hour (c) 30 km per hour (d) 13 im per hour

48. How much time would Vijay had taken in reaching his office by the same route if he had not stopped at the bank and hospital ?

(a) 20 minutes (b) 23 minutes (c) 18 minutes (d) 13 minutes

49. How far is the hospital from his wife's office ?

(a) 3 km (b) 4 km (c) $4\frac{1}{2}$ km (d) 1 km

50. How far is Viay's office from his home as the crow flies ?

(a) 3 km (b) 4 km (c) 2 km (d) 5 km

51. If α, β be two directions of projection to hit a given point (h, k), then :

(a) $\cos(\alpha+\beta)=-\frac{h}{k}$ (b) $\sin(\alpha+\beta)=-\frac{h}{k}$ (c) $\cot(\alpha+\beta)=-\frac{h}{k}$ (d) $\tan(\alpha+\beta)=-\frac{h}{k}$

52. A shot is fixed at an angle α to the horizontal up an inclined plane of inclination β. It will strike the plane horizontally if :

(a) $\tan\alpha = \tan\beta$ (b) $2\tan\alpha = \tan\beta$ (c) $\tan\alpha = 2\tan\beta$ (d) $4\tan\alpha = \tan\beta$

53. If at any instant the velocity of projectile be u and its direction of motion α to the horizon, then it will be moving at right angles to this direction after time :

(a) $\frac{u}{g}\sin\alpha$ (b) $\frac{u}{g}\cos\alpha$ (c) $\frac{u}{g}\text{cosec}\,\alpha$ (d) $\frac{u}{g}\sec\alpha$

54. The simple harmonic motion is the motion of a particle which moves in a straight line so that the acceleration is always directed towards a fixed point on the line and varies as the :

(a) distance from the fixed point

(b) square of the distance from the fixed point

(c) reciprocal of the distance from the fixed point

(d) reciprocal of the square of the distance from the fixed point

55. The singular solution of the differential equation $y = xp + a\sqrt{1+p^2}\left(p=\frac{dy}{dx}\right)$ is a :

(a) parabola (b) hyperbola (c) circle (d) straight line

56. A mass of 10 kg falls from rest, and is them brought to rest by penetrating 1 m into some sand; the average thrust of the send on it is (taking g = 10 m/s²) :

(a) 800 N (b) 900 N (c) 1000 N (d) 1100 N

57. If a particle moves along a plane curve, then its velocity along the normal at every point is :

(a) zero (b) unity (c) finite (d) infinite

58. If a particle moves on a cycloid, then the motion is :

(a) linear (b) simple harmonic (c) simple (d) parabolic

59. If a particle moves along $x = a(2t + \sin 2t)$, $y = a(1 - \cos 2t)$, then acceleration is :

(a) constant (b) variable (c) unknown (d) known

60. The displacement has :

(a) only magnitude (b) only direction

(c) both magnitude and direction (d) constant negative quantity

61. Weights W, ω, W, are attached to points B, C, D respectively of a light string AE where B, C, D divide the string into 4 equal lengths. If the string hangs in the form of 4 consecutive sides of a regular octagon with the ends A and E attached to points on the same level, then :

(a) $W = 2\omega$ (b) $W = (\sqrt{2}+1)\omega$ (c) $W = (\sqrt{3}+1)\omega$ (d) $W = 4\omega$

62. A uniform rod of weight W rests with its ends in contact with two smooth planes, inclined at angles α and β respectively to the horizon, and intersecting in a horizontal line. The inclination θ of the rod to the vertical is given by :

(a) $2\tan\theta = \tan\beta - \tan\alpha$ (b) $2\tan\theta = \tan\alpha - \tan\beta$

(c) $2\cot\theta = \cot\beta - \cot\alpha$ (d) $2\cot\theta = \cot\alpha - \cot\alpha$

63. Let P, Q, R be the sum of the components of various forces acting at a point, in three mutually perpendicular directions. The the forces are in equilibrium if :

(a) $P = Q = R$ (b) $P + Q = Q + R = R + P = 0$

(c) $P = Q = R = 0$ (d) $P + Q + R = 0$

64. The momments of a system of coplanar forces (not a equilibrium) about three collinear points A, B, C in the plane are G_1, G_2, G_3. Then :

(a) $G_1 \cdot AB + G_2 \cdot BC + G_3 \cdot CA = 0$ (b) $G_1 \cdot BC + G_2 \cdot CA + G_3 \cdot AB = 0$

(c) $G_1 \cdot CA + G_2 \cdot AB + G_3 \cdot BC = 0$ (d) $G_1 \cdot G_2 + CA \cdot AB + G_3 \cdot BC = 0$

65. If six forces, of relative magnitudes 1, 2, 3, 4, 5 and 6 act along the sides of a regular hexagon, taken in order, then the single equivalent force is of relative magnitude :

(a) 1 (b) 3 (c) 5 (d) 6

66. ABCD ..... is a polygon of n sides, and forces act at a point parallel and proportional to AB, 2BC, 3CD, etc. If O be the centroid of all the points B, C, D, ... including A, then their resultant is parallel and proportional to :

(a) $(n-2)OA$ (b) $(n+1)OA$ (c) nOA (d) $(n-1)OA$

67. Two forces given in magnitude at each through a fixed point, and are inclined at a constant angle θ. If θ varies, then the locus of A is :

(a) a straight line (b) a circle (c) a parabola (d) an ellipse

68. If three foces acting at a point are represented in magnitude and direction by three sides of a triangle, taken in order, they are in equilibrium. This condition is :

(a) only necessary and not sufficient (b) only sufficient but not necessary

(c) both necessary as well as sufficient (d) neither necessary nor sufficient

69. The resultant of P and Q is R. If Q is doubled, R is also doubled. If Q is reversed, R is again doubled. T h e n
$P^2 : Q^2 : R^2$ is given by :

(a) 1 : 1 : 1 (b) 2 : 2 : 3 (c) 2 : 3 : 2 (d) $3:2:\sqrt{2}$

70. In the Linear Programming Problem :

Maximize $z = 4x + y$

Subject to :

$3x + 5y \le 15$

$5x + y \le 15$

$-x + y \le 2$

$4x + 5y \le 20$

$x, y \ge 0,$

has :

(a) no solution (b) one solution (c) infinite solution (d) finite solution

71. Fit a straight line regression of Y on X from the following table :

X	:	0	1	2	3	4	5	6
Y	:	2	1	3	2	4	3	5

(a) $Y = 0.35 + 1.578\,X$ (b) $Y = 1.578 + 0.35\,X$.

(c) $Y = 1.357 + 0.5\,X$ (d) $Y = 0.5 + 1.357\,X$

72. The value of the correlation coefficient between two variable lies between :

(a) 0 and ∞ (b) $-\infty$ and ∞ (c) 0 and 1 (d) -1 and 1

73. In the method of least square of curve fitting, if n are constants, then the normal equations are :

(a) n^2 (b) n (c) $n - 1$ (d) $n + 1$

74. For a normal curve the greatest ordinate is :

(a) $\frac{1}{\sigma\sqrt{2\pi}}$ (b) $\frac{1}{\sqrt{2\pi\sigma}}$ (c) $\sigma\sqrt{2\pi}$ (d) $2\pi\sigma$

75. In case of Poisson distribution :

(a) mean > variance (b) mean < variance

(c) mean = variance (d) mean and variance are not related

76. The variance of Binomial distribution is :

(a) np (b) $1 - np$ (c) npq (d) $\pm\sqrt{n - pq}$

77. For a frequency distribution standard deviation is computed by using the formula :

(a) $\sigma = \frac{\Sigma f(x - \bar{x})}{\Sigma f}$ (b) $\sigma = \frac{\sqrt{\Sigma f(x - \bar{x})^2}}{\Sigma f}$

(c) $\sigma = \sqrt{\frac{\Sigma f(x - \bar{x})^2}{\Sigma f}}$ (d) $\sigma = \sqrt{\frac{\Sigma f(x - \bar{x})}{\Sigma f}}$

78. If the sizes in the frequency distribution are given in an ascending order of magnitude, then the median is calculated by :

(a) $M_d = l + \left(\frac{\frac{N}{2}+C}{f}\right) \times i$ (b) $M_d = l + \left(\frac{\frac{N}{2}-C}{f}\right) \times i$

(c) $M_d = l - \left(\frac{\frac{N}{2}+C}{f}\right) \times i$ (d) $M_d = l - \left(\frac{\frac{N}{2}-C}{f}\right) \times i$

79. The average of n numbers $x_1, x_2, x_3, \ldots\ldots, x_n$ is M. If x_1 is replaced by x', then the new average is :

(a) $M - x_1 + x'$ (b) $\frac{M - x_1 + x'}{n}$ (c) $\frac{(n-1)M - x_1 + x'}{n}$ (d) $\frac{Mn - x_1 + x'}{n}$

80. In a box containing 100 bulbs, 10 are defective. What is the probability the out of a sample of 5 bulbs, none is defective ?

(a) 10^{-5} (b) $\left(\frac{1}{2}\right)^5$ (c) $\left(\frac{9}{10}\right)^5$ (d) $\frac{9}{10}$

81. A single letter is selected at random from the word "PROBABILITY". The probability that it is a vowel, is :

(a) $\frac{3}{11}$ (b) $\frac{4}{11}$ (c) $\frac{2}{11}$ (d) 0

82. In a single throw with two dice, the chances of throwing eight is :

(a) $\frac{7}{36}$ (b) $\frac{1}{18}$ (c) $\frac{1}{9}$ (d) $\frac{5}{36}$

83. The probability that A, B, C can solve problem is $\frac{1}{3}, \frac{1}{3}, \frac{1}{3}$ respectively they attempt independently, then the probability that the problem will solved is :

(a) $\frac{1}{9}$ (b) $\frac{2}{9}$ (c) $\frac{4}{9}$ (d) $\frac{2}{3}$

84. The value of $\cos^{-1}\sqrt{\frac{2}{3}} - \cos^{-1}\frac{\sqrt{6}+1}{2\sqrt{3}}$ is equal to :

(a) $\frac{\pi}{3}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{2}$ (d) $\frac{\pi}{6}$

85. If $\sin^{-1}x + \cos^{-1}\left(\frac{1}{2}\right) = \frac{\pi}{2}$, then x is :

(a) 0 (b) $\frac{2}{\sqrt{3}}$ (b) $\frac{1}{\sqrt{5}}$ (d) $\frac{\sqrt{3}}{2}$

86. The solution of the equation $3\sin^{-1}\left(\frac{2x}{1+x^2}\right) - \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right) + 2\tan^{-1}\left(\frac{2x}{1-x^2}\right) = \frac{\pi}{3}$ is :

(a) $x = \sqrt{3}$ (b) $x = \frac{1}{\sqrt{3}}$ (c) $x = 1$ (d) $x = 0$

87. If the angles of elevation of the top and bottom of a flag staff fixed at the top of a tower at a point distant a from the foot a tower are α and β, then height of the flag staff is :
(a) $a(\sin\alpha - \sin\beta)$ (b) $a(\sin\alpha - \cos\beta)$ (c) $a(\cot\alpha - \cot\beta)$ (d) $a(\tan\alpha - \tan\beta)$

88. If the angle of elevation of a cloud at a height h above the level of water in a lake is α and the angle of depression of its image in the lake is β, then the height of the cloud above the surface of the lake is not correct :

(a) $\frac{h(\tan\beta + \tan\alpha)}{\tan\beta - \tan\alpha}$ (b) $\frac{h\sin(\alpha+\beta)}{\sin(\beta-\alpha)}$ (c) $\frac{h(\cot\beta + \cot\alpha)}{\cot\beta - \cot\alpha}$ (d) $\frac{h\cos(\alpha+\beta)}{\sin(\beta-\alpha)}$

89. If $y = \sec^{-1}\left(\frac{x+1}{x-1}\right) + \sin^{-1}\left(\frac{x-1}{x+1}\right)$, then $\frac{dy}{dx}$ is :

(a) 1 (b) 0 (c) $\frac{x-1}{x+1}$ (d) $\frac{x+1}{x-1}$

90. If $\sin x + \sin^2 x = 1$, then the value of $\cos^{12} x + 3\cos^{10} x + 3\cos^8 x + \cos^6 x$ is equal to :
(a) –1 (b) 1 (c) –2 (d) 2

91. The maximum value of $\frac{\log_e^x}{x}$ is :

(a) 1 (b) $\frac{2}{e}$ (c) e (d) $\frac{1}{e}$

92. If $A + B + C = \pi$ and $x = \sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$, then :

(a) $x \geq \frac{1}{8}$ (b) $x \leq \frac{1}{8}$ (c) $x \geq \frac{1}{2}$ (d) $x \leq \frac{1}{2}$

93. The value(s) of $\cos\frac{\pi}{7}\cos\frac{4\pi}{7}\cos\frac{5\pi}{7}$ is (are) :

(a) $-\frac{1}{8}$ (b) $-\frac{1}{4}$ (c) $\frac{1}{8}$ (d) $\frac{1}{4}$

94. If cosec A + cot A = $\frac{5}{2}$, then tan A is :

(a) $\frac{4}{9}$ (b) $\frac{3}{5}$ (c) $\frac{15}{16}$ (d) $\frac{20}{21}$

95. The point of intersection of the lines $\vec{r}\times\vec{a} = \vec{b}\times\vec{a}$ and $\vec{r}\times\vec{b} = \vec{a}\times\vec{b}$ is :

(a) $\vec{a}$ (b) $\vec{b}$ (c) $\vec{a}+\vec{b}$ (d) $\vec{a}-\vec{b}$

96. What is the value of $(\vec{a}\times\vec{b})\times(\vec{c}\times\vec{d}) + (\vec{a}\times\vec{c})\times(\vec{d}\times\vec{b}) + (\vec{a}\times\vec{d})\times(\vec{b}\times\vec{c})$?

(a) $2[\vec{a}\,\vec{d}\,\vec{c}]\,\vec{b}$ (b) $2[\vec{b}\,\vec{d}\,\vec{c}]\,\vec{a}$ (c) $2[\vec{a}\,\vec{c}\,\vec{d}]\,\vec{b}$ (d) $2[\vec{b}\,\vec{c}\,\vec{d}]\,\vec{a}$

97. If $\vec{a},\vec{b},\vec{c}$ are vectors from the origin to the point A, B, C, then $(\vec{a}\times\vec{b} + \vec{b}\times\vec{c} + \vec{c}\times\vec{a})$:

(a) perpendicular to the plane ABC
(b) parallel to the plane ABC
(c) lies in the plane ABC
(d) is null vector

98. The volume of the parallelopiped whose edges are represented by $2\hat{i} - 3\hat{j} + 4\hat{k}$, $\hat{i} + 2\hat{j} - \hat{k}$ and $3\hat{i} - \hat{j} + 2\hat{k}$ is :

(a) 10 (b) 7 (c) 6 (d) 5

99. Which of the following is correct ?

(a) $(\vec{a}\times\vec{b}) = (\vec{a}\cdot\vec{b})^2 + \vec{a^2} + \vec{b}$
(b) $(\vec{a}\times\vec{b})^2 = (\vec{a}\cdot\vec{b})^2 - \vec{a^2} + \vec{b^2}$
(c) $(\vec{a}\times\vec{b})^2 + (\vec{a}\cdot\vec{b})^2 = \vec{a^2}\,b^2$
(d) $(\vec{a}\times\vec{b})^2 + (\vec{a}\cdot\vec{b})^2 = \vec{a^2}\,\vec{b^2} = 0$

100. If $\vec{a}, \vec{b}, \vec{c}$, be three non-coplanar vectors, then the cross product is :

(a) distributive over scalar product of vectors
(b) not distributive over scalar product of vectors
(c) distributive over addition of vectors.
(d) not distributive over addition of vectors

101. The angle between two non-zero vectors $\vec{a}$ and $\vec{b}$ is given by

(a) $\sin^{-1}\frac{\vec{a}\cdot\vec{b}}{|\vec{a}\vec{b}|}$ (b) $\cos^{-1}\frac{\vec{a}\cdot\vec{b}}{|\vec{a}\cdot\vec{b}|}$ (c) $\sin^{-1}\frac{\vec{a}\cdot\vec{b}}{|\vec{a}||\vec{b}|}$ (d) $\cos^{-1}\frac{\vec{a}\cdot\vec{b}}{|\vec{a}||\vec{b}|}$

102. The point of intersection of the line $\vec{r}=\vec{a}+\vec{b}+t\vec{c}$ and the plane $\vec{r}=\vec{a}-\vec{b}+t_1(\vec{a}+\vec{b}-\vec{c})+t_2(\vec{a}-\vec{b}+\vec{c})$ is :

(a) $2\vec{a}-3\vec{b}+4\vec{c}$ (b) $2\vec{a}-3\vec{b}-4\vec{c}$ (c) $2\vec{a}+3\vec{b}+4\vec{c}$ (d) $2\vec{a}+3\vec{b}-4\vec{c}$

103. The area of the triangle having vertices (1, 3, 2), (2, –1, 1) and (–1, 2, 3) is :

(a) $\frac{1}{2}\sqrt{107}$ (b) $\frac{1}{2}\sqrt{155}$ (c) $\frac{1}{2}\sqrt{165}$ (d) $\frac{1}{2}\sqrt{187}$

104. The system of vectors are :
(a) Never closed under addition and multiplication
(b) Closed under addition and in a restricted sence in multiplication
(c) Closed under addition and multiplication
(d) Closed under addition only

105. Which of the following differential equations can be reduced to homogeneous form ?

(a) $y(e^x+x^2y)dx-e^xdy=0$ (b) $x^3\frac{dy}{dx}-x^2y+y^4\cos x=0$

(c) $(4x+6y+5)dx=(2x+3y+4)dy$ (d) $(1+y^2)dx+(x-\sin y)dy=0$

106. Which of the following differential equatoin is linear ?

(a) $(1+y)\frac{dy}{dx}+\cos x=0$ (b) $x+y\frac{dy}{dx}=0$

(c) $\frac{d^2y}{dx^2}+x^2\frac{dy}{dx}+(1+x)y=e^x$ (d) $(1+y)\frac{d^2y}{dx^2}+xy=e^x+x$

107. The differential equation y = px + f(p) is called of :
(a) Clairaut's form (b) Newtonian form (c) Bernoulli's form (d) Euler's form

108. If r is a radius and k is thickness of a frustum of a sphere, then its curved surface of frustum is :

(a) $\frac{1}{2}\pi rk$ (b) πrk (c) $2\pi rk$ (d) $4\pi rk$

109. If h is height and r_1, r_2 are the radii of the end of the frustum of a cone, then the volume of the frustum is :

(a) $\frac{\pi h}{3}(r_1^2-3r_1r_2+r_2^2)$ (b) $\frac{\pi h}{3}(r_1^2+3r_1r_2+r_2^2)$ (c) $\frac{\pi h}{3}(r_1^2-r_1r_2+r_2^2)$ (d) $\frac{\pi h}{3}(r_1^2+r_1r_2+r_2^2)$

110. The value of $\int_0^{\pi/2} \log(\tan x)dx$ is equal to :

(a) 0 (b) $\frac{x}{4}$ (c) $\frac{x}{2}$ (d) π

111. The value of $\int\frac{x+\sin x}{1+\cos x}dx$ is :

(a) $x\cot\frac{x}{2}$ (b) $x\tan\frac{x}{2}$ (c) $x\sin\frac{x}{2}$ (d) $x\cos\frac{x}{2}$

112. The value of $\int\frac{xe^x}{(x+1)^2}dx$ is :

(a) $\frac{1}{x+1}e^x$ (b) $(x-1)^2e^x$ (c) $(x+1)e^x$ (d) e^x

113. If x and y be two real variable, such that $x > 0$ and $xy = 1$, then the minimum value of $x + y$ is :

(a) 1 (b) −1 (c) 2 (d) −2

114. The condition that the curve $ax^2 + by^2 = 1$ and $a'x^2 + b'y^2 = 1$ should intersect orthogonally is that :

(a) $a + b = a' + b'$ (b) $a - b = a' - b'$ (c) $\frac{1}{a}+\frac{1}{b}=\frac{1}{a'}+\frac{1}{b'}$ (d) $\frac{1}{a}-\frac{1}{b}=\frac{1}{a'}-\frac{1}{b'}$

115. The equation of tangent at (2, 2) of the curve $xy^2 = 4(4 - x)$ is :

(a) $x - y = 4$ (b) $x + y = 4$ (c) $x - y = 2$ (d) $x + y = 2$

116. The derivative of $\sin^{-1}\frac{1-x^2}{1+x^2}$ w.r.t. $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ is :

(a) −1 (b) 0 (c) $\frac{1}{x}$ (d) x

117. The function f(x) defined by $f(x) = x\left[1+\frac{1}{3}\sin(\log x^2)\right]$, $x \neq 0$; $f(x) = 0$, $x = 0$, then :

(a) f(x) is continuous at x = 0
(b) f(x) has discontinuity of first kind at x = 0
(c) f(x) has discontinuity of second kind at x = 0
(d) f(x) has removable discontinuity at x = 0

118. $\lim_{n\to\infty}(1+x)^{1/x}$ is equal to :

(a) 0 (b) 1 (c) e (d) $\frac{1}{e}$

119. For the conic $\frac{l}{r} = 1 + e\cos\theta$, the sum of reciprocals of the segments of any focal chord is equal to :

(a) l (b) 2l (c) $\frac{1}{l}$ (d) $\frac{2}{l}$

120. If the line lx + my = n touches the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ if :

(a) $a^2l^2 - b^2m^2 = n^2$ (b) $al - bm = n$ (c) $a^2l^2 + b^2m^2 = n^2$ (d) $al + bm = n$

121. The straight line $x\cos\alpha + y\sin\alpha = p$ touches the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ if :

(a) $p^2 = a^2\cos^2\alpha - b^2\sin^2\alpha$ (b) $p^2 = a^2\cos^2\alpha + b^2\sin^2\alpha$
(c) $p^2 = a^2\sin^2\alpha - b^2\cos^2\alpha$ (d) $p^2 = a^2\sin^2\alpha + b^2\cos^2\alpha$

122. The focal distance of a point on the parabola $y^2 = 8x$ is 4. Its ordinates are :

(a) ± 1 (b) ± 2 (c) ± 3 (d) ± 4

123. The radius of the circle on which the four points of intersection of the lines $(2x - y + 1)(x - 2y + 3) = 0$ with the axes lie, is :

(a) 5 (b) $\frac{5}{\sqrt{2}}$ (c) $\frac{5}{2\sqrt{2}}$ (d) $\frac{5}{4\sqrt{2}}$

124. The equation of circle passing through (−1, 2) and concentric with $x^2 + y^2 - 2x - 4y - 4 = 0$ is :

(a) $x^2 + y^2 - 4y - 4 = 0$ (b) $x^2 + y^2 - 2x - 4y + 2 = 0$
(c) $x^2 + y^2 - 2x - 4y + 4 = 0$ (d) $x^2 + y^2 - 2x - 4y + 8 = 0$

125. The angle between the two straight line represented by the equation $6x^2 + 5xy - 4y^2 + 7x + 13y - 3 = 0$ is :

(a) $\tan^{-1}\frac{3}{5}$ (b) $\tan^{-1}\frac{5}{3}$ (c) $\tan^{-1}\frac{2}{11}$ (d) $\tan^{-1}\frac{11}{2}$

126. The equation of the straight line passing through the point of intersection of $4x + 3y - 8 = 0$ and $x + y - 1 = 0$, and the point (−2, 5) is :

(a) $9x + 7y - 17 = 0$ (b) $4x + 5y + 6 = 0$ (c) $3x - 2y + 19 = 0$ (d) $3x - 4y - 7 = 0$

127. If m is the mid point of the side BC of the triangle ABC, then :

(a) $AB^2 + AC^2 = AM^2 + BM^2$ (b) $AB^2 + AC^2 = 2AM^2 + 2BM^2$
(c) $AM^2 + MB^2 = 2AC^2$ (d) $2AB^2 + 2AC^2 = AM^2 + MB^2$

128. The straight line passes through the point $P(2, \sqrt{3})$ and makes an angle of 60° with the x-axis. The length of the intercept on it between the point P and the line $x + \sqrt{3}y = 12$ is :

(a) 1.5 (b) 2.5 (c) 3.5 (d) 4.5

129. Let H be a sub-group of a group G and a, b ∈ H. Let a ~ b iff a ≡ b mod H, then which of the following is true ?
(a) '~' is a reflexive relation
(b) '~' is a symmetric relation
(c) '~' is a transitive relation
(d) All of these

130. Let P be a probability function on S = (l_1, l_2, l_3, l_4) such that $P(l_2) = \frac{1}{3}, P(l_3) = \frac{1}{6}, P(l_4) = \frac{1}{9}$. Then $P(l_1)$ is :

(a) $\frac{7}{18}$ (b) $\frac{1}{3}$ (c) $\frac{1}{6}$ (d) $\frac{1}{2}$

131. If u = {natural numbers}, A = {multiples of 3} and B = {multiples of 5}, then A – B equals :

(a) $\bar{A} \cap B$ (b) $A \cap \bar{B}$ (c) $\bar{A} \cup \bar{B}$ (d) $\overline{A \cap B}$

132. Which of the following statement is true ?
(a) For any two sets A and B either $A \subseteq B$ or $B \subseteq A$
(b) $\{a\} \in \{a, b, c\}$
(c) {a, b, a, b, a, b, ...} is an infinite set
(d) {a, b, c} = {c, a, b}

133. State which of the following statement is correct ?
(a) Every set has a proper subset
(b) Every subset of a finite set is finite
(c) Every subset of an infinite set is infinite
(d) The set {x : x + 8 = 8} is the null set

134. If the matrices $A = \begin{bmatrix} 1 & 1 & 1 \\ 3 & 3 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} -2 & 3 \\ 1 & -5 \\ 4 & 1 \end{bmatrix}$, then AB is equal to :

(a) $\begin{bmatrix} -3 & -1 \\ -9 & -3 \end{bmatrix}$ (a) $\begin{bmatrix} 3 & -1 \\ 9 & -3 \end{bmatrix}$ (c) $\begin{bmatrix} -3 & 1 \\ 9 & 3 \end{bmatrix}$ (d) $\begin{bmatrix} 3 & 1 \\ -9 & 3 \end{bmatrix}$

135. If ω is cube root of unity, then the value of determinant $\begin{vmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \\ \omega^2 & 1 & \omega \end{vmatrix}$ is equal to :

(a) –1 (b) 1 (c) 0 (d) 2

136. The expression $\frac{12}{3 + \sqrt{5} + 2\sqrt{2}}$ is equal to :

(a) $1 - \sqrt{5} + \sqrt{2} + \sqrt{(10)}$ (b) $1 - \sqrt{5} - \sqrt{2} + \sqrt{(10)}$ (c) $1 + \sqrt{5} - \sqrt{2} + \sqrt{(10)}$ (d) $1 + \sqrt{5} + \sqrt{2} - \sqrt{(10)}$

137. If ${}^nC_{r-1} = 36$, ${}^nC_r = 84$ and ${}^nC_{r+1} = 126$, then the value of r is equal to :

(a) 1 (b) 2 (c) 3 (d) 4

138.In the binomial expansion of $(a - b)^n$, $n \geq 5$, the sum of 5th and 6th terms is zero. Then $\frac{a}{b}$ equals :

(a) $\frac{n-5}{6}$ (b) $\frac{n-4}{5}$ (c) $\frac{5}{n-4}$ (d) $\frac{6}{n-5}$

139.The sum of 16 terms of the following series $\frac{1^3}{1} + \frac{1^3+2^3}{1+2} + \frac{1^3+2^3+3^3}{1+2+5} + \ldots\ldots\ldots$16 terms is :

(a) 446 (b) 644 (c) 464 (d) 460

140.If $x = 1 + a + a^2 + a^3 + \ldots\ldots \infty\ (a < 1)$, $y = 1 + b + b^2 + b^3 + \ldots\ldots \infty\ (a < 1)$, then the value of $1 + ab + a^2b^2 + a^3b^3 + \ldots\ldots\infty$ is equal to :

(a) $\frac{xy}{x+y+1}$ (b) $\frac{xy}{x+y-1}$ (c) $\frac{x-y}{x+y+1}$ (d) $\frac{x-y}{x+y-1}$

141.If the sum of first p terms of an A.P. is q and the sum of the first q terms is p, then the sum of the first (p + q) terms is :

(a) p + q + 1 (b) − (p + q + 1) (c) −(p + q) (d) p + q

142.The nth term of the series $2\frac{1}{2} + 1\frac{7}{13} + 1\frac{1}{9} + \frac{20}{30} + \ldots\ldots$ is :

(a) $\frac{20}{5n^2+3}$ (b) 20 (5n + 3) (c) $\frac{2}{5n-3}$ (d) $\frac{20}{5n+3}$

143.The value of $7\log\frac{16}{15} + 5\log\frac{25}{24} + 3\log\frac{81}{80}$ is equal to :

(a) log 2 (b) zero (c) unity (d) 0.2

144.The value of complex number $\left(\frac{1+i}{\sqrt{2}}\right)^8 + \left(\frac{1-i}{\sqrt{2}}\right)^8$ is :

(a) 2 (b) −2 (c) $\sqrt{2}$ (d) $\frac{1}{\sqrt{2}}$

145.If the sum of three consecutive odd natural numbers is 153, then the numbers are :

(a) 47, 49, 51 (b) 49, 51, 53 (c) 51, 53, 55 (d) 53, 55, 57

146.The solution of the following equation $\frac{x-1}{3} - \frac{4x+1}{4} = \frac{1}{12}$ is :

(a) −1 (b) 1 (c) −2 (d) 2

147. The factorization of the expression $36x^2 - 12x + 1 - 25y^2$ is :

(a) $(5x - 6y + 1)(5x + 6y + 1)$ (b) $(6x - 5y + 1)(6x + 5y + 1)$

(c) $(5x - 6y - 1)(5x + 6y - 1)$ (d) $(6x - 5y - 1)(6x + 5y - 1)$

148. If , then $x^a y^b z^c$ equals :

(a) 0 (b) 1 (c) xyz (d) None of these

149. Which of the following decimal number of in the form $\frac{p}{q}$?

(a) $\frac{60}{7}$ (b) $\frac{68}{9}$ (c) $\frac{63}{4}$ (d) $\frac{62}{5}$

150. Which of the following is the decimal representation of $\frac{22}{7}$?

(a) $3.\overline{142857}$ (b) $3.\overline{142867}$ (c) $3.\overline{14957}$ (d) $3.\overline{14967}$