Question Paper of JNU MCA ENTRANCE 2011

1. A binary tree has 9 nodes. In-order and pre-order of the tree as follow :
   In order : E A C K F H D B G
   Pre-order : F A E K C D H G B
   What is the post-order traversal?
   (a) E C K A H B G D E (B) E K C A H B G D E (C) K F A E C D H G B (D) None of these

2. A bus has exactly six stops on its route. The bus first stops at stop one and then at stops two, three, four, five and six respectively. After the bus leaves stop six, the bus turns and returns to stop one and repeates the cycle. These stop are at six buildings that are, in alphabetical order L, M, N, O, P and Q. Some other information about the stops are as follows :
   P is the third stop
   M is the sixth stop
   O is the stop immediately before Q
   N is the stop immediately before L
   In case N is the fourth stop, which among the following must be the stop immediately before P?
   (a) O (b) Q (c) N (d) L

3. A differential equation in determinant is given by $\begin{vmatrix} y(x) & y'(x) \\ \sin x & \cos x \end{vmatrix} = 0$ where $y'(x) = \frac{dy(x)}{dx}$ is the derivative of y with respect to x. What to state about the different equation solutions?
   (a) It has no solution (b) It has finite number of solutions
   (c) It has countable number of solutions (d) It has uncountable number of solutions

4. What will be printed from the following program block?
   ```
   {
   char s1[50] = "xyzt"
   char "s2 = "xyat"
   int dif:
   dif = strcmp (s1, s2)
   printf("\n %d, dif);
   }
   ```
   (a) 1 (b) 25 (c) 15 (d) –1

5. What will be the eigenvalues of the lower triangular matrix defined by $\begin{bmatrix} 1 & 0 & 0 \\ 5 & -1 & 0 \\ 8 & -2 & 2 \end{bmatrix}$?

(a) 1, 2, –1 (b) 1, 5, 8 (c) 5, 8, –2 (d) None

6. MPEG in multimedia system stands for
(a) Motion Phase Experts Group (b) Motion Picture Experts Group
(c) Media Phase Experts Group (d) Media Picture Experts Group

7. A survey recently conducted revealed that marriage is fattening. The survey found that on an average, women gained 23 pounds and men gained 18 pounds during 13 years of marriage. The answer to which among the following questions would be the most appropriate in evaluating the reasoning presented in the survey?
(a) Why is the time period of the survey 13 years, rather than 12 or 14?
(b) Did any of the men surveyed gain less than 18 pounds during the period he was married?
(c) How muchweight is gained or lost in 13 years by a single people of comparable age to those studied in the survey?
(d) When the survey was conducted were the women as active as the men?

8. Which of the graph traversals of an unweigted graph can be used to generate path in ascending order of length of the path?
(a) BFS (b) DFS (c) Any of the above (d) None

9. The inverse of a skew-symmetric matrix of odd order
(a) is a symmetric matrix (b) is a skew-symmetrical matrix
(c) is a diagonal matrix (d) does not exist

10. Five educational films A, B, C, D and E are to be shown to a group of students. The films are to be shown in a particular order which conforms to the following conditions:
A must be shown earlier than C
B must be shown earlier than D
E must be the fifth film shown.
Which among the following is an acceptable order for showing the educational films?
(a) A, C, B, D, E (b) A, C, D, E, B (c) B, D, C, A, E (d) B, D, E, A, C

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11. Find the sum of the infinite series of complex numbers given by $\sum_{k=1}^{\infty} \frac{(1+2i)^k}{5^k}$, where $i^2 = -1$

(a) ∞ (b) $\frac{1}{2}(1+i)$ (c) $1-2i$ (d) $\frac{1}{2}i$

12. Consider the following assertions :
(i) Let A be a square matrix such that $A^{100} = I$ implies A is invertible.
(ii) When A, B are invertible matrices of same size, then $ABA^{-1} = B$ will be satisfied
(iii) When A is invertible, the $(A + A^t)$ is invertible, where A^t is the transpose of A
From the above, identify the assertion(s) which is/are not necessarily true.
(a) (i) only (b) (i) and (ii) only (c) (ii) and (iii) only (d) None of these

13. Six scientists A, B, C, D, E and F are to present a paper each at a one-day conference. Three of them will present in the morning session before the lunch break whereas the other three will be presented in the afternoon session. The lectures have to be scheduled in such a way that they comply with the following restrictions :
B should present his paper immediately before C's presentation; their presentations cannot be seprated by the lunch break. D must be either the first or the last scientist to present his paper. In case C is to be the fifth scientist to present his paper, then B must be the
(a) first (b) second (c) third (d) fourth

14. Consider the following statement : Let A, B be square matrices of same size.
Some conclusions may be derived as follows :
(i) If A, B are invertible, then AB = BA will be satisfied
(ii) If the matrix (AB) is invertible, then $(AB)^{-1} = ((B^tA^t)^{-1})^t$ will be satisfied, where t denote the transpose
(iii) If A, B are invertible, then $B^{-1} = A^{-1} - B^{-1}(B - A)A^{-1}$ will be satisfied
(a) (i) only (b) (i) and (ii) only (c) (ii) and (iii) only (d) None of these

15. The following function are defined on the real line $f_1(x) = \begin{cases} 0, & \text{when } x \text{ is rational} \\ 1, & \text{when } x \text{ is irrational} \end{cases}$
$f_2(x) = \max\{0, x\}$
(a) f_1, f_2 have uncountable number of points of non-differentiability
(b) f_1, f_2 have countable number of points of non-differentiability
(c) f_1, f_2 have finite number of points of non-differentiability
(d) None of these

16. As Lave is related to Volcano, which of the following relations stands valid?
(a) Ice : Glass (b) Cascade : Precipice (c) Stream : Geyser (d) Avalanche : Ice

17. End-around carry (EAC) generated in 1's complement arithmetic should be
(a) discarded (b) added to the result
(c) subtracted from the result (d) preserved for the next operation

18. Which of the following words is most opposite in meaning to the word ABATE?
(a) Attach (b) Alter (c) Assist (d) Augment

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19. Consider the following program segment :

```
for (i = 0, j = strlen(s) - 1; i ≤ j i++, j—)
{
    c = s[i];
    s[i] = s[j];
    s[j] = c;
    x = c*s;
}
```

In the above, x = c*5; is
(a) dead code (b) loop invariant (c) basic code (d) None

20. The equation of the plane passing through the point {1, 5, –7} having normal vector 41i – 17j – 3k, where i, j and k are unit vectors in the X-, Y- and Z- direction respectively, will be
(a) 41x – 17y – 3z – 39 = 0 (b) 21x – 2y – 3z – 19 = 0
(c) x + 5y – z – 29 = 0 (d) None of these

21. OPTAB AND SYMTAB are data structures used by
(a) assembler (b) loader (c) compiler (d) parser

22. If $x^4 = 16$, then what will be the value of 4^x?
(a) 2 (b) 4 (c) 16 (d) 12

23. Let l be a set of letters, d the set of digits and o the set of other symbols, then /.*(l|d|o)* *./ is
(a) comment string in Pascal or C language
(b) grammar of the comment string in Pascal or C language
(c) deterministic finite automata of the comment string in Pascal or C language
(d) recular expression of the comment string in Pascal or C language

24. For a function (sequence) defined by the rules s(1) = 1, s(2) = 2 and s(n + 1) = 2s(n) – s(n – 1), the values of s(4), s(5) and s(6) respectively are
(a) 4, 5, 6 (b) 4, 5, 11 (c) 5, 6, 11 (d) 5, 6, 7

25. The truth value of the formula $[(\neg(p \wedge q) \rightarrow r)] \leftrightarrow \neg(r \rightarrow s)$, if truth value of p be true, q be false, r be true and s be false, is
(a) tautology (b) true (c) false (d) invalid

26. Mohan drives to Sushil's house at an average speed of 40 mph. If he can drive 2/3 of the way in an hour, how far away is Sushil's house?
(a) 60 miles (b) 20 miles (c) 80 miles (d) 50 miles

27. Consider the following statements and determine which of the options is valid:
(i) Compilers synthesise target programs.
(ii) Right recursion is preferred over left re-cursion for recursive descent parsing.
(iii) The LL(k) grammars enhances the efficiency of the bottom-up parsers.
(iv) Parse trees graphically exhibit the derivation of a word using the grammar of a language.
(a) Only (i) is true (b) Only (i) and (ii) are true
(c) Only (i) and (iii) are true (d) Only (i) and (iv) are true

28. The function f and g are defined by $f(x) = |2x + 1|$ and $g(x) = 3$ for all numbers x. What is the least value of c for which $f(c) = g(c)$?
(a) 1 (b) –1 (c) 2 (d) –2

29. If a file of size n = 1000 takes 5 ms for sorting using heapsort algorithm, then approximately how much time would it take to sort a file of size n = 10000000000000?
Assume that all data are available in the main memory.
(a) 20 ms (b) 5000000000 ms (c) 20000000 ms (d) 20000000000 ms

30. Let z be a standard normal random variable and fora fixed x, set $X = \begin{cases} z, & \text{if } z > x \\ 0, & \text{otherwise} \end{cases}$
What will be E[X]?
(a) 0 (b) 1 (c) $\frac{1}{\sqrt{2\pi}} e^{\frac{x^2}{2}}$ (d) x

31. If $y = \sin(\sin x)$ and $\frac{d^2y}{dx} + \frac{dy}{dx}\tan x + f(x) = 0$, then f(x) will be equal to
(a) $\sin^2 x \sin(\cos x)$ (b) $\sin^2 x \cos(\cos x)$ (c) $\cos^2 x(\sin(\cos x))$ (d) $\cos^2 x \sin(\sin x)$

32. What will be the value of the following computation?
$^{20}C_1 + 2 \times {}^{20}C_2 + 3 \times {}^{20}C_3 + \ldots + 20 \times {}^{20}C_{20}$
(a) 380×2^{20} (b) 20×2^{19} (c) 20×2^{38} (d) None

33. In a certain code, GIGANTIC is written as GOGTANCI. How will MIRACLES be written in that code?
(a) MIRLCAES (b) MIRLACSE (c) RIMCALSE (d) RIMLCAES

34. If X_1 has mean 1 and variance 5 while X_2 has mean –2 and variance 5, and the two are independent, find the variance of $(X_1 + 2X_2 - 3)$.
(a) 25 (b) 15 (c) 36 (d) None

35. What is critical section of a program?
(a) A part of OS not allowed to be accessed by any process
(b) A part of memory to be used by the OS only
(c) A set of instruction that access mutually exclusive shared resource
(d) None of the above

36. What will be the value of $\lim_{x\to\infty}\left(\frac{1+5x^2}{1+3x^2}\right)^{x^2}$?
(a) e^{-1} (b) e (c) e^2 (d) 1

37. Choose the odd one
(a) Potassium (b) Silicon (c) Gallium (d) Zirconium

38. Consider the t
$f_1(z) = x^2 - y^2 + x + i(2x + y)$ and $f_2(z) = 2x^2 + y^2 + i(y^2 - x)$
where $z = x + iy$ is complex variable so that $i^2 = -1$.
Then, for any complex number z, identify the correct statement.
(a) Both f_1 and f_2 are analytic (b) f_1 is analytic but not f_2
(c) f_2 is analytic but not f_1 (d) Both f_1 and f_2 are not analytic

39. Suppose three boxes contain a mixture of white and black balls. The first box contains 12 white and 3 black balls; the second contains 4 white and 16 black balls and the third contains 6 white and 4 black balls. A box is selected at random and a single ball is chosen from it. The choice of the box is made according to a throw of a fair die. If the number of spots on the die is 1, the first box is selected. If the number of sports is 2 or 3, the second box is selected; other wise (the number of spots is equal to 4, 5 or 6) the third box is chosen. Find the probability that a white ball is chosen.
(a) 1/2 (b) 22/24 (c) 3/10 (d) 1/3

40. Let X and Y be two discrete random variables with join probability mass function given by

	X = –1	X = 0	X = 1
Y = 1	1/12	3/12	1/12
Y = 0	1/12	0/12	1/12
Y = 1	1/12	3/12	1/12

The values of E(X) and E(XY) respectively are
(a) 1, 0 (b) 0, 0 (c) 0, 1 (d) 1, 1

41. Nepthalene is related to woollen in the same way as antibiotic is related to
(a) germ (b) immunity (c) disease (d) body

42. If f(x) is a polynomial of degree 8 and $f(x)f\left(\frac{1}{x}\right) = f(x) + f\left(\frac{1}{x}\right)$, then f(x) is
(a) an odd function (b) an even function
(c) neither even nor odd function (d) None of these

43. Suppose $3993 is deposited in a savings account which earns 4.3% interest. What is the approximate compound amount after two years if the interest is compound continuously?
(a) $6870 (b) $5326 (c) $4351 (d) $6997

44. Given the following definition, which answer points to contents in x?
int x; int*p = & x; int *p = &p;
(a) p (b) &p (c) **p (d) *p

45. The period of |sinx| – |cosx| is
(a) 2π (b) π (c) $\pi/2$ (d) None

46. DWH is related to WDS in the same way as FUL is related to
(a) UFO (b) OFU (c) FOU (d) ELV

47. The derivative of $\sec^{-1}\left(\frac{1}{2x^2-1}\right)$ with respect $\sqrt{1-x^2}$ at $x=\frac{1}{2}$ is
(a) 2 (b) 4 (c) 1 (d) –2

48. The digit in the unit place of the number $183! + 3^{183}$ is
(a) 7 (b) 6 (c) 3 (d) 4

49. A self-complemented distributive lattice is called
(a) Boolean algebra (b) Self-dual lattice (c) Modular lattice (d) Complete lattice

50. If there is an error of k% in measuring the edge of a cube, then the percent error in estimating its volume is
(a) k (b) 3k (c) k/3 (d) None

51. What is the number that comes next in the following sequence?
4, 6, 12, 14, 28, 30, ...
(a) 32 (b) 60 (c) 62 (d) 64

52. The equation of a curve passing through $\left(2, \frac{7}{2}\right)$ and having gradient $1-\left(\frac{1}{x^2}\right)$ at (x, y) is
(a) $y = x^2 + x + 1$ (b) $xy = x^2 + x + 1$ (c) $xy = x + 1$ (d) None

53. What will be the value of the following expression in C language?
$6 < 7 > 5$
(a) True (b) False (c) 1 (d) 2

54. The solution of the differential equation $(1-y)x\frac{dy}{dx} + (1+x)y = 0$ is
(a) $\log|xy| + x - y = c$ (b) $\log|xy| + x + y = c$ (c) $\log|xy| - x - y = c$ (d) None of these

55. The highest normal form for a relation with two at tributes is
(a) 1NF (b) 2NF (c) 3NF (d) BCNF

56. Let X be a Poisson random variable with parameter λ. What will be the value of P(X is even) – P(X is odd)?

(a) $\frac{1}{2}(1+e^{-2\lambda})$ (b) $\frac{1}{2}(1-e^{-2\lambda})$ (c) e^{-2x} (d) None

57. Which of the following is not a DDL statement?
(a) ALTER (b) DROP (c) GRANT (d) CREATE

58. If $f(x) = \cos(\log x)$, then $f(x)f(x) - \frac{1}{2}\left\{f\left(\frac{x}{y}\right) + f(xy)\right\}$ has the value

(a) –2 (b) –1 (c) $\frac{1}{2}$ (d) None

59. Which of the following ordering, from most acceptable to least acceptable levels of cohesion, is correct?
(a) Sequential, Communicational, Procedural, Logical
(b) Procedural, Communicational, Temporal, Logical
(c) Functional, Procedural, Sequential, Logical
(d) None of the above

60. Ram walks 10 meters in front and 10 meters to the right. Then every time turning to his left, he walks 5 meters, 15 meters and 15 meters respectively. How far is he form his starting point?
(a) 5 meters (b) 10 meters (c) 15 meters (d) 20 meters

61. If S_1, S_2 and S_3 be respectively the sum of n, 2n and 3n terms of a GP, then $\frac{S_1(S_3 - S_2)}{(S_2 - S_1)^2}$ is equal to

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

62. The equivalent of $(3124)_4$ to base 3 is
(a) 217 (b) 21000 (c) 22011 (d) 17010

63. If $\sin^{-1}\left(\frac{x^2 - y^2}{x^2 + y^2}\right) = \log a$, then $\frac{dy}{dx}$ equals

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

64. Let (h, k) be a fixed point, where h > 0, k > 0, A straight line passing through this point cuts the positive direction of the coordinate axes at the points P and Q. Which of the following is the minimum area of the triangle OPQ, O being the origin?

(a) hk (b) 2hk (c) $\frac{1}{2}$hk (d) None

65. Alpha testing is a type of
(a) verification testing (b) validation testing (c) mutation testing (d) regression testing

66. The area of the region bounded by the parabola $y = x^2 + 1$ and the straight line $x + y = 3$ is given by

(a) $\frac{45}{7}$ (b) $\frac{25}{4}$ (c) $\frac{\pi}{18}$ (d) $\frac{9}{2}$

67. A moving-arm disk storage with one head has 200 tracks per recording surface. Disk rotation speed is 2400 r.p.m. and track storage capacity is 62500 bits. What will be the transfer time?
(a) 3.75 Mbits/sec (b) 4.25 Mbits/sec (c) 2.5 Mbits/sec (d) 1.5 Mbits/sec

68. The population of a country increases at a rate pro portional to the number of inhabitants. If the population doubles in 30 years, then the population will triple in approximately how many years?
(a) 42 (b) 45 (c) 48 (d) 51

69. If it was Saturday on 17th December 1982, what will be the day on 22nd December, 1984?
(d) Sunday (b) Monday (c) Friday (d) Saturday

70. If a, b, c are in AP, then ax + by + c = 0 will always pass through a fixed point whose coordinates are
(a) (1, −2) (b) (−1, 2) (c) (1, 2) (d) (−1, −2)

71. The value of $\lim_{x \to 0} \frac{\int_0^{x^2} (x + xt)dt}{\sin x \tan(\pi - x)}$ is
(a) 0 (b) 1 (c) 2 (d) $\frac{1}{2}$

72. Which process model is appropriate for automating an existing manual system?
(a) Waterfall model (b) Prototyping odel (c) Spiral model (d) None of the above

73. If $y = \tan^{-1}\frac{x-1}{1-x} + \tan^{-1}\frac{1-x}{1+x}$, then $\frac{dy}{dx}$ is given by
(a) $\frac{1}{(1+x^2)}$ (b) $\frac{1}{(1-x^2)}$ (c) $\frac{2x}{(1-x^2)}$ (d) 0

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74. A circular queue is implemented as an array of five elements, say q[5], with F(front) and R(rear) pointers initialized as F = R − 1. Assuming that F points one position below the actual front element, whereas R points to the actual rear element, what would be the values of F and R after the following sequence of operations (D: delete, I: insert)?
(a) F = 2, R = 1 (b) F = 1, R = 2 (c) F = 1, R = 1 (d) None

75. What will be printed from the following C scripts?
```
if ("RAM" = = "RAM")
    print ("TRUE")
else
    printf ("FALSE")
```
(a) True (b) False (c) Compilation Error (d) Runtime Error

76. A relation R(A, B, C, D) has the set of functional dependencies {B → C, C → A, B → D}. Which of the following decompositions is dependency pre serving?
(a) R1(C, A) R2(C, B, D) (b) R1(A, C, D) R2(B, D)
(c) R1(C, A) R2(A, B, D) (d) All of the above

77. The equations x − y = 4 and $x^2 + 4xy + y^2 = 0$ represent the sides of
(a) an equilateral triangle (b) a right-angled triangle
(c) an isosceles triangle (d) None of the above

78. If two relations have no attributes in common, then natural join
(a) is a cross project (b) is a non-equijoin (c) yields no result (d) cannot be performed

79. The circles whose equations are $x^2 + y^2 + c^2 = 2ax$ and $x^2 + y^2 + c^2 = 2by$ will touch one other externally if
(a) $\frac{1}{b^2} + \frac{1}{c^2} = \frac{1}{a^2}$ (b) $\frac{1}{c^2} + \frac{1}{a^2} = \frac{1}{b^2}$ (c) $\frac{1}{a^2} + \frac{1}{b^2} = \frac{1}{c^2}$ (d) None of the above

80. Which of the following statements is false?
(a) Paging suffers from internal fragmentation
(b) Segmentation suffers from external fragmentation
(c) Segments can be paged
(d) Pages cannot be segmented

81. A constructor is invoked when
(a) a class is declared (b) a class is used
(c) an object is declared (d) an object is used

82. If the chord of contact of tangents from a point P to a given circle passes through Q, then the circle on PQ as diameter
(a) cuts the given circle orthogonally (b) touches the given circle externally
(c) touches the given circle internally (d) None of the above

83. If + means +, − means ×, + means ÷ and × means −, then what will be the value of the expression $36 \times 12 + 4 \div 6 + 2 - 3$?
(a) 2 (b) 18 (c) 42 (d) None of these

84. The vertices of the hyperbola $9x^2 - 16y^2 - 36x + 96y - 252 = 0$ are
(a) (6, 3) (b) (6, 3), (−6, 3) (c) (−6, 3), (−6, −3) (d) None of these

85. The simplified expression for the SOP expression $\Sigma(1, 3, 5, 7, 9, 11, 13, 15)$ corresponding to the inputs ABCD is
(a) D' (b) A' + D' (c) A'B + C'D (d) A + B + C + D

86. If P(X, Y) be any point of ellipse $16x^2 + 25y^2 = 400$ and $F_1 = (3, 0)$, $F_2 = (-3, 0)$, then $PF_1 + PF_2$ equals
(a) 6 (b) 8 (c) 10 (d) 12

87. Which of the following is not a storage class supported by C++?
(a) Auto (b) Register (c) Dynamic (d) Mutable

88. The equation of the plane containing the line $\frac{x+1}{-3} = \frac{y-3}{2} = \frac{z+2}{1}$ and the point (0, 7, −7) is
(a) x + y + z = 1 (b) x + y + z = 2 (c) x + y + z = 0 (d) None

89. Which of the following is true for linkage editor?
(a) It is used to edit programs which have to be later linked together
(b) It links object modules and resolves extyernal references between them before loading
(c) It links object modules during compilation
(d) It resolves external references between object modules during execution

90. The angle between two diagonals of a cube is
(a) $\cos^{-1}\frac{1}{2}$ (b) $\cos^{-1}\frac{1}{3}$ (c) $\cos^{-1}\frac{1}{4}$ (d) $\frac{\pi}{2}$

91. The number of boys in a class is three times the number of girls. Which of the following numbers cannot represent the total number of students in the class?
(a) 40 (b) 42 (c) 44 (d) 48

92. In a complete graph of n vertices, how many Hamiltonian circuits are possible?
(a) n! (b) n^2 (c) n^n (d) None

93. If vectors $\hat{i} - 2x\hat{j} - 3y\hat{k}$ and $\hat{i} - 3x\hat{j} - 2y\hat{k}$ are orthogonal to each other, then the locus of the point (x, y) is
(a) a circle (b) an ellipse (c) a parabola (d) a straight line

94. What is the data structure used by the macroprocessor to expand nested macrocalls?
(a) Multilist (b) Tree (b) Stack (d) Heap

95. The angle between $\bar{a}$ and $\bar{b}$ is $\frac{5\pi}{6}$, and the projection of $\bar{a}$ in the direction $\bar{b}$ is $\frac{6}{\sqrt{3}}$ then $|\bar{a}|$ is equal to
(a) 6 (b) $\frac{\sqrt{3}}{2}$ (c) 12 (d) 4

96. The variance of the first n natural numbers is
(a) $\frac{n^2-1}{12}$ (b) $\frac{n^2-1}{6}$ (c) $\frac{n^2+1}{6}$ (d) $\frac{n^2+1}{12}$

97. A dice is rolled three times. What is the probability of getting a large number than the previous number?
(a) $\frac{5}{216}$ (b) $\frac{5}{54}$ (c) $\frac{1}{6}$ (d) $\frac{5}{36}$

98. Consider the following statements :
Some camels are ships
No ship is a boat
some conclusions may be derived as follows :
(i) some ships are camels
(ii) some boats are camels
(iii) some camels are not boats
(iv) All boats are camels
Which of the above is/are followed from the above given two statements?
(a) Only (i) follows (b) Only (ii) and (iii) follow
(c) Only (i) and (iii) follow (d) Only (i) and (iv) follow

99. If two events A and B are such that $P(A^C) = 0.3$, $P(B) = 0.4$ $P(A \cap B^C) = 0.5$, then $P\left(\frac{B}{A \cup B^C}\right)$ is equal to
(a) 0.20 (b) 0.25 (c) 0.30 (d) 0.35

100. The angle between the minute hand and the hour hand of a clock when the time is 7:20 AM, is
(a) 100 degrees (b) 104 degrees (c) 108 degrees (d) 112 degrees

101. If sinA = sinB and cosA = cosB, then the value of A in terms of B is
(a) $n\pi + B$ (b) $n\pi + (-1)nB$ (c) $2n\pi + B$ (d) $2n\pi - B$

102. An aeroplane flying horizontally 1 km above the ground is observed at an elevation of 60 degrees and after 10 seconds the elevation is observed to be 30 degree. The uniform speed of the aeroplane in kilometers per hour is

(a) $640\sqrt{3}$ (b) 240 (c) $240\sqrt{3}$ (d) None of these

103. In a class of 55 students, the number of students studying different subjects is 23 in Mathematics, 24 in Physics, 19 in Chemistry 12 in Mathematics and Physics, 9 in Mathematics and Chemistry, 7 in Physics and Chemistry and 4 in all the three subjects. The number of students who have taken exactly one subject is

(a) 6 (b) 7 (c) 9 (d) 22

104. At the end of a conference, all the ten people shake hands with each other once. How many handshakes will there be altogether?

(a) 20 (b) 45 (c) 55 (d) 90

105. If α and β are of the roots of $x^2 - 2x + 4 = 0$, then $\alpha^n + \beta^n$ is equal to

(a) $2^n \cos\frac{n\pi}{3}$ (b) $2^n \cos\frac{(n+1)\pi}{3}$ (c) $2^{n-1} \cos\frac{n\pi}{3}$ (d) $2^{n-1} \cos\frac{(n+1)\pi}{3}$

106. $\frac{(-1+i\sqrt{3})^{15}}{(1-i)^{20}} + \frac{(-1-i\sqrt{3})^{15}}{(1+i)^{20}}$ is equal to

(a) -64 (b) -32 (c) -16 (d) $\frac{1}{16}$

107. If the roots of equation $12x^2 - mx + 5 = 0$ are in the ration 2 : 3, then m is equal to

(a) $2\sqrt{10}$ (b) $5\sqrt{10}$ (c) $3\sqrt{10}$ (d) None of these

108. In a round-robin CPU scheduling algorithm, let strepresent the time for context switch, q denote the time quantum and r denote the average time aprocess runs before blocking on I/O. What will be the CPU efficiency is $s < q < r$?

(a) $\frac{r}{r+s}$ (b) $\frac{s}{r+s}$ (c) $\frac{q}{q+s}$ (d) None

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109. If $\int f(x)dx = g(x)$, $\int f^{-1}(x)dx$ is equal to

(a) $g^{-1}(x)$ (b) $xf^{-1}(x) - g(f^{-1}(x))$ (c) $\int xf^{-1}(x) - g^{-1}(x)$ (d) $f^{-1}(x)$

110. Consider a logical address space of 8 pages each of 1024 words mapped into memory of 32 frames. How many bits are there in the physical address?

(a) 15 (b) 13 (c) 11 (d) 9

111. The value of $(P \; Q) \wedge (P \rightarrow R) \wedge (Q \rightarrow S)$ is equivalent to

(a) $S \rightarrow R$ (b) $R \rightarrow S$ (c) $S \wedge R$ (d) S R

112. In a connected graph of n vertices, what will e the length of a Hamiltonian path (if it exists)?

(a) n (b) n + 1 (c) n - 1 (d) $\frac{n}{2}$

113.A relation R on a set A = {1, 2, 3, 4, 5} is defined by x Ry : x + 1 = y. What is R^3?
(a) {(1, 3), (2, 4)} (b) {(1, 3), (2, 5)} (c) {(1, 4), (2, 5)} (d) {(1, 4), (4, 5)}

114.Suppose X is a continuous random variable with density function f : E[|X – A|] which is minimized when A is equal to
(a) median (b) mode (c) mean (d) standard deviation

115. $\int_C xy^2 dy$, where the path of integration C is the quarter circle defined by the parameter variable t as

$x + 4\cos t$, $y = 4\sin t$ and $0 \le t \le \frac{\pi}{2}$

(a) 4π (b) 8π (c) 16π (d) None

116.Sanjay has 7 friends. In how many ways can be invite one or more friends at dinner?
(a) 127 (b) 126 (c) 127 (d) 128

117.What will be the value of $4\tan^{-1}\frac{1}{5} + \tan^{-1}\frac{1}{239}$?

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

118.What will be printed from the following block d = 0

```
for (i = 1; i < 31; ++1)
    for (j = 1; j < 31; ++j)
    for (k = 1; k < 31; ++k)
        if (((i + j + k) %3)++0) d = d+1;
printf("%d", d);
```

(a) 9000 (b) 27000 (c) 3000 (d) None of these

119.The total number of ways in which three distinct number in AP can be selected from the set {1, 2, 3, ..., 24} is equal to
(a) 66 (b) 132 (c) 198 (d) None of these

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120.The minimum number of colors needed to color a graph having n(>3) vertices and 2 edges is
(a) 4 (b) 3 (c) 2 (d) 1