		PARTICULARS TO BE FILLED IN BY THE CANDIDATE	
1310812		Name of the Candidate	
		Roll Number	
Paper Code	WCAM/131	Application Number	
		Name of the Centre	
Question Booklet Number	1310812	Centre Code	
		Date of the Test	
Question Paper Series	D	Signature of the Candidate	

Maximum Marks: 100

Test Duration: 02 hours

INSTRUCTIONS

- Complete all entries on the cover page and put your signature in the space provided.
- Use only Ball Point Pen (black / blue) for making entries in the Question Booklet and the OMR Answer Sheet.

SEAL

1. The Question Booklet consists of 16 pages and contains 100 multiple choice questions (MCQs). Count the number of pages and questions before attempting the questions. Discrepancy, if any, must immediately be brought to the notice of the Invigilator.
2. The Test duration as specified above shall be reckoned from the moment of distribution of the Question Booklets.
3. Blank space in the Question Booklet may be used for rough work.
4. Each MCQ is followed by four alternative answers. Select only one answer, which you consider as the most appropriate. Shade the relevant circle against the corresponding question number on the OMR Answer Sheet. Selecting more than one answer for a question, even if one of the selected answers is correct, would result in its being treated as an incorrect answer.
5. Answers for MCQs should ONLY be marked on the OMR Answer Sheet. No answer should be written/marked on the Question Booklet.
6. **The candidate is required to separate the original OMR Answer Sheet and its carbonless copy at the perforation carefully after the Admission Test. He / She shall hand over the original OMR Answer Sheet and Admit Card to the Invigilator before leaving his/her seat and take with him/her the carbonless copy of the OMR Answer Sheet and the Question Booklet.**
7. **Failure to handover the original OMR Answer Sheet will lead to cancellation of the candidature.**

1. Find number of page faults for FIFO (First In First Out) page replacement policy if only 3 pages can be loaded at a time

5, 4, 3, 2, 1, 4, 3, 5, 4, 3, 2, 1, 5

(a) 9
(b) 10
(c) 11
(d) 12

2. Assume we need to download text documents at the rate of 1000 pages per minute. What is the required bit rate of the channel, if a page is an average of a 24 lines with 80 characters in each line?

(a) 1.636 Mbps
(b) 1.736 Mbps
(c) 1.836 Mbps
(d) 1.936 Mbps

3. If every non-key attribute is functionally dependent on primary key, then relation will be in atleast

(a) First Normal Form (INF)
(b) Second Normal Form (2NF)
(c) Third Normal Form (3NF)
(d) Fourth Normal Form (4NF)

4. OSI layer which is responsible for moving frames from one hope to the next is

(a) Physical
(b) Data Link
(c) Transport
(d) Network

5. Runtime polymorphism is implemented by-

(a) Function overloading
(b) Operator overloading
(c) Virtual Function
(d) Function Template

6. Which of the following sorting methods will be the best if number of swapping done, is the only measure of efficiency ?

(a) Bubble sort
(b) Insertion sort
(c) Selection sort
(d) All of these

7. The maximum number of comparison needed to sort 7 items using radix sort is (assume each item is a 4 digit decimal number)

(a) 280
(b) 40
(c) 47
(d) 38

8. What is the output of this C code ?

```
#include <stdio.h>
int main()
{
printf ("Hello World! %d \n", x);
return 0;
}
```

(a) Hello World! x;
(b) Hello World! followed by a junk value
(c) Compile time error
(d) Hello World

9. QoS stands for
   (a) Quality of security
   (b) Quality of system
   (c) Quality of service
   (d) None of the mentioned

10. A graph in which all nodes are of equal degree is called
   (a) Multi graph
   (b) Non regular graph
   (c) Regular graph
   (d) Complete graph

11. Which of these data types is used by operating system to manage Recursion in Java/C/C++?
   (a) Array
   (b) Stack
   (c) Queue
   (d) Tree

12. What is the binary equivalent of the decimal number 368?
   (a) 101110000
   (b) 110110000
   (c) 111010000
   (d) 111100000

13. Which of the following is not a storage class supported by C++ ?
   (a) register
   (b) auto
   (c) mutable
   (d) dynamic

14. In C++, the declaration
   int x; int&p=x;
   is same as the declaration
   int x; *p; p = &x;
   This remark is
   (a) true
   (b) false
   (c) sometimes true
   (d) none of the above

15. Assume that a random number generating function – rand ( ), returns an integer between 0 and 10000 (both inclusive). If you want to simulate the throwing of a die using this random function, use the expression
   (a) rand ( ) % 6
   (b) rand ( ) % 6 + 1
   (c) rand ( ) % 5 + 1
   (d) none of the above

16. For a method to be an interface between the outside world and a C++ class, it has to be declared
   (a) private
   (b) protected
   (c) public
   (d) external

17. To sort many large objects or structures, it would be most efficient to place
   (a) references to them in an array and sort the array
   (b) them in a linked list and sort the linked list
   (c) pointers to them in an array and sort the array
   (d) them in an array and sort the array

18. Consider a noise less channel with a bandwidth of 3000 Hz transmitting a signal with two signal levels. Maximum bit rate can be
   (a) 3000 bps
   (b) 6000 bps
   (c) 9000 bps
   (d) 12000 bps

19. Express the boolean function F = xy + x´zin a product of maxterms form
   (a) π (0, 1, 5, 7)
   (b) π (0, 2, 4, 5)
   (c) π (0, 1, 3, 5)
   (d) π (1, 3, 5, 7)

20. In C++, a variable defined within a block is visible
   (a) from the point of definition onward in the program
   (b) from the point of definition onward in the function
   (c) from the point of definition onward in the block
   (d) throughout the function

21. Salim, the son of Murad is married to Sanna, whose sister Jabeen is married to Ayaan, the brother of Salim. How is Jabeen married to Ayaan, the brother of Salim. How is Jabeen related to Murad ?
   (a) Sister
   (b) Cousin
   (c) Sister in law
   (d) Daughter in law

22. Santosh goes first 7 km North then turns left and moves 10 km, again he turns left and moves 7 km. How far is he from the starting point ?
   (a) 7 km
   (b) 10 km
   (c) 17 km
   (d) 24 km

23. Neeta starting from point X and walked straight 5km West, then turned left and walked 2 km and again turned left and walked straight 7 km. In which directed is she from X ?
   (a) North – East
   (b) South - West
   (c) South - East
   (d) North - West

24. Find the missing in the following
   ACE, GIK, ... , SUN
   (a) LNP
   (b) MOQ
   (c) NPR
   (d) MNO

25. Find the missing sequence in the following
   25, 49, 121, 169, ...
   (a) 256
   (b) 283
   (c) 225
   (d) 189

26. The empirical relationship between mean, median and mode is :
   (a) mean – mode = 3 (mean – median)
   (b) mean – median = 3 (mean – mode)
   (c) median – mode = 3 (mean – mode)
   (d) None of these

27. Select the pair that has the same relationship as the original pair

East : Orient

(a) North : Polar
(b) North : Tropic
(c) South : Capricorn
(d) West : Occident

28. Find the missing (?) from among the given options.

$$\frac{T}{J} : 2 :: \frac{X}{H} : ?$$

(a) 2
(b) 3
(c) $\frac{23}{7}$
(d) 4

29. Find the missing sequence in the following.

1, 1, 2, 3, ..., 8, 13

(a) 3
(b) 4
(c) 5
(d) 8

30. Find the missing (?) from among the given options.

B : 16 : : D : ?

(a) 12
(b) 150
(c) 200
(d) 264

31. Let $f(x, y) = x^3 + y^3$ for all $(x,y) \in \mathbb{R}^2$. Then

(a) f has a local maxima at (0, 0)
(b) f has a local minima at (0, 0)
(c) f has neither a local maxima nor a local minima at (0, 0)
(d) f has both a local maxima and a local minimum at (0, 0)

32. Let $T : P_2(x) \to P_2(x)$ be linear transformation on vector space $P_2(x)$ (polynomials of degree ≤ 2 over R) such that $T(f(x)) = \frac{d}{dx}(f(x))$. Then the matrix of T w.r.t. basis $\{1, x, x^2\}$ is

(a) $\begin{bmatrix} 0 & 0 & 0 \\ 1 & 0 & 0 \\ 0 & 2 & 0 \end{bmatrix}$
(b) $\begin{bmatrix} 0 & 0 & 1 \\ 0 & 2 & 0 \\ 0 & 0 & 0 \end{bmatrix}$
(c) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 2 \\ 0 & 0 & 0 \end{bmatrix}$
(d) $\begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 2 \\ 0 & 0 & 0 \end{bmatrix}$

33. If $x + y + z = u$, $y + z = uv$, $z = u v w$, then the value of the Jacobian of x, y, z with respect to u, v, w is

(a) uv
(b) uv^2
(c) $u^2 v^2$
(d) $u^2 v$

34. The polar coordinates of pole are

(a) undefined
(b) (0, 0)
(c) $\left(0, \frac{\pi}{2}\right)$
(d) $\left(0, \frac{\pi}{3}\right)$

35. Let the equation of a straight line passing through a point A $(\alpha, \beta, \upsilon)$ and having direction ratios l, m, n be given by $\frac{x-\alpha}{l} = \frac{y-\alpha}{m} = \frac{z-\upsilon}{n} = r$. Suppose that P be any arbitrary point on this line with coordinates $(\alpha + lr, \beta + mr, \upsilon + nr)$. Geometrically, r is

(a) equal to the distance AP
(b) proportional to the distance AP
(c) equal to half the distance AP
(d) proportional to AP^2

36. The volume of the solid generated by revolving the region between the y-axis and the curve $x = 2\sqrt{y}, 0 \leq y \leq 4$, about the y-axis is

(a) 4π
(b) 32π
(c) 16π
(d) 8π

37. If $U = \{(x, y) \in R^2 | y = mx\}$ and $W = \{(x, y) \in R^2 | y = tx, t \neq m\}$ are subspaces of R^2, then dim (U + W) is

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

38. Which of the following function is continuous at origin

(a) $f(x) = \begin{cases} \cos\frac{1}{x}, & x \neq 0 \\ 0, & x = 0 \end{cases}$
(b) $f(x) = \begin{cases} x + \sin\frac{1}{x}, & x \neq 0 \\ 1, & x = 0 \end{cases}$
(c) $f(x) = \begin{cases} \sin x \sin\frac{1}{x}, & x \neq 0 \\ 0, & x = 0 \end{cases}$
(d) $f(x) = \begin{cases} x \sin\frac{1}{x}, & x \neq 0 \\ 1, & x = 0 \end{cases}$

39. If α is characteristics root of a non-singular matrix A, then the characteristics root of adj A is

(a) $\frac{|A|}{\alpha}$
(b) $|A| - \alpha$
(c) $|A| + \alpha$
(d) $\frac{\alpha}{|A|}$

40. The solution of $y = 2px + \tan^{-1}(xp^2)$, is (here $p = \frac{dy}{dx}$)

(a) $y = 2cx + \tan^{-1}(xc^2)$
(b) $y = cx^2 + \tan^{-1}\left(\frac{c^2}{4}\right)$
(c) $y = cx + \tan^{-1}\left(\frac{c^2x}{4}\right)$
(d) $y = cx + \tan^{-1}(c^2x)$

41. The extremal of the functional $I = \iint_D \left[\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y^2} + \left(\frac{\partial^2 z}{\partial x \partial y}\right)^2\right] dx\, dy$ is

(a) $Z = xF_1(y) + F_2(y) + yF_3(x) + F_4(x)$
(b) $Z = x^2 F_1(y) + F_2(y) + yF_3(x) + F_4(x)$
(c) $Z = xF_1(y) + F_2(y) + y^2 F_3(x) + F_4(x)$
(d) $Z = x^2F_1(y) + F_2(y) + y^2F_3(x) + F_4(x)$

42. The complete solution of $(p^2 + q^2)y = qz$, is

(a) $z = \left(\frac{a^2+b^2}{b}\right)y$
(b) $z^2 = (a^2 + b^2)x + by$
(c) $z^2 = (a + bx)^2 + b^2y^2$
(d) $z = (a + bx) + by$

43. The solution of the differential equation $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = xe^x \sin x$ is

(a) $y = (c_1 - c_2 x)e^x + e^x(2\cos x + x \sin x)$ (b) $y = (c_1 + c_2 x)e^x - e^x(2\cos x + x \sin x)$
(c) $y = (c_1 + c_2 x)e^{-x} - e^{-x}(2\cos x + x \sin x)$ (d) $y = (c_1 + c_2 x)e^{-x} + e^{-x}(2\cos x - x \sin x)$

44. The centre of a rectangular hyperbola lies on the line $y = 2x$. If one of the asymptotes is $x + y + c = 0$, then the other asymptote is

(a) $x - y - 3c = 0$ (b) $2x - y + c = 0$
(c) $x - y - c = 0$ (d) none of these

45. The derivative of $f(x,y) = x^2 + xy$ at $P_0(1, 1)$ in the direction of the unit vector $\vec{u} = \left(\frac{1}{\sqrt{2}}\right)\hat{i} + \left(\frac{1}{\sqrt{2}}\right)\hat{j}$, is

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

46. If $u = f(x - y, y - z, z - x)$, then the value of $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z}$ will be equal to

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

47. The continuous function $f : \mathbb{R} \to \mathbb{R}$ defined by $f(x) = (x^2 + 1)^{2017}$ is

(a) onto but not one-one (b) one-one but not onto
(c) both one-one and onto (d) neither one-one nor onto

48. Let $\mathbb{R}^3 = \{(x, y, z) \mid x, y, z \in \mathbb{R}\}$ be the vector space over the field of real numbers $\mathbb{R}$. Let W be the subspace of $\mathbb{R}^3$ generated by the set $\{(1, 2, -3)\}$. Geometrically, W represents,

(a) a straight line having equations $2x - y = 0 = 3y + 2z$
(b) a straight line passing through origin and having direction cosines $\frac{1}{\sqrt{14}}, \frac{2}{\sqrt{14}}, \frac{3}{\sqrt{14}}$
(c) a plane having the equation $5x + 2y + 3z = 0$
(d) a plane passing through the points $(-2, 1, 3)$, $(1, 2, -3)$ and $(2, 1, -3)$

49. Let $f(x, y) = \begin{cases} 0, & xy \neq 0 \\ 1, & xy = 0 \end{cases}$, then which of the following is true

(a) f is continuous at (0, 0) and f_x, f_y exist at (0, 0)
(b) f is continuous at (0, 0) and f_x, f_y does not exist at (0, 0)
(c) f is not continuous at (0, 0) and f_x, f_y does not exist at (0, 0)
(d) f is not continuous at (0, 0) and f_x, f_y exist at (0, 0)

50. If H and K are subgroups of group G, then

(a) HUK is subgroup of G (b) HUK may or may not be subgroup of G
(c) HUK is never subgroup of G (d) all of the above statements are false

51. The value of $\int_0^a \int_y^x \frac{z\,dx\,dy}{x^2y^2}$ is

(a) $\frac{\pi}{4}$ (b) $\frac{\pi a}{4}$
(c) πa (d) $\frac{a}{4}$

52. The value of $\iiint_v z\,dx\,dy\,dz$ is, where the region of integration v is a cylinder, which is bounded by the following surfaces :

$z = 0, z = 1, x^2 + y^2 = 4$

(a) 2π (b) π
(c) 3π (d) 4π

53. The greatest value of the function $f(x, y) = xy$ on the ellipse $\frac{x^2}{8} + \frac{y^2}{2} = 1$, is

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

54. The third order divided difference of $\frac{1}{x}$ based on the arguments x_0, x_1, x_2, x_3 is

(a) $\frac{1}{x_0x_1x_2}$ (b) $\frac{-1}{x_0x_1x_2}$
(c) $\frac{1}{x_0x_1x_2x_3}$ (d) $\frac{-1}{x_0x_1x_2x_3}$

55. Which of the following is an incorrect statement ?

(a) $E\nabla = \nabla E$ (b) $\mu = \frac{1}{2}(E^{1/2} + E^{-1/2})$
(c) $\mu\delta = \frac{1}{2}(\Delta + \nabla)$ (d) $\delta = E^{1/2} + E^{-1/2}$

56. The locus of points from which three mutually perpendicular tangent lines can be drawn to the paraboloid $ax^2 + by^2 = 2z$, will be

(a) $a(x^2 + y^2) - (a + b)z = 1$ (b) $b(x^2 + y^2) + (a + b)z = 2$
(c) $a(y^2 + z^2) - (a - b)x = 1$ (d) $ab(x^2 + y^2) - 2(a + b)z = 1$

57. If $y_1 = 4, y_3 = 12, y_4 = 19$ and $y_x = 7$ then value of x is (approx)

(a) 2.86 (b) 1.86
(c) 1.09 (d) 9.01

58. An integrating factor for the differential equation $(y^3 + 2y^2)\,dx + (2xy^2 + xy)\,dy = 0$, is

(a) $x^{1/3}y^{5/3}$ (b) $x^{-1/3}y^{5/3}$
(c) $x^{1/3}y^{-5/3}$ (d) $x^{-1/3}y^{-5/3}$

59. If y_1 and y_2 are two solutions of initial value problem $y'' + p(x)y' + q(x)y = 0$, $y(x_0) = y_0$, $y'(x_0) = y'_0$ and Wronskian $W(y_1, y_2) = 0$, then y_1 and y_2 are

(a) linearly independent (b) discontinuous functions
(c) linearly dependent (d) not differentiable functions

60. The equation of a circular cylinder, whose guiding curve is
$$x^2 + y^2 + z^2 = 9,\ x - y + z = 3$$
will be

(a) $x^2 + y^2 + z^2 + xy + yz - zx - 9 = 0$ (b) $x^2 + y^2 + z^2 - xy - yz - zx + 1 = 0$
(c) $x^2 + y^2 + z^2 - xy + yz - zx + 9 = 0$ (d) $5x^2 + 8y^2 + 5z^2 + 4yz + 8zx - 4x - 144 = 0$

61. In case of two-way classification with 'r' rows and "c" columns, the degree of freedom for error is:

(a) rc − 1 (b) (r − 1) c
(c) (c − 1) r (d) (r − 1) (c − 1)

62. Let $x_1 = 2.2$, $x_2 = 4.1$, $x_3 = 3.4$, $x_4 = 4.5$, $x_5 = 1.1$ and $x_6 = 5.7$ be observed values of a random simple of size 6 from a U (θ−1, θ+4) distribution, $\theta \in (0, \infty)$ is unknown. Then MLE of θ is:

(a) 1.8 (b) 1.1
(c) 5.7 (d) 3.6

63. If $x_1, x_2, \ldots\ldots x_n$ are random observations on a Bernoulli variate X taking the value '1' with probably p and the value '0' with probability (1 − p), then a constant estimate of p(1 − p) is

(a) $\frac{\bar{X}}{1-\bar{X}}$ (b) $\bar{X}(1-\bar{X})$
(c) $(\bar{X})^2$ (d) $\sqrt{\bar{X}}$

64. Let X be any random variable with means μ and variance 9. Then the smallest value of m such that $P(|X - \mu| < m) \geq 0.99$, is

(a) 90 (b) $\sqrt{90}$
(c) $\sqrt{\frac{100}{11}}$ (d) 30

65. If $f(x) = \frac{1}{2}$, $-1 < x < 1$, zero elsewhere, is the pdf of the random variable X, the pdf of $Y = X^2$ is:

(a) $\frac{1}{2}, -1 < y < 1$ (b) $\frac{1}{2\sqrt{y}}, 0 < y < 1$
(c) $\frac{1}{4\sqrt{y}}, 0 < y < 1$ (d) $1, 0 < y < 1$

66. If the mean and variance of a binomial variate X are 8 and 4 respectively, then P[X < 3] equals

(a) $\frac{137}{2^{16}}$ (b) $\frac{235}{2^{16}}$
(c) $\frac{125}{2^{14}}$ (d) $\frac{256}{2^{16}}$

67. For a normal distribution, the coefficient of Kurtosis β_2 and γ_2 are

(a) $\beta_2 = 0$, $\gamma_2 = 3$ (b) $\beta_2 = 3$, $\gamma_2 = 0$
(c) $\beta_2 > 0$, $\gamma_2 > 3$ (d) $\beta_2 < 0$, $\gamma_2 < 3$

68. If X is the number of heads obtained in four tosses of a balanced coin. Define $= \frac{1}{1+X}$. The ... value of $P\left(Y = \frac{1}{3}\right)$ is

(a) $\frac{1}{8}$ (b) $\frac{1}{4}$
(c) $\frac{3}{8}$ (d) $\frac{3}{16}$

69. The probability that a high school student being male is $\frac{1}{3}$ and that being female is $\frac{2}{3}$. The probability that a male student completes the course successfully is $\frac{7}{10}$ and that a female student does it is $\frac{4}{5}$. A student selected at random is found to have completed the course. What is the probability that the student is female ?

(a) $\frac{16}{23}$ (b) $\frac{4}{5}$
(c) $\frac{9}{11}$ (d) $\frac{3}{7}$

70. Consider the following regression equations :
$$8X - 10Y + 66 = 0 \text{ and } 40X - 18Y = 214$$
The correlation coefficient between X and Y is

(a) 0.6 (b) −0.6
(c) 0 (d) 1

71. The first four moments of a distribution about the value 5 of the variable are 2, 20, 40 and 50. The S.D. is :

(a) 2 (b) 4
(c) 7 (d) 16

72. Given that $P(A) = \frac{1}{3}$, $P(B) = \frac{3}{4}$ and $P(A \cup B) = \frac{11}{12}$. Then the probability P(B|A) is

(a) $\frac{1}{6}$ (b) $\frac{2}{3}$
(c) $\frac{1}{2}$ (d) $\frac{3}{4}$

73. If g is a continuous and convex function on the interval I and X is a random variable, where values are in I with probability 1, then which of the following statements is true :

(a) $E[g(X)] \geq g[E(X)]$ (b) $E[g(X)] \leq g[E(X)]$
(c) $E[g(X)] = g[E(X)]$ (d) $E[g(X)] = \frac{1}{g[E(X)]}$

74. If a random variable X follows geometric distribution, then for any two positive integers j and k, $P(X \geq j + K \mid X \geq j)$ is equal to :

(a) $P(X \geq j)$ (b) $P(X \geq k)$
(c) $P(X \leq j)$ (d) $P(X \leq j + k)$

75. Let $X \sim N(\mu, \sigma^2)$, where μ and σ^2 both are unknown. Then the simple hypothesis is :

(a) $H_0 : \sigma = 2$ (b) $H_0 : \mu = 5$
(c) $H_0 : \mu = 2, \sigma = 4$ (d) $H_0 : \mu \neq 5, \sigma = 2$

76. Bowley's coefficient of skewness is based on
(a) Mean and variance (b) Quartiles
(c) Deciles (d) Percentiles

77. If a constant value 5 is subtracted from each observation of a set, the variance is
(a) reduced by 5 (b) reduced by 25
(c) unaltered (d) increased by 25

78. Census survey is free from
(a) Response error (b) Non response error
(c) Non-sampling error (d) Sampling error

79. The skewness in a binomial distribution will be zero, if
(a) $p < \frac{1}{2}$ (b) $p = \frac{1}{2}$
(c) $p > \frac{1}{2}$ (d) $p = 0$

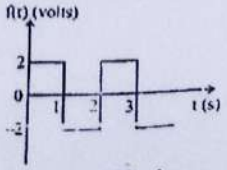
80. If experiment material is homogeneous, then suitable design is :
(a) RBD (b) CRD
(c) LSD (d) Split plot

81. A particle of mass 2 kg is moving such that at time t second, its position in meter is given by $\vec{r}(t) = 5\hat{i} - 2t^2\hat{j}$. The angular momentum of the particle at t = 2s about the origin in kg-m/s, is
(a) $64\,\hat{i}$ (b) $-64\,\hat{k}$
(c) $-80\,\hat{k}$ (d) $80\,\hat{i}$

82. The energy of a unstable particle is $100\,m_0C^2$. If its life time in its own rest frame is 10^{-10} s, how far will it move approximately in lab frame before decaying ?
(a) 0.03 m (b) 3 m
(c) 30 m (d) 3 km

83. If the electrostatic potential is given by $\phi = K(x^2 + y^2 + z^2)$, where K is constant then the charge density giving rise to the above potential would be
(a) $-K\varepsilon_0$ (b) $-2K\varepsilon_0$
(c) $-3K\varepsilon_0$ (d) $-6K\varepsilon_0$

84. What would be the D.C. component of the following waveform ?



(a) 0 (b) 1
(c) 2 (d) 3.2

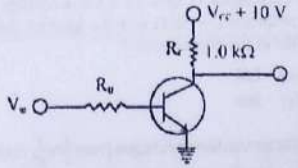
85. A inductor (140 mH), capacitance (10^3 μF) and a resistor (3Ω) are connected in series to an a.c. source whose e.m.f. (in volts) varies with time t (in second) according to the expression E = 282 sin(100t). What is the impedance of the circuit ?
(a) 2 Ω (b) 15 Ω
(c) 5 Ω (d) 10 Ω

86. The reflected ray is completely polarized when the angle of incidence of the incident light on the surface of glass slab is 60°. What is the velocity of light inside the glass ?
(a) $\sqrt{3} \times 10^8$ ms^{-1} (b) $\frac{\sqrt{3}}{2} \times 10^8$ ms^{-1}
(c) $\sqrt{2} \times 10^8$ ms^{-1} (d) $\frac{1}{\sqrt{2}} \times 10^8$ ms^{-1}

87. Two straight and narrow parallel slits 3 mm apart are illuminated with a monochromatic source ($\lambda = 5.9 \times 10^{-5}$ cm). Fringes are obtained at a distance of 30 cm from the slit. What is the width of the fringes ?
(a) 5.9×10^{-5} m (b) 5.9×10^{-7} m
(c) 5.9×10^{-3} m (d) 5.9×10^{-8} m

88. A S_i transistor with β = 100 is to be operated as a CE amplifier with fixed bias method. The transistor operates with collector current I_C = 1 mA and V_{CE} = 4 V with load resistance in the collector circuit is 2 kΩ. What is the value of R_B ?
(a) 470 Ω (b) 530 Ω
(c) 470 KΩ (d) 530 KΩ

89. For given transistor circuit, what will be V_{CE}, where V_{in} = 0V



(a) 0 V (b) 5 V
(c) 10 V (d) 2.5 V

90. The sum over the Legendre polynomials $\sum_{n=0}^{\infty} P_n(x)$ is
(a) $\sqrt{2}(1-x)^{\frac{1}{2}}$ (b) $\sqrt{2}(1-x)^{-\frac{1}{2}}$
(c) $\frac{(1-x)^{+\frac{3}{2}}}{\sqrt{2}}$ (d) $(2-2x)^{-\frac{1}{2}}$

91. If the y(x) is the Laguerre function then which of the following second order differential equation, it should satisfy ?
(a) $x^2y'' + xy' + ny = 0$ (b) $y'' + \alpha x^2 y + ny = 0$
(c) $y'' + (\alpha - x + 1)y' + ny = 0$ (d) $xy'' + (\alpha - x + 1)y' + ny = 0$

92. A beam of electrons of wavelength 1Å is diffracted as it passes through a poly crystalline cubic crystal structure with spacing of 1Å. The Bragg angle for the first order diffraction maximum will be

(a) 10° (b) 20°
(c) 30° (d) 40°

93. Two coherent sources, whose intensity ratio is 25:1 produce interference fringes. What is the ratio of a maximum intensity and minimum intensity of the interference pattern ?

(a) 18 : 12 (b) 25 : 1
(c) 5 : 1 (d) 9 : 4

94. A light source of wavelength λ illuminates a metal and ejects photoelectrons with a maximum kinetic energy of 1.00 eV. A second light source, with half the wavelength of the first, ejects photo electrons with a maximum kinetic energy of 4.00 eV. What is the work function of the metal?

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

95. What is the directional derivative of $f(x,y) = x^2y$ in the direction $\hat{i} + 2\hat{j}$ at point (3,2) ?

(a) $\sqrt{5}$ (b) $\frac{10}{\sqrt{5}}$
(c) $\frac{20}{\sqrt{5}}$ (d) $\frac{30}{\sqrt{5}}$

96. Typical values of the h-parameters of a transistors are the following :

$h_{fe} = 330$; $h_{ie} = 4.5\ K\Omega$; $h_{re} = 2\times10^{-4}$ and $h_{oe} = 20\times10^{-6}$ mho

The transistor is used as a CE amplifier with the load resistance R_L = 5 kΩ and the internal resistance R_L = 5KΩ and the internal resistance of the signal source R_S = 10KΩ. What is the value of the current gain ?

(a) 150 (b) 300
(c) 200 (d) 100

97. If the power factor changes from $\frac{1}{3}$ to $\frac{1}{6}$, then what is the increase in impedance ?

(a) 50% (b) 75%
(c) 100% (d) 200%

98. Who first came up with the idea of stimulated emission ?

(a) Alexander Graham Bell (b) Isaac Newton
(c) Arthur Schalow (d) Albert Einstein

99. The time constant of a RC circuit is 1 sec. When 1 MΩ resistance is added in series, the time constant becomes 1.5 sec. The capacitance and the resistance of the circuit are given by :

(a) R = 1MΩ ,C = 1 μFarad (b) R = 2MΩ , C = 0.5 μ Farad
(c) R = 2MΩ , C = 1 μ Farad (d) R = 2MΩ , C = 5.0 μ Farad

100. A parallel plate capacitor has circular plates of 6 cm diameter and 2mm separation of air. The amount of charge that will appear on the plates for a potential difference of 100 volts is

(a) 0.4×10^{-9} coulomb (b) 2.5×10^{-9}coulomb
(c) 5×10^{-9}coulomb (d) 1.25×10^{-9}coulomb

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Answer Key (MCA) Admission Test 2020-21

SERIES: D

Q.No.	Answer
1	B
2	A
3	B
4	B
5	C
6	C
7	A
8	C
9	C
10	C
11	B
12	A
13	D
14	B
15	B
16	C
17	C
18	B
19	B
20	C
21	D
22	B
23	C
24	B
25	B
26	A
27	D
28	B
29	C
30	D
31	A
32	D
33	D
34	A
35	B
36	B
37	C
38	C
39	A
40	B

Q.No.	Answer
41	A
42	C
43	B
44	A
45	C
46	A
47	D
48	A
49	D
50	B
51	B
52	A
53	A
54	D
55	D
56	D
57	B
58	D
59	C
60	A
61	D
62	A
63	B
64	D
65	B
66	A
67	B
68	C
69	A
70	A
71	B
72	C
73	A
74	B
75	C
76	B
77	C
78	D
79	B
80	B

Q.No.	Answer
81	C
82	B
83	D
84	A
85	C
86	A
87	A
88	D
89	C
90	D
91	D
92	C
93	D
94	B
95	D
96	C
97	C
98	D
99	B
100	D

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