



**2021**  
**Computer Science and Applications**  
**UTKAL UNIVERSITY**

**5 YEARS INTEGRATED MCA**

**Total Number of Questions = 70**

**Full Marks: 70**

**Time: 01 Hour 30 Mins**

**Name of  
Candidate:**

**Roll no:**

**Instruction to the Candidates:**

1. Do not open the booklet until the announcement is made.
2. Do not leave the examination hall until the examination is over.
3. All questions are compulsory and are of multiple choice types.
4. Each question shall have four answers (including one correct answer) and the examinee shall have to darken only the appropriate circle/oval using black / blue ball point pen.
5. **There is no negative mark for each wrong answer.**
6. Each correct answer shall fetch **one mark**, each un-attempted question will fetch **zero mark**.
7. If more than one circle is darkened for one question, it will be treated as an incorrect answer.
8. Left side blank pages of question booklet can be used for rough work.
9. Infringement of examination rule of any type will lead to cancellation of evaluation of answer script.
10. Use of Electronic Gadgets/Cell phones is strictly prohibited.
11. Do not ask for clarification from the invigilator(s) regarding the question. In case any correction / clarification are deemed necessary, the invigilator(s) will announce it publicly.

1. A class consists of a set of  $S$  of 100 students, 70 of which pass in geometry and 60 pass in algebra. No one failed in both subjects, then the number of students who passed in both algebra and geometry is
  - (a) 30
  - (b) 40
  - (c) 20
  - (d) 10
2. If  $|A| = m$  and  $|B| = n$  then  $|P(A) \times P(B)|$  is
  - (a)  $2^m$
  - (b)  $2^n$
  - (c)  $2^{mn}$
  - (d)  $2^{m+n}$
3. If  $R = \{(x, y): x^2 + y^2 \leq 4 ; x, y \in Z\}$  is a relation on  $Z$ , write down the domain of  $R$ .
  - (a)  $\{-7, 7, -8, 8\}$
  - (b)  $\{-3, -3, -4, 4\}$
  - (c)  $\{-2, -1, 0, 1, 2\}$
  - (d) none of these
4. Consider a non-empty set consisting of children in a family and a relation  $R$  defined as  $aRb$  if  $a$  is brother of  $b$ . Then  $R$  is
  - (a) Symmetric but not transitive
  - (b) transitive but not symmetric
  - (c) neither symmetric nor transitive
  - (d) both symmetric and transitive
5. If  $f: N \rightarrow N$ , defined by  $f(x) = x^2 + x + 1$  is
  - (a) One-one
  - (b) Onto
  - (c) One-one and onto
  - (d) Neither one-one nor onto
6. The function  $f: R \rightarrow R$  defined by  $f(x) = 2^x + 2^{|x|}$  is
  - (a) One-one and onto
  - (b) Many-one and onto
  - (c) One-one and into
  - (d) Many-one and into

7. If the binary operation  $*$  is defined on the set  $Z$  of integers as  $a * b = 3a - b$ , then the value of  $(2 * 3) * 4$  is
- (a) 2
  - (b) 3
  - (c) 4
  - (d) 5
8. The number of commutative binary operations that can be defined on a set of 2 elements is
- (a) 8
  - (b) 6
  - (c) 4
  - (d) 2
9. The interval form of the inequality  $\{x: |x| > 5, x = 5\}$  is
- (a)  $x \in (-\infty, -5) \cup [5, \infty)$
  - (b)  $x \in (-\infty, -5] \cup [5, \infty)$
  - (c)  $x \in [-5, 5]$
  - (d) None of these
10. Let  $z$  is a complex number. Then the value of  $|e^z|$ , when  $z = 2\pi(1 + i)$  is
- (a) 0
  - (b)  $e^{2\pi}$
  - (c)  $\pi$
  - (d) None of the above
11. The principal value of the argument of  $z = 1 - i$  is
- (a)  $-\frac{\pi}{4}$
  - (b) 1
  - (c) 3
  - (d)  $\pi$
12. If  $\sin^{-1}x - \cos^{-1}x = \frac{\pi}{6}$ , then  $x =$
- (a)  $\frac{1}{2}$
  - (b)  $\frac{\sqrt{3}}{2}$
  - (c)  $-\frac{1}{2}$
  - (d) None of these

13. The value of  $\sin \left( \frac{1}{4} \sin^{-1} \frac{\sqrt{63}}{8} \right)$  is

(a)  $\frac{1}{\sqrt{2}}$

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

(c)  $\frac{1}{2\sqrt{2}}$

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

14. The domain of  $\cos^{-1}(x^2 - 4)$  is

(a)  $[3, 5]$

(b)  $[-1, 1]$

(c)  $[-\sqrt{5}, -\sqrt{3}] \cup [\sqrt{3}, \sqrt{5}]$

(d)  $[-\sqrt{5}, -\sqrt{3}] \cap [-\sqrt{5}, \sqrt{3}]$

15. If  $\tan^{-1}(\cot \theta) = 2\theta$ , then  $\theta =$

(a)  $\pm \frac{\pi}{3}$

(b)  $\pm \frac{\pi}{4}$

(c)  $\pm \frac{\pi}{6}$

(d) None of these

16. The objective function  $Z = 4x + 3y$  can be maximized subjected to the constraints

$$3x + 4y \leq 24, 8x + 6y \leq 48, x \leq 5, y \leq 6; x, y \geq 0$$

(a) at only one point

(b) at two points only

(c) at an infinite number of points

(d) None of these

17. The optimal value of the objective function is attained at the points

(a) given by intersections of inequations with the axes only

(b) given by intersection of inequations with x-axis only

(c) given by corner points of the feasible region

(d) None of these

18. The objective function of a LPP is

(a) constraint

(b) a function to be optimized

- (c) a relation between the variables
- (d) none of these

19. Which of the following statements is correct?

- (a) Every LPP admits an optimal solution
- (b) A LPP admits unique optimal solution
- (c) If a LPP admits two optimal solutions it has an infinite number of optimal solutions
- (d) None of these

20. The trace of the matrix  $A = \begin{bmatrix} 1 & -5 & 7 \\ 0 & 7 & 9 \\ 11 & 8 & 9 \end{bmatrix}$  is

- (a) 17
- (b) 25
- (c) 3
- (d) 12

21. The matrix  $A = \begin{bmatrix} 0 & -5 & 8 \\ 5 & 0 & 12 \\ -8 & -12 & 0 \end{bmatrix}$  is a

- (a) Diagonal matrix
- (b) Symmetric matrix
- (c) Skew-symmetric matrix
- (d) Scalar matrix

22. If  $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ a & b & -1 \end{bmatrix}$  then  $A^2$  is equal to

- (a) Null matrix
- (b) A unit matrix
- (c)  $-A$
- (d)  $A$

23. If matrix  $A = [a_{ij}]_{2 \times 2}$ , where  $a_{ij} = \begin{cases} 1, & \text{if } i \neq j \\ 0, & \text{if } i = j \end{cases}$ , then  $A^2$  is equal to

- (a)  $I$
- (b)  $A$
- (c)  $O$
- (d)  $-I$

24. If  $A$  and  $B$  are square matrices of order 2, then  $\det(A + B) = 0$  is possible when

- (a)  $\det(A) = 0$  or  $\det(B) = 0$
- (b)  $\det(A) + \det(B) = 0$
- (c)  $\det(A) = 0$  and  $\det(B) = 0$
- (d)  $A + B = O$

25. If  $x, y \in R$ , then determinant  $\Delta = \begin{vmatrix} \cos x & -\sin x & 1 \\ \sin x & \cos x & 1 \\ \cos(x+y) & -\sin(x+y) & 0 \end{vmatrix}$  lies in

the interval

- (a)  $[-\sqrt{2}, \sqrt{2}]$
- (b)  $[-1, 1]$
- (c)  $[-\sqrt{2}, 1]$
- (d)  $[-1, -\sqrt{2}]$

26. If  $A$  is an invertible matrix, then  $\det(A^{-1})$  is equal to

- (a)  $\det(A)$
- (b)  $\frac{1}{\det(A)}$
- (c) 1
- (d) None of these

27. The system of equations  $x + y + z = 5$ ,  $x + 2y + 3z = 9$ ,  $x + 3y + \alpha z = \mu$  has a unique solution, if

- (a)  $\alpha = 5, \mu = 13$
- (b)  $\alpha \neq 5$
- (c)  $\alpha = 5, \mu \neq 13$
- (d)  $\mu \neq 13$

28. Two lines  $2x - 3y + 1 = 0$  and  $3x + ky - 1 = 0$  are perpendicular to each other if  $k$  is equal to

- (a) 2
- (b) 3
- (c) -2
- (d) 3

29. The length of the tangent drawn from the point  $(-2, 3)$  to the circle,  $x^2 + y^2 - 4x + 6y + 4 = 0$  is

(a)  $\sqrt{44}$

(b)  $\sqrt{43}$

(c)  $\sqrt{42}$

(d) none of these

30. The equation of the directrix to the parabola  $x^2 = -6y$  is

(a)  $y + 6 = 0$

(b)  $2y - 3 = 0$

(c)  $y - 6 = 0$

(d)  $2y + 3 = 0$

31. A bag contains 5 black balls, 4 white balls and 3 red balls. If a ball is selected randomly, the probability that it is black or red ball is

(a)  $1/3$

(b)  $1/4$

(c)  $5/12$

(d)  $2/3$

32. If  $S$  is the sample space  $P(A) = \frac{1}{3}P(B)$  and  $S = A \cup B$ , where  $A$  and  $B$  are two mutually exclusive events, then  $P(A) =$

(a)  $1/4$

(b)  $1/2$

(c)  $3/4$

(d)  $3/8$

33. Assume that in a family, each child is equally likely to be a boy or a girl. A family with three children is chosen at random. The probability that the eldest child is a girl given that the family has at least one girl is

(a)  $1/2$

(b)  $1/3$

(c)  $2/3$

(d)  $4/7$

34. Let  $A$  and  $B$  are two events such that  $P(A) = 0.6$ ,  $P(B) = 0.2$  and  $P(A/B) = 0.5$ . Then  $P(A/B)$  equals

(a)  $1/10$

(b)  $3/10$

(c)  $3/8$

(d)  $6/7$

35. If two events are independent, then

(a) they must be mutually exclusive

(b) the sum of their probabilities must be equal to 1

(c) (a) and (b) both are correct

(d) none of the above is correct

36. Let  $f(x) = |x| + |x - 1|$ , then

(a)  $f(x)$  is continuous at  $x = 0$ , as well as at  $x = 1$

(b)  $f(x)$  is continuous at  $x = 0$ , but not at  $x = 1$

(c)  $f(x)$  is continuous at  $x = 1$ , but not at  $x = 0$

(d) none of these

37. The function  $f(x) = |\cos x|$  is

(a) everywhere continuous and differentiable

(b) everywhere continuous but not differentiable at  $(2n + 1)\pi/2, n \in Z$

(c) neither continuous nor differentiable at  $(2n + 1)\pi/2, n \in Z$

(d) none of these

38. Write the value of the derivative of  $f(x) = |x - 1| + |x - 3|$  at  $x = 2$

(a) 0

(b) 1

(c) 2

(d) 3

39. Every invertible function is

(a) Monotonic function

(b) Constant function

(c) Identity function

(d) Not necessarily monotonic function

40. The function  $f(x) = \frac{x}{1+|x|}$  is

(a) Strictly increasing

(b) Strictly decreasing

(c) Neither increasing nor decreasing

(d) None of these



41. The angle of intersection of the curves  $y = 2\sin^2 x$  and  $y = \cos 2x$  at  $x = \frac{\pi}{6}$

is

(a)  $\frac{\pi}{4}$

(b)  $\frac{\pi}{2}$

(c)  $\frac{\pi}{3}$

(d)  $\frac{\pi}{6}$

42. The line  $y = mx + 1$  is a tangent to the curve  $y^2 = 4x$ , if the value of  $m$  is

(a) 1

(b) 2

(c) 3

(d)  $\frac{1}{2}$

43. The value of  $\int_0^3 [x] dx$  is

(a) 3

(b) 0

(c) 5

(d) 4

44. The value of  $\int_{-1}^1 e^{|x|} dx$  is

(a)  $e$

(b)  $2e$

(c)  $2e-1$

(d) none of these

45.  $\int_{-1}^1 x|x| dx$  equals

(a) 0

(b) 1

(c) 2

(d) 3

46.  $\int_0^1 xe^{x^2} dx$

(a)  $e$

(b)  $2/e$

(c)  $2e$

(d)  $\frac{(e-1)}{2}$

47. Quartile deviation is given by

- (a)  $Q_3 - Q_1$
- (b)  $\frac{Q_3 - Q_2}{2}$
- (c)  $\frac{Q_2 - Q_1}{2}$
- (d)  $\frac{Q_3 - Q_1}{2}$

48. The average to be used to find the per capita income in different cities is

- (a) Mean
- (b) Median
- (c) Mode
- (d) None of these

49. The average to be used to determine the average wages in an industrial concern is

- (a) Mean
- (b) Median
- (c) Mode
- (d) None of these

50. The integrating factor of the differential equation  $(x \log x) \frac{dy}{dx} + y = 2 \log x$ , is given by

- (a)  $\log(\log x)$
- (b)  $e^x$
- (c)  $\log x$
- (d)  $x$

51. The degree of the differential equation  $\left(\frac{dy}{dx}\right)^4 + 3x \frac{d^2y}{dx^2} = 0$

- (a) 1
- (b) 2
- (c) 4
- (d) None of these

52. The number of arbitrary constants in the general solutions of the differential equation of order 3 is

- (a) 3
- (b) 2
- (c) 5

(d) 1

53. There are four doors leading to the inside of a cinema hall. The number of ways a person can enter into it and come out is

(a) 15

(b) 14

(c) 16

(d) 13

54. Find  $r$  if  $16P(15, r) = 13P(16, r)$

(a) 3

(b) 4

(c) 6

(d) 2

55. The number of ways a student can choose 5 courses out of 9 if 2 courses are compulsory is

(a)  ${}^7C_3$

(b)  ${}^9C_3$

(c)  ${}^5C_3$

(d) None of these

56. The Value of  $(0.999)^4$  correct up to three decimal places is

(a) 0.996

(b) 0.995

(c) 0.994

(d) none of these

57. The direction ratios of the line  $x - y + z = 0$  and  $x - 3y - 6 = 0$  are proportional to

(a) 3, 1, -2

(b) 2, -4, 1

(c) 4, 6, -1

(d) 7, 3, 10

58. If  $\vec{a} = 2\hat{i} - 3\hat{j} - \hat{k}$  and  $\vec{b} = \hat{i} + 4\hat{j} - 2\hat{k}$ , then  $\vec{a} \times \vec{b}$  is

(a)  $10\hat{i} + 2\hat{j} + 11\hat{k}$

(b)  $10\hat{i} + 3\hat{j} + 11\hat{k}$

(c)  $10\hat{i} - 2\hat{j} - 10\hat{k}$

(d)  $10\hat{i} - 3\hat{j} + 11\hat{k}$

59. If points  $A(60\hat{i} + 3\hat{j})$ ,  $B(40\hat{i} - 8\hat{j})$  and  $C(a\hat{i} - 52\hat{j})$  are collinear, then  $a$  is equal to

- (a) 40
- (b) -40
- (c) 20
- (d) -20

60. If  $\vec{a}$  and  $\vec{b}$  be two unit vectors and  $\theta$  is the angle between them. Then  $\vec{a} + \vec{b}$  is a unit vector if  $\theta$  is

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

61. Which of the following is a non-volatile memory?

- (a) SRAM
- (b) ROM
- (c) DRAM
- (d) All of these

62. Microsoft Word is \_\_\_\_\_.

- (a) an application software
- (b) a system software
- (c) an input device
- (d) an output device

63. Integrated Circuit chips are made up of \_\_\_\_\_.

- (a) iron
- (b) aluminum
- (c) zinc
- (d) silicon

64. Which of the following is not a type of line printer?

- (a) Drum printer
- (b) Laser printer
- (c) Chain printer

- (d) None of these
65. ALU stands for\_\_\_\_\_.
- (a) Arithmetic Logic Unit
  - (b) Add Logic Unit
  - (c) Arithmetic Long Unit
  - (d) Add Long Unit
66. Which of the following is not a search engine?
- (a) Google
  - (b) Yahoo
  - (c) Bing
  - (d) None of these
67. Which of the following is an operating system?
- (a) Scanner
  - (b) Linux
  - (c) MS-Excel
  - (d) Notepad
68. Which of the following is not a type of computer network?
- (a) LAN
  - (b) MAN
  - (c) CAN
  - (d) WAN
69. \_\_\_\_\_ converts assembly language to machine level language.
- (a) Interpreter
  - (b) Compiler
  - (c) Adder
  - (d) Assembler
70. \_\_\_\_\_ gives a diagrammatic representation of an algorithm.
- (a) Graph
  - (b) Flowchart
  - (c) Table
  - (d) Data