VERSION CODE

A1

Maximum Marks : 100
Total Duration : 150 Minutes
Maximum Time For Answering : 120 Minutes
Subject : MATHEMATICS AND COMPUTER SCIENCE

MENTION YOUR PGCET NUMBER

Serial Number : **118621**

Subject Code **P-MCS**

DOs:

1. This question booklet is issued to you by the invigilator **after 10.20 a.m.**
2. Check whether the PGCET Number has been entered and shaded in the respective circles on the OMR answer sheet.
3. The version code and serial number of this question booklet should be entered on the OMR answer sheet and the respective circles should also be shaded completely.
4. The Version Code and Serial Number of this question booklet should be entered on the Nominal Roll without any mistakes.
5. Compulsorily sign at the bottom portion of the OMR answer sheet in the space provided.

DON'Ts:

1. **THE TIMING AND MARKS PRINTED ON THE OMR ANSWER SHEET SHOULD NOT BE DAMAGED / MUTILATED / SPOILED.**
2. **The 3rd Bell rings at 10.30 a.m., till then;**
   - Do not remove the seal present on the right hand side of this question booklet.
   - Do not look inside this question booklet or start answering on the OMR answer sheet.

IMPORTANT INSTRUCTIONS TO CANDIDATES

1. In case of usage of signs and symbols in the questions, the regular textbook connotation should be considered unless stated otherwise.
2. This question booklet contains 75 questions and each question will have one statement and four different options / responses & out of which you have to choose one correct answer.
3. After the 3rd Bell is rung at 10.30 a.m., remove the paper seal on the right hand side of this question booklet and check that this booklet does not have any unprinted or torn or missing pages or items etc., if so, get it replaced by a complete test booklet. Read each item and start answering on the OMR answer sheet.
4. Completely **darken / shade** the relevant circle with a **blue or black ink ballpoint pen** against the question number on the OMR answer sheet.

ಸರಿಯಾದ ಕ್ರಮ CORRECT METHOD				ತಪ್ಪು ಕ್ರಮಗಳು WRONG METHOD								
Ⓐ	●	Ⓒ	Ⓓ	✖	Ⓑ	Ⓒ	Ⓓ	Ⓐ	Ⓑ	Ⓒ	⊘	Ⓐ	●	●	Ⓓ

5. Please note that even a minute unintended ink dot on the OMR answer sheet will also be recognized and recorded by the scanner. Therefore, avoid multiple markings of any kind on the OMR answer sheet.
6. Use the space provided on each page of the question booklet for Rough Work. Do not use the OMR answer sheet for the same.
7. **Last bell will ring at 12.30 pm, stop marking on the OMR answer sheet.**
8. Hand over the **OMR answer sheet** to the room invigilator as it is.
9. After separating the top sheet (KEA copy), the invigilator will return the bottom sheet replica (candidate's copy) to you to **carry home for self-evaluation.**
10. Only **Non-programmable** calculators are allowed for "M.E. / M.Tech / M.Arch." examination.

Marks Distribution	PART-1 : 50 QUESTIONS CARRY ONE MARK EACH (1 TO 50)
	PART-2: 25 QUESTIONS CARRY TWO MARKS EACH (51 TO 75)

A1

P–MCS

MATHEMATICS AND COMPUTER SCIENCE
PART – 1
Each question carries one mark. (50 × 1 = 50)

1. The difference between the expectation of square a random variable $[E(x^2)]$ and the square of the expectation of the random variable $[(Ex)^2]$ is denoted by R, then:

   (A) R = 0

   (B) R < 0

   (C) R ≥ 0

   (D) R > 0

2. If E_1 and E_2 are independent events satisfying the following conditions.

   $P(E_1) = P(E_2)$ and $PCE_1 UE_2) = 1$

   then $P(E_1) = $ _____

   (A) 0

   (B) $\frac{1}{4}$

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

   (D) 1

3. A fair coin is tossed 3 times in succession. If the first toss produces a head then the probability of getting exactly two heads in three tosses is _____

   (A) $\frac{1}{4}$

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

   (C) $\frac{3}{4}$

   (D) $\frac{1}{3}$

4. Let x be a standard normal random variable. The expected value of x cos x is

   (A) –1

   (B) 0

   (C) 1

   (D) π

5. If the standard deviation of the speed of vehicle in a highway is 8.8 kmph and the mean speed of the vehicle is 33 kmph, the coefficient of variation in speed is

   (A) 0.1517

   (B) 0.1867

   (C) 0.266

   (D) 0.3646

6. 60% of the employees of the company are college graduates. Of these 10% are in the sales dept. Of the employees who did not graduate from the colleges are 80% in the sales department. A person is selected at random, find the probability that person is in the sales.

   (A) 42%

   (B) 24%

   (C) 83%

   (D) 38%

Space For Rough Work

7. The variance of Number of heads resulting from 10 independent tosses for a fair coin is

   (A) $\dfrac{5}{4}$

   (B) $\dfrac{5}{2}$

   (C) $\dfrac{3}{4}$

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

8. The integral $\displaystyle\int_{2}^{\infty} \dfrac{dx}{x \log x}$

   (A) diverges to ∞

   (B) diverges to $-\infty$

   (C) converges to 2

   (D) converges to -3

9. The value of the integral given below is

   $\displaystyle\int_{0}^{\pi} x^2 \cos x \, dx$

   (A) -2π

   (B) π

   (C) $-\pi$

   (D) 2π

10. Consider the differential equation

    $\dfrac{dy}{dx} + y = e^x$ with $y(0) = 1$ then the value of

    $y(1)$ is

    (A) $e + e^{-1}$ (B) $\dfrac{1}{2}[e - e^{-1}]$

    (C) $\dfrac{1}{2}[e + e^{-1}]$ (D) $2[e - e^{-1}]$

11. The order of the differential equation whose general solution is given by

    $y = (c_1 + c_2) \sin(x + c_3) - c_4 e^{x + c_5}$ is

    (A) 5

    (B) 4

    (C) 2

    (D) 3

12. The inverse Laplace transform of $\dfrac{1}{(S^2 + S)}$ is

    (A) $1 + e^t$

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

    (C) $1 - e^t$

    (D) $1 + e^{-t}$

Space For Rough Work

13. The area enclosed between the parabola $y = x^2$ and the straight line $y = x$ is _____

(A) $\dfrac{1}{8}$ (B) $\dfrac{1}{6}$

(C) $\dfrac{1}{3}$ (D) $\dfrac{1}{2}$

14. Let $f(x) = e^x$ in $[0, 1]$ then the value of c of the mean value theorem is

(A) 0.5   (B) $e - 1$

(C) $\log (e - 1)$ (D) None

15. $\displaystyle\int_0^\infty \overline{e}^t \dfrac{\sin t}{t}, dt$

(A) $\dfrac{\pi}{4}$ (B) $\dfrac{\pi}{2}$

(C) 1   (D) None

16. If x^2 is one of the solutions of $x^2 y'' - 2y = 0$ then its second linearly independent solution is

(A) $\dfrac{1}{3x}$ (B) x^3

(C) $\dfrac{1}{x^2}$ (D) $3x^2$

17. The value of $\displaystyle\lim_{x \to 0} \dfrac{\log x}{\cot x}$ is

(A) 1   (B) -1

(C) 0   (D) 2

18. The value of $\displaystyle\int_0^{\pi/2} \dfrac{1}{1 + \sqrt{\tan x}} dx$

(A) $\pi/2$ (B) $\pi/4$

(C) 0   (D) $\perp$

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

(A) $\dfrac{59}{6}$ (B) $\dfrac{9}{2}$

(C) $\dfrac{10}{3}$ (D) $\dfrac{7}{6}$

20. If 'm' and 'n' are degree and order of $[1 + (y')^2]^{2/3} = y''$ then the value of $\dfrac{m + n}{m - n}$ is

(A) 3   (B) 5

(C) 2   (D) 4

Space For Rough Work

21. If $u = x^m y^m$ then

(A) $du = mx^{n-1} y^n + nx^m y^{n-1}$

(B) $du = mdx + n\, dy$

(C) $u\, du = mx\, dx + nydy$

(D) $\dfrac{du}{u} = m\,\dfrac{dx}{x} + n\,\dfrac{dy}{y}$

22. $p \rightarrow q$ is logically equivalent to

(A) $\sim p \vee \sim q$

(B) $\sim p \vee q$

(C) $p \wedge \sim p$

(D) $\sim p \wedge q$

23. The probability of selecting a non-leap year which will contain 53 Wednesdays is

(A) $\dfrac{3}{7}$

(B) $\dfrac{2}{7}$

(C) $\dfrac{1}{7}$

(D) $\dfrac{1}{53}$

24. If $p\,(x = 1) = p\,(x = 2)$ for a Poisson variate x then $p(x = 0)$ is

(A) e^{-2}

(B) e^2

(C) e^5

(D) e^6

25. Given $A - B = \{2, 5, 8, 10\}$ and $A \cap B = \{3, 5, 15\}$. The set A is

(A) $\{5, 15\}$

(B) $\{2, 3, 15\}$

(C) $\{2, 3, 8, 15\}$

(D) $\{2, 3, 5, 8, 10, 15\}$

26. Number of permutations of the letters in the word SSPOI SESNO are

(A) 75625

(B) 75630

(C) 75600

(D) 75683

Space For Rough Work

27. A Group (G, •) is called an Abelian group if

(A) $a = b \ \forall \ a, b \in G$

(B) $a \bullet b = b \bullet a \ \forall \ a, b \in G$

(C) $a + b = b + a \ \forall \ a, b \in G$

(D) $a \div b = b \div a \ \forall \ a, b \in G$

28. The process of repeating a group of statements in an algorithm is known as

(A) sequence

(B) iteration

(C) flow

(D) selection

29. How many values a function can return at a time?

(A) only one

(B) depends on the system

(C) infinite values

(D) 2

30. The purpose of return statement is

(A) To return control back to the calling function

(B) To return control and value to calling function

(C) To return void

(D) To return value to the calling function

31. The index or subscript value for an array of size n ranges from

(A) 1 to n – 1

(B) 0 to n – 1

(C) 1 to n

(D) 0 to n

32. If we don't initialize a static array, what will be the elements set to?

(A) 0

(B) a floating point number

(C) an undetermined value

(D) character constant

Space For Rough Work

33. Two dimensional array elements are stored

(A) system dependent

(B) in row major order

(C) compiler dependent

(D) in column major order

34. Array elements are stored in

(A) Sequential memory locations

(B) Scattered memory locations

(C) Direct memory locations

(D) Random memory location

35. Identify the incorrect declaration of arrays from the following:

(A) int a[50];

(B) float values [10][20];

(C) double a[50];

(D) int score [10, 15];

36. Which of the following is not a storage class?

(A) external

(B) automatic

(C) register

(D) define

37. Register variable are active

(A) outside the function

(B) throughout the program

(C) only in the function where it is defined

(D) surrounding of that function

38. In which stage the below code gets replaced by the contents of the file
#include<stdio.h>

(A) During linking

(B) During editing

(C) During preprocessing

(D) During execution

Space For Rough Work

39. What is the correct value returned to the operating system upon successful completion of a program?

   (A) 0

   (B) – 1

   (C) 1

   (D) Programs do not return a value

40. What will be the output of the program given below?
```
#include<stdio.h>
main( )
{
     char *p="Xyz";
     while(*p)
        printf("%c", *p++);
}
```

   (A) Xyz

   (B) yz

   (C) Runtime error

   (D) Compile error

41. '%x', '%p', '%lp' all these used to print hexadecimal format of

   (A) address

   (B) long

   (C) integer

   (D) double

42. EDI contains how many bit address for the beginning of a block in memory?

   (A) 8

   (B) 64

   (C) 128

   (D) 32

43. A visual studio .NET application is compiled into a machine independent language called

   (A) Byte code

   (B) Intermediate code

   (C) Microsoft intermediate language

   (D) Independent code

44. The file extension for ASP.NET web pages is

   (A) .asp

   (B) .aspn

   (C) .aspv

   (D) .aspx

Space For Rough Work

45. When displaying a web page, the application layer uses

(A) FTP

(B) SMTP

(C) TCP

(D) HTTP

46. Delete command in SQL is used to

(A) delete rows in a table

(B) delete columns in a table

(C) delete the entire table with schema

(D) delete the primary key

47. Operating system is a

(A) System program

(B) Application program

(C) Machine program

(D) I/O program

48. Which is not a keyword in C++?

(A) new

(B) malloc

(C) New

(D) realloc

49. An example of non-linear data structure

(A) Stack

(B) Queue

(C) Tree

(D) Array

50. Which of the following is not an assembler?

(A) Load and go

(B) One-pass assembler

(C) Two-pass assembler

(D) Three-pass assembler

Space For Rough Work

Each question carries 2 marks. (25 × 2 = 50)

51. What will be the output of the following program?

```
#include<stdio.h>
int main ( ) {
    int x;
    x = 10, 20, 30;
    printf ("%d", x) ;
    return 0;
}
```

(A) 10 (B) 20
(C) 30 (D) 0

52. What will be the output of following c code?

```
#include<stdio.h>
extern int x;
int main ( ) {
    do {
        do {
            printf("%o", x) ;
        }
        while (!–2) ;
    }
    while (0) ;
    return 0;
}
int x = 8;
```

(A) 8   (B) 10
(C) 0   (D) 9

53. Consider the program where a,b are integers with b > 0

```
x:=a; y:=b; z:=0;
while y > 0 do
    if odd (x) then
            z : = z + x;
            y: = y – 1;
    else y : = y ≡ 2;
            x: = 2 • x;
    fi
```

Invariant of the loop is a condition which is true before and after every iteration of the loop. In the above program the loop invariant is given by

$$0 \leq y \text{ and } z + x * y \equiv a * b$$

Which of the following is true of the program?

(A) The program will not terminate for some values of a, b

(B) The program will terminate with $z = 2 \wedge b$

(C) The program will terminate with $z = a * b$

(D) The program will not terminate for some values of a,b but when it does terminate, the condition $z = a * b$ will hold.

Space For Rough Work

54. What will be the output of the following program?

```c
#include<stdio.h>
int main ( ) {
    float a=0.7;
    if (a<0.7) {
        printf ("C");
    }
    else {
        printf ("C++");
    }
    return 0;
}
```

(A) C

(B) C++

(C) NULL

(D) None of these

55. What is the extension of compiled Java classes?

(A) • class   (B) • java

(C) • txt   (D) • js

56. The method of object class to generate a duplicate copy of an object in Java is

(A) clone ( )   (B) copy ( )

(C) duplicate ( )   (D) triplicate ( )

57. Blowfish is a

(A) Block cipher

(B) Stream cipher

(C) Character cipher

(D) Address cipher

58. Algorithm to find the minimum cost spanning tree

(A) Prim's algorithm

(B) Shannon's algorithm

(C) Tree algorithm

(D) Graph algorithm

59. In a Binary search tree the value of root node is

(A) greater than all node values of the left subtree

(B) greater than all node values of the right subtree

(C) Root node is the smallest among all values

(D) Root node is the largest among all values

60. SCSI stands for

(A) System call system interface

(B) Small computer system interface

(C) Semi computer semi interface

(D) Semi computer system interface

Space For Rough Work

61. The probability that a student knows the current answer to a multiple choice question is $2/3$. If he does not know the answer, then he guesses the answer. The probability of the guessed answer to be correct is $\frac{1}{4}$. Given that the student has answered the question correctly, the conditional probability that the student knows the correct answer is

(A) $2/3$ (B) $3/4$

(C) $5/6$ (D) $8/9$

62. A bag contains 5 red and 10 black balls. Eight of them are placed in another bag. What is the probability that the latter contains 3 red and 5 blacks balls?

(A) $\dfrac{5C_3 \times 10C_5}{15C_8}$ (B) $\dfrac{5C_3 + 10C_5}{15C_8}$

(C) $\dfrac{5C_3 \times 10C_5}{15C_6}$ (D) $\dfrac{5C_3 + 10C_5}{15C_6}$

63. A manufacturer knows that the computer he makes contains on an average 1% defective. He packs them in boxes of 100. The probability that a box picked out at random will contain 4 or more faulty computer is

(A) $1 - \dfrac{8}{3} e^{-1}$ (B) $\dfrac{8}{3} e^{-1}$

(C) $\dfrac{3}{8} e^{-1}$ (D) $1 - \dfrac{3}{8} e^{-1}$

64. Let E and F be two events with $P(E) > 0$ $P(F/E) = 0.3$ and $P(E \cap F^c) = 0.2$ then $P(E)$ equals

(A) $2/7$ (B) $3/7$

(C) $4/7$ (D) $5/7$

65. The following data about the flow of liquid was observed in a continuous chemical process plant.

Flow rate (litres/sec)	Frequency
7.5 to 7.7	1
7.7 to 7.9	5
7.9 to 8.1	35
8.1 to 8.3	13
8.3 to 8.5	12
8.5 to 8.7	10

Mean flow rate of the liquid is

(A) 8.00 litres/sec (B) 8.06 litres/sec

(C) 8.16 litres/sec (D) 8.26 litres/sec

66. The random variable x takes on the value 1, 2 or 3 with probabilities $\dfrac{2+5p}{5}$, $\dfrac{1+3p}{5}$ and $\dfrac{1.5+2p}{5}$ respectively. The value of P and E (x) are respectively.

(A) 0.05, 1.87

(B) 1.90, 5.87

(C) 0.05, 1.10

(D) 0.25, 1.40

Space For Rough Work

67. The value of the integral $\int\limits_{0}^{2}\int\limits_{0}^{x} e^{x+y}\, dy.dx$ is

(A) $\dfrac{1}{2}(e-1)$ (B) $\dfrac{1}{2}(e^2-1)^2$

(C) $\dfrac{1}{2}(e^2-e)$ (D) $\dfrac{1}{2}\left(e-\dfrac{1}{e}\right)^2$

68. $\int\limits_{\frac{3\pi}{4}}^{\frac{4\pi}{3}} \dfrac{\sin x \,.\, \cos x}{|\cos x|}\, dx = \dfrac{k}{2}$ then the value

of k is

(A) $\sqrt{2}-1$

(B) $1-\sqrt{2}$

(C) $2-\sqrt{2}$

(D) $\sqrt{2}-2$

69. The integrating factor for differential equation $(x^2y - 2xy^2)\, dx + (x^3 - 3x^2y)\, dy$ is given by

(A) $\dfrac{1}{xy}$

(B) xy

(C) x^2y^2

(D) $\dfrac{1}{x^2y^2}$

70. If $f(t) = t$ for $0 \le t \le a$ such that $f(t+a) = f(t)$ then $L\{f(t)\}$ is

(A) $\dfrac{1}{s^2} - \dfrac{a\,e^{-as}}{s(1-e^{-as})}$

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

(C) $\dfrac{a\,e^{-as}}{s(1-e^{-as})}$

(D) None

71. Laplace transform $f(t) = \cos(pt+q)$ is

(A) $\dfrac{S\cos q - p\sin q}{s^2+p^2}$

(B) $\dfrac{S\cos q + p\sin q}{s^2+p^2}$

(C) $\dfrac{S\sin q - p\cos q}{s^2+p^2}$

(D) $\dfrac{S\sin q + p\cos q}{s^2+p^2}$

72. If $x = r\cos\theta$, $y = r\sin\theta$ where r and θ are the function of x, then $\dfrac{dx}{dt}$ is equal to

(A) $r\cos\theta\,\dfrac{dr}{dt} - r\sin\theta\,\dfrac{d\theta}{dt}$

(B) $\cos\theta\,\dfrac{dr}{dt} - r\sin\theta\,\dfrac{d\theta}{dt}$

(C) $r\cos\theta\,\dfrac{dr}{dt} + \sin\theta\,\dfrac{d\theta}{dt}$

(D) $r\cos\theta\,\dfrac{dr}{dt} - \sin\theta\,\dfrac{d\theta}{dt}$

Space For Rough Work

73. Consider the Assertion (A) and Reason (R) given below:

Assertion (A): if $u = xy\, f\left(\dfrac{y}{x}\right)$ then

$$x\,\dfrac{\partial u}{\partial x} + y\,\dfrac{\partial u}{\partial y} = 2u.$$

Reason (R) : Given function u is homogenous of degree 2 in x and y of these statements

(A) Both A and R are true and R is correct explanation of A

(B) Both A and R are true and R is not correct explanation of A

(C) A is true but R is false

(D) A is false but R is true

74. If $u = \sin^{-1}\left(\dfrac{x}{y}\right) + \cos^{-1}\left(\dfrac{y}{x}\right)$ then $\dfrac{ux}{uy} = $_____

(A) $\dfrac{x}{y}$

(B) $\dfrac{y}{x}$

(C) $\dfrac{-x}{y}$

(D) $\dfrac{-y}{x}$

75. The parabolic arc $y = \sqrt{x}$, $1 \le x \le 2$ is revolved around the x-axis. The volume of solid of revolution is _____

(A) $\dfrac{\pi}{4}$

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

(C) $\dfrac{3\pi}{4}$

(D) $\dfrac{3\pi}{2}$

_____

Space For Rough Work

SPACE FOR ROUGH WORK