**QUESTION BOOKLET CODE** 

### 2012 CA

**Test Paper Code: CA** 

Time: 3 Hours

A. General:

#### Max. Marks: 300

# INSTRUCTIONS

- 1. This Booklet is your Question Paper. It contains **20** pages and has 100 questions.
- 2. The Question Booklet **Code** is printed on the right-hand top corner of this page.
- 3. The Question Booklet contains blank spaces for your rough work. No additional sheets will be provided for rough work.
- 4. Clip board, log tables, slide rule, calculator, cellular phone or any other electronic gadget in any form are <u>NOT</u> allowed.
- 5. Write your Name and Registration Number in the space provided at the bottom.
- 6. All answers are to be marked only on the machine gradable Objective Response Sheet **(ORS)** provided along with this booklet, as per the instructions therein.
- 7. The Question Booklet along with the Objective Response Sheet (ORS) must be handed over to the Invigilator before leaving the examination hall.
- 8. Refer to Special Instruction/Useful Data on reverse of this sheet.

### B. Filling-in the ORS:

- 9. Write your Registration Number in the boxes provided on the upper left-hand-side of the **ORS** and darken the appropriate bubble under each digit of your Registration Number using a **HB pencil**.
- 10. Ensure that the **code** on the **Question Booklet** and the **code** on the **ORS** are the same. If the codes do not match, report to the Invigilator immediately.
- 11. On the lower-left-hand-side of the **ORS**, write your Name, Registration Number, and Name of the Test Centre and put your signature in the appropriate box with ball-point pen. Do not write these anywhere else.

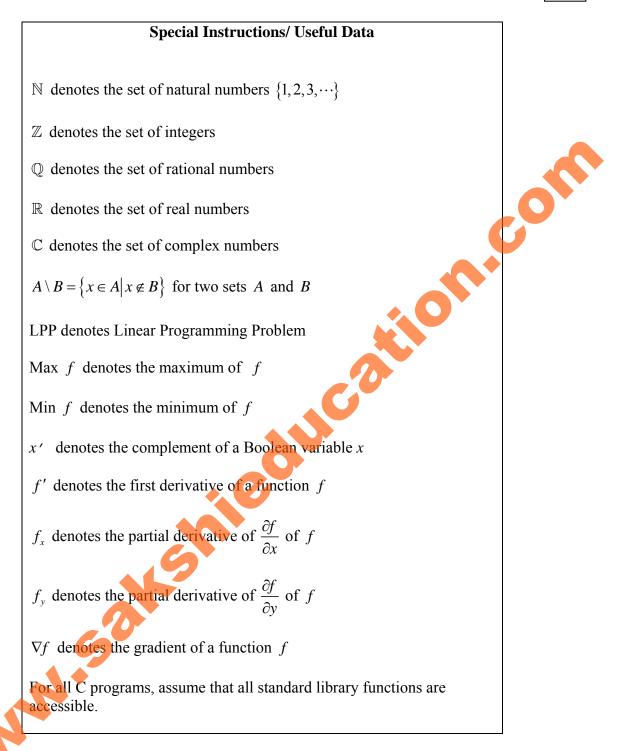
### C. Marking of Answers on the ORS:

- 12. Each question has **4 choices** for its answer: (A), (B), (C) and (D). Only **ONE** of them is the correct answer.
- 13. On the right-hand-side of **ORS**, for each question number, darken with a **HB Pencil** ONLY one bubble corresponding to what you consider to be the most appropriate answer, from among the four choices.
- 14. There will be negative marking for wrong answers.

# MARKING SCHEME:

- (a) For each correct answer, you will be awarded 3 (Three) marks.
- (b) For each wrong answer, you will be awarded -1 (Negative one) mark.
- (c) Multiple answers to a question will be treated as a wrong answer.
- (d) For each un-attempted question, you will be awarded 0 (Zero) mark.

Name				
Registration Number				



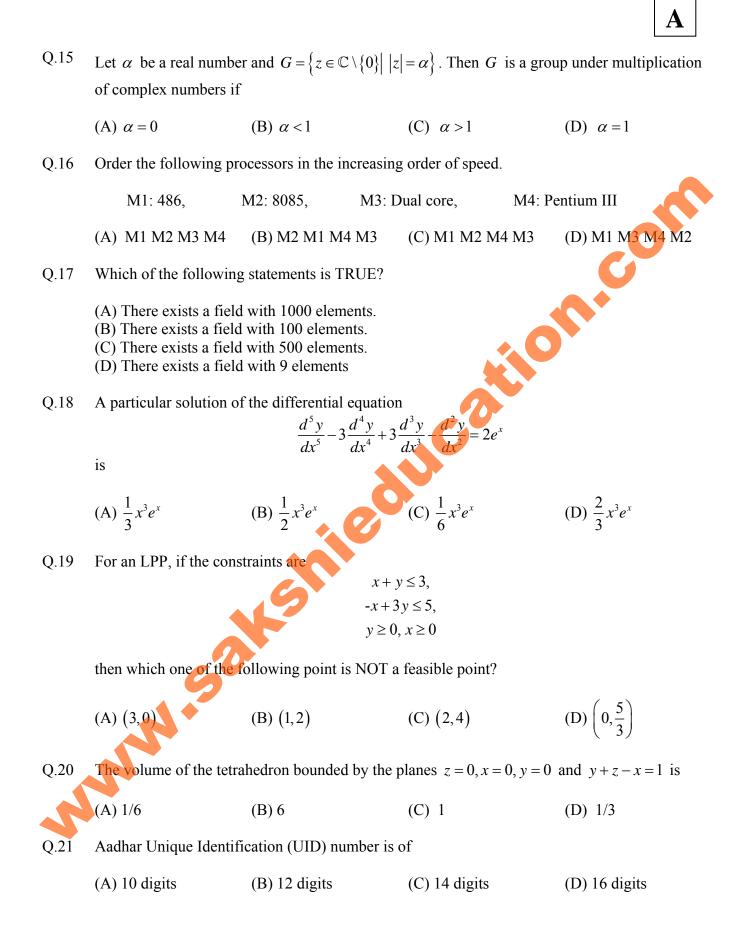
Q.1 Who created the first free email service on the Internet? (A) B. W. Kernighan (B) Bill Gates (C) N. Karmakar (D) Sabeer Bhatia Q.2 Let  $S = \{x \in \mathbb{Q} \mid x^2 \in \{1, 20, 21\}\}$ . Then the number of elements in the set *S* is COR (A) 1 (C) 4 (D) 6 (B) 2 Q.3 The rank of the matrix  $\begin{vmatrix} 1 & 2 & 4 & 1 & -2 \\ 2 & 3 & 7 & 1 & -2 \\ 1 & 0 & 2 & -1 & 2 \\ 1 & 1 & 1 & 2 & 4 \end{vmatrix}$  is (D) 4 (A) 1 (B) 2 Q.4 Mega FLOPS stands for (A)  $10^9$  floating point operations per second (B)  $10^5$  fixed point operations per second (C)  $10^6$  floating point operations per second (D)  $10^{12}$  fixed point operations per second The set  $S = \{(x, y) \in \mathbb{R}^2 | x \notin \mathbb{Q} \text{ or } y \notin \mathbb{Z}\}$  is Q.5 (A)  $(\mathbb{R} \setminus \mathbb{Q}) \times (\mathbb{R} \setminus \mathbb{Z})$  (B)  $(\mathbb{R} \times \mathbb{R}) \times (\mathbb{Q} \setminus \mathbb{Z})$ (C)  $(\mathbb{R} \setminus \mathbb{Q}) \times \mathbb{R}$  (D)  $\mathbb{R} \times (\mathbb{R} \setminus \mathbb{Z})$ The number  $20^6 - 13^6$  is divisible by Q.6 (A) 11 (B) 5 (C) 13 (D) 6 The inverse of the matrix  $\begin{bmatrix} 1 & 1 & 1 \\ 2 & 3 & 2 \\ 3 & 8 & 2 \end{bmatrix}$  is Q.7  $\begin{array}{c} 10 & -6 & 1 \\ -2 & -1 & 0 \\ -7 & -5 & -1 \end{array} \\ (C) \begin{bmatrix} 10 & -6 & -1 \\ -2 & 1 & 0 \\ -7 & 5 & 1 \end{bmatrix}$ (B)  $\begin{bmatrix} 10 & -6 & 1 \\ -2 & -1 & 0 \\ -7 & -5 & 1 \end{bmatrix}$ (D)  $\begin{bmatrix} 10 & -6 & 1 \\ -2 & 1 & 0 \\ -7 & 5 & 1 \end{bmatrix}$ 

Q.8 Let  $f: \mathbb{R} \to \mathbb{R}$  be defined by  $f(x) = x^2 + 4x + 5$ . Then which of the following statements is TRUE? (A) f is one-one. (B) f is on-to. (C) f is one-one and on-to. (D) f is neither one-one nor on-to. (D) 9 Q.9 The number of distinct 3 digit numbers greater than 100 where no digit repeats itself is (A) 504 (B) 648 (C) 326 The digit at the unit place of the number  $19^{25}$  is Q.10 (A) 1 (B) 3 (C) 5 Q.11 The differential equation  $\frac{dy}{dx} + (\tan x) y = \cos x, \quad x \in \left($ has the solution (A)  $y = (x+c)\cos x$ (B)  $y = (x+c)\sec x$ (x+c) cosec x (C)  $y = (x+c)\sin x$ Consider the function  $f(x) = -x^4 + 2x^3 - 1$ . What is the absolute truncation error for evaluation Q.12 of f'(x) at x = 0.5 by the first order forward difference scheme using a step size, h = 0.5? (A)  $\frac{5}{9}$ (D)  $\frac{8}{5}$ (C)  $\frac{1}{3}$ Consider the following LPF Q.13 Max f = 5x + 12vsubject to  $x + 5y \le 50,$  $6x + 3y \le 36.$  $x \le 5, x \ge 0, y \ge 0$ The number of extreme points of the feasible region are (A) 4 (B) 5 (C) 6 (D) 7 Q.14 Solution of the initial value problem  $(2\cos y + 3x)dx - x\sin y dy = 0, y(1) = 0$ is

(A)  $x^2 \cos y + y^3 = 1$ (B)  $x^2 \sin y + y^3 = 0$ (D)  $y^2 \sin x + y^3 = 0$ (C)  $x^2 \cos y + x^3 = 2$ 

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А



The general solution of the nonhomogeneous differential equation

Q.22

А

 $\frac{d^2y}{dx^2} + \frac{dy}{dx} - 12y = 150\cos 3x$ is (A)  $c_1 e^{-3x} + c_2 e^{4x} - 7\cos 3x - \sin 3x$ com (B)  $c_1 e^{3x} + c_2 e^{-4x} - 7\cos 3x + \sin 3x$ (C)  $c_1 e^{3x} + c_2 e^{-4x} + 7\cos 3x + \sin 3x$ (D)  $c_1 e^{3x} + c_2 e^{-4x} - 7\cos 3x - \sin 3x$ Q.23 Which of the following is/are main memory of a computer? P: RAM, Q: Hard disk, R: CDROM, S: Pen drive (C) P only (D) P, R, and S only (A) P and Q only (B) Q only Q.24 The boundary value problem  $\frac{d^2 y}{dx^2} + \pi^2 y = 0, \quad y(0) = 0, \quad y(1) = 0$ has (A) two solutions (B) no solution (D) infinitely many solutions (C) unique solution Q.25 Suppose  $\vec{a} = \hat{i} - 2\hat{j} + 3\hat{k}$ ,  $\vec{b} = \hat{i} + \hat{k}$  and  $\vec{c} = \hat{i} - \hat{j} + 3\hat{k}$ . Then  $\vec{a} \times (\vec{b} \times \vec{c})$  is (A)  $8\hat{i} + 4\hat{i}$ (C)  $8\hat{i} + 8\hat{j}$  (D)  $8\hat{i} - 8\hat{j}$ (B)  $8\hat{i} - 4$ The Newton-Raphson method is used to find a real root of  $f(x) = x^3 - x + 1 = 0$  with initial Q.26 approximation  $x_2$  is (B)  $\frac{5}{8}$ (C) 2 (D) 3 Q.27 **SMS** stands for (A) Short Message Service (B) Secured Message Service (C) Short Mail Service (D) Secured mail Service Q.28 What is the probability of getting an even number or a number less than 5, in tossing a fair die?

(A) 
$$\frac{2}{3}$$
 (B)  $\frac{1}{3}$  (C)  $\frac{5}{6}$  (D)  $\frac{1}{6}$ 

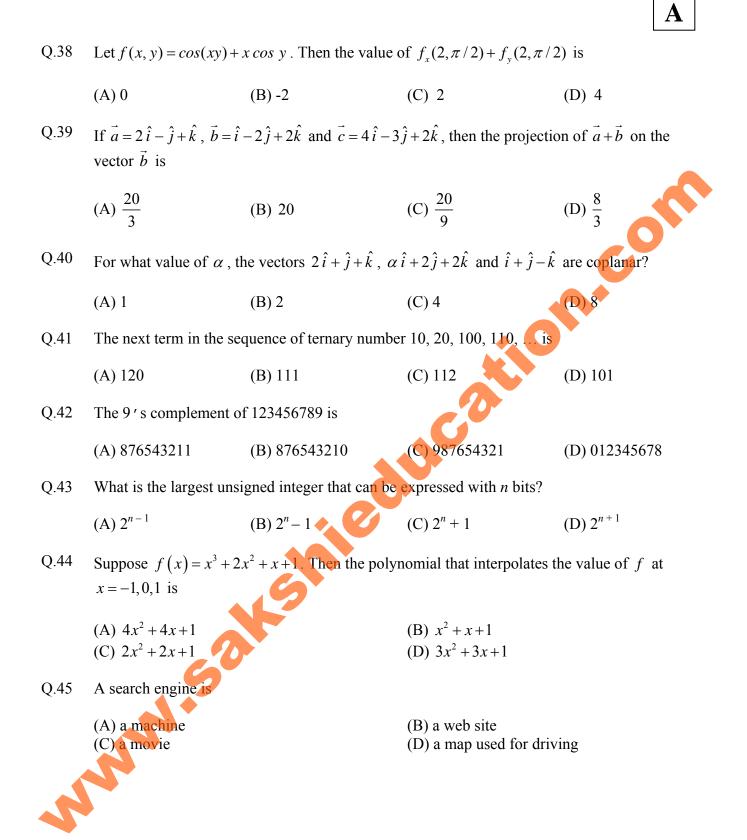
Q.29

Rabindranath Tagore won the Nobel prize in Literature for his book entitled (A) War and Peace (B) Malgudi Days (C) Gitanjali (D) Durgeshnandini Q.30 Which company is the leader in computer networking? (B) Cisco (C) Oracle (A) Wipro For the table Q.31 0 1 2 3 х f(x)2 9 1 28 the divided difference f[1,2,3] is (D) 1 (A) 6 (B) 13 (C) 3 Q.32 Which one of the following is equivalent to 8 Giga bytes (B)  $2^{33}$  bytes C 2<sup>43</sup> bytes (D)  $2^{53}$  bytes (A)  $2^{23}$  bytes The decimal value of  $(327)_8 \times (25)_8$  is Q.33 (B) 8175 (A) 5625 (C) 3267 (D) 4515 Q.34 The value of the integral  $\int (1+5x-100x^2) dx$  by Simpson's  $\frac{1}{2}$  rd rule is (B) – (A) -288 (C) 288 (D) 289 Which one of the following stands for LAN? Q.35 (A) Local Area Network (B) Logical Area Network (C) Large Area Network (D) Least Area Network The Boolean expression (x + y)(x + y') is equivalent to 0.36(A) x + y(B) y (C) xy(D) xQ.37 ISP stands for (A) Internet Security Protocol (B) Intelligent Service Package

(D) Intelligent Service Provider

(C) Internet Service Provider

Α



# Q.46 The Lagrange form of the interpolating polynomial that fits the data

	x	0	1	2	
	f(x)	1	2	5	
+ -	$\frac{5}{2}x(x-1)$ $\frac{5}{2}x(x-1)$ $\frac{2}{5}x(x-1)$ $\frac{2}{5}x(x-1$	1) 1)	l has	2	

is

(A) 
$$\frac{1}{2}(x-1)(x-2)-2x(x+2)+\frac{5}{2}x(x-1)$$
  
(B)  $\frac{1}{2}(x-1)(x-2)+2x(x+2)+\frac{5}{2}x(x-1)$   
(C)  $2(x-1)(x-2)+\frac{1}{2}x(x+2)+\frac{2}{5}x(x-1)$   
(D)  $2(x-1)(x-2)-\frac{1}{2}x(x+2)+\frac{2}{5}x(x-1)$ 

Q.47 The function f(x, y) = xy defined on  $x^2 + y^2 \le 1$  has

- (A) both maximum and minimum values
- (B) only maximum value
- (C) only minimum value
- (D) neither maximum nor minimum value

Q.48 The area of the region enclosed by the parabola  $x^2 = 4ay$  and the line x = 2a with x-axis is

(A) 
$$\frac{4}{3}a^2$$

(A)  $-\frac{2}{3}$ 

(C) 
$$\frac{3}{4}a^2$$
 (D)  $\frac{2}{3}a^2$ 

Q.49 Consider the system of linear equations

$$x-2y+z=3$$
$$2x+\alpha z=-2$$
$$-2x+2y+\alpha z=1$$

In order to have unique solution to this linear system of equations the value of  $\alpha$  should not be equal to

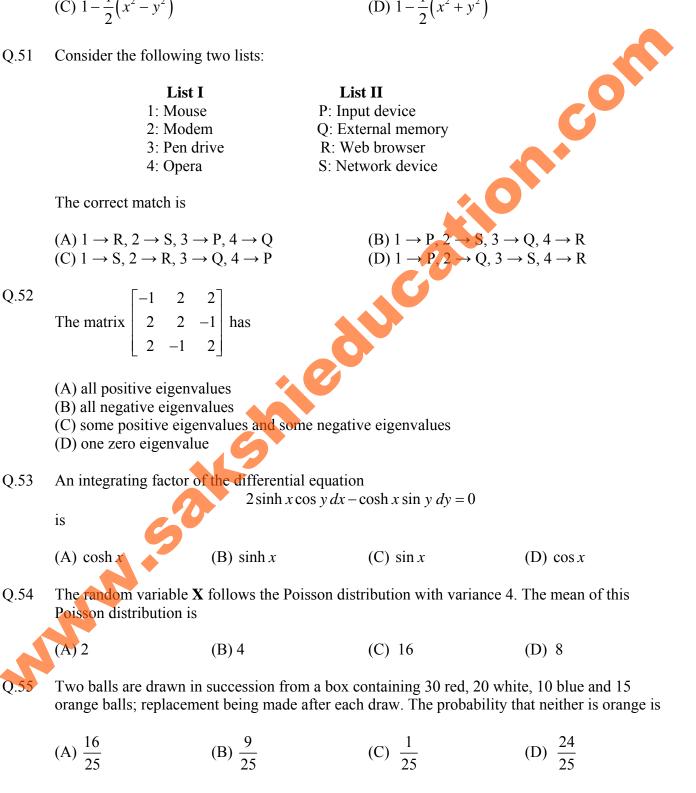
(B) 
$$\frac{2}{3}$$
 (C)  $\frac{4}{3}$  (D)  $-\frac{4}{3}$ 



Q.50 The quadratic approximation of  $f(x, y) = \cos x \cos y$  about the point (0, 0) is

(A) 
$$1 + \frac{1}{2}(x^2 - y^2)$$
  
(B)  $1 + \frac{1}{2}(x^2 + y^2)$   
(C)  $1 - \frac{1}{2}(x^2 - y^2)$   
(D)  $1 - \frac{1}{2}(x^2 + y^2)$ 

Q.51 Consider the following two lists:



Q.56 Let the function f has the values  $f_0, f_1, f_2$  at equidistant nodal points  $x_0, x_1, x_2$  where  $x_i = x_0 + ih$ , i = 1, 2. Then, the divided difference  $f[x_0, x_1, x_2]$  is equal to

(A) 
$$\frac{\nabla f_2}{2h}$$
 (B)  $\frac{\Delta f_0}{2h}$  (C)  $\frac{\Delta^2 f_0}{2h^2}$  (D)  $\frac{\nabla f_1}{2h}$ 

Q.57 Let  $\sigma = (1,3,5,7,9,10)(2,4,6,8)$  be a permutation in  $S_{10}$ . Then the smallest positive integer m (D) 12 such that  $\sigma^m = Id$ , the identity permutation, is

(A) 24 (B) 6 (C) 4

Consider the following two lists: Q.58

List I	List II
1: TFT	P: Visual display unit 🥢 🌔
2: RAM	Q: Volatile memory
3: ROM	R: Non-volatile memory
4: CRT	S: Non-writable memory

The correct match is

- (A)  $1 \rightarrow P, 2 \rightarrow Q, 3 \rightarrow S, 4 \rightarrow R$ (C)  $1 \rightarrow S, 2 \rightarrow Q, 3 \rightarrow S, 4 \rightarrow P$
- A base 12 number system is called duodecimal. It uses the symbols 0, 1, 2, ..., 9, A, and B, Q.59 where A and B are the symbols used to represent 10 and 11 respectively. What is the duodecimal equivalent of the decimal number 1594?

(A) A09

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(C) B0A
                    (D) B0B
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(B)  $1 \rightarrow P, 2 \rightarrow R, 3 \rightarrow Q, 4 \rightarrow S$ (D)  $1 \rightarrow P, 2 \rightarrow Q, 3 \rightarrow S, 4 \rightarrow P$ 

A particular solution of the differential equation Q.60

is  

$$\frac{d^{2}y}{dx^{2}} - \frac{dy}{dx} = xe^{x}$$
(A)  $-\frac{x^{2}}{2}e^{x} + (x-1)e^{x}$ 
(B)  $-\frac{x^{2}}{2}e^{-x} + (x-1)e^{-x}$ 
(C)  $\frac{x^{2}}{2}e^{x} - (x-1)e^{x}$ 
(D)  $\frac{x^{2}}{2}e^{-x} - (x-1)e^{-x}$ 

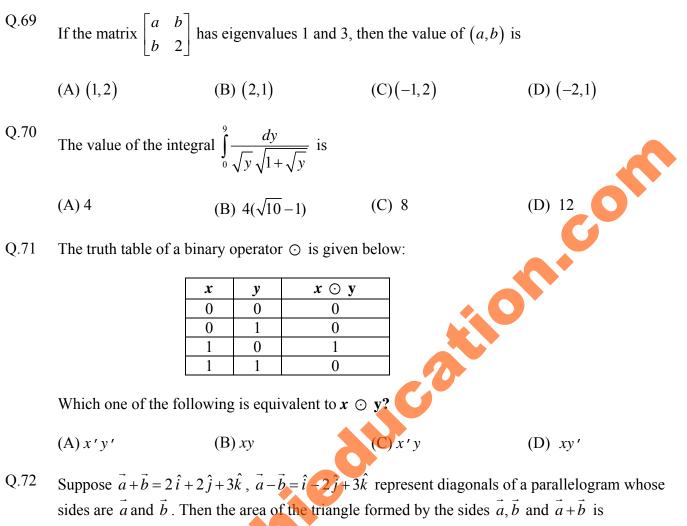
(B) A0A

The equation for the tangent plane to the surface  $2x^3y - xz^2 = -3$  at the point (1, -1, 1) is

(A) 7x - 2y + 2z = 11(B) 2x - 7y + 2z = 11(D) 7x + 2y - 2z = 11(C) 2x + 7y - 2z = 11

Q.62 The minimum distance from the origin to the plane 
$$x+3y-z=11$$
 in  $\mathbb{R}^3$  is  
(A) 10 (B) 1 (C)  $\sqrt{11}$  (D) 11  
Q.63 Let  $\sigma$  be a 6-cycle in  $S_{12}$ . Then  $\sigma'$  is also 6-cycle if the value of *i* is  
(A) 2 (B) 3 (C) 5 (D) 12  
Q.64 The book entitled, 'The Discovery of India' was written by  
(A) Abul Kalam Azad (D) Sarvepalli Radhakrishnan  
Q.65 Consider the following two lists:  
**List I**  
1: Functional programming  
2: Logical programming  
3: Proceedural programming  
3: Object oriented programming  
3: Dispect oriented programming  
3: Dispect oriented programming  
3: Lisp  
Which one of the following is correct match?  
(A)  $1 \rightarrow P, 2 \rightarrow Q, 3 \rightarrow S, 4 \rightarrow Q$  (B)  $1 \rightarrow P, 2 \rightarrow Q, 3 \rightarrow P, 4 \rightarrow R$   
Q.66 What is the octal equivalent of the hexelecimal number ABC?  
(A)  $5674$  (B)  $534$  (C)  $5275$  (D)  $5274$   
Q.67 The fourth order linear ultrerential equation having  $e^{-x}$ ,  $xe^{-x}$ ,  $\cos 2x$ ,  $\sin 2x$  as solutions is  
(A)  $\frac{d^4y}{dx^4} + 2\frac{d^2y}{dx^2} + 3\frac{d^4y}{dx^4} + 4y = 0$   
(B)  $\frac{d^4x}{dx^4} + 2\frac{d^2y}{dx^2} + 3\frac{d^4y}{dx^4} + 4y = 0$   
(D)  $\frac{d^4y}{dx^4} + 2\frac{d^2y}{dx^4} + 3\frac{d^2y}{dx^4} + 4\frac{d^2y}{dx^4} + 2y = 0$   
(D)  $\frac{d^4y}{dx^4} + 2\frac{d^2y}{dx^2} + 3\frac{d^4y}{dx^4} + 4y = 0$   
(D)  $\frac{d^4y}{dx^4} + 2\frac{d^2y}{dx^2} + 3\frac{d^4y}{dx^4} + 4y = 0$   
(D)  $\frac{d^4y}{dx^4} + 2\frac{d^2y}{dx^2} + 3\frac{d^2y}{dx^4} + 4\frac{d^2y}{dx^4} + 2y = 0$   
(D)  $\frac{d^4y}{dx^4} + 2\frac{d^2y}{dx^2} + 3\frac{d^2y}{dx^4} + 4y = 0$   
(D)  $\frac{d^4y}{dx^4} + 2\frac{d^2y}{dx^2} + 3\frac{d^2y}{dx^4} + 4y = 0$   
(D)  $\frac{d^4y}{dx^4} + 2\frac{d^2y}{dx^2} + 3\frac{d^2y}{dx^4} + 4y = 0$   
(D)  $\frac{d^4y}{dx^4} + 2\frac{d^2y}{dx^2} + 3\frac{d^2y}{dx^4} + 4y = 0$   
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(D)  $\frac{d^4y}{dx^4} + 2\frac{d^2y}{dx^2} + 3\frac{d^2y}{dx^4} + 4y = 0$   
(D)  $\frac{$ 

(A) 
$$\frac{600}{729}$$
 (B)  $\frac{128}{729}$  (C)  $\frac{601}{729}$  (D)  $\frac{64}{81}$ 



(A) 
$$\frac{1}{4}\sqrt{189}$$
 (B)  $\frac{1}{4}\sqrt{198}$  (C)  $\frac{1}{4}\sqrt{179}$  (D)  $\frac{1}{4}\sqrt{197}$ 

Q.73 What is the characteristic equation of the T flip-flop, if Q and  $Q^+$  denote the output during the current and next clock cycle?

(A) 
$$Q^+ = T + Q$$
  
(B)  $Q^+ = T \cdot Q \cdot + TQ$   
(C)  $Q^+ = TQ' + T'Q$   
(D)  $Q^+ = T' + Q'$   
Q.74  
The integral  $\int_{-1}^{1} f(x) dx$  where f is continuous on [-1,1], is approximated by the formula

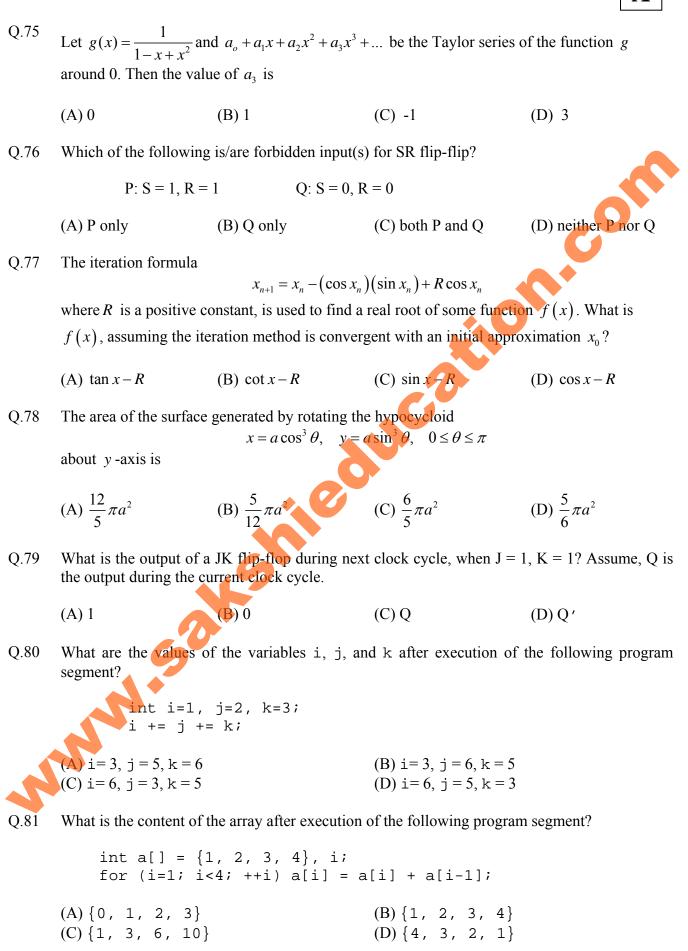
$$\int_{-1}^{1} f(x) dx \simeq \alpha f\left(-\frac{1}{\sqrt{2}}\right) + \beta f\left(\frac{1}{\sqrt{2}}\right).$$

Suppose the approximation is exact for all polynomials of degree  $\leq 1$ . Then the value of  $\alpha$  is

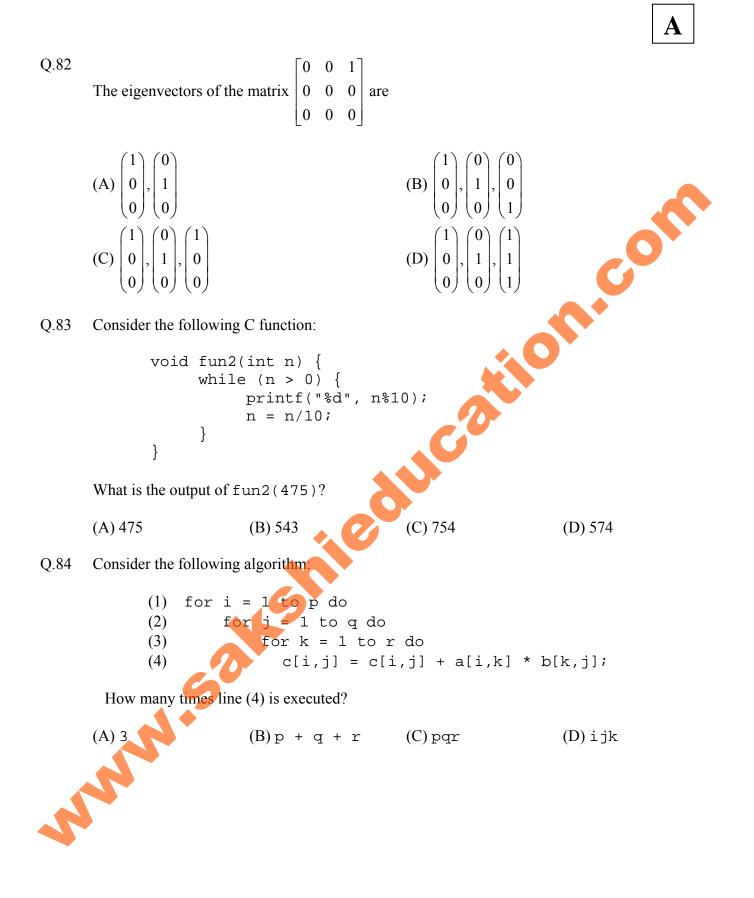
(A) -1 (B) 1 (C) 
$$\frac{1}{\sqrt{2}}$$
 (D)  $-\frac{1}{\sqrt{2}}$ 

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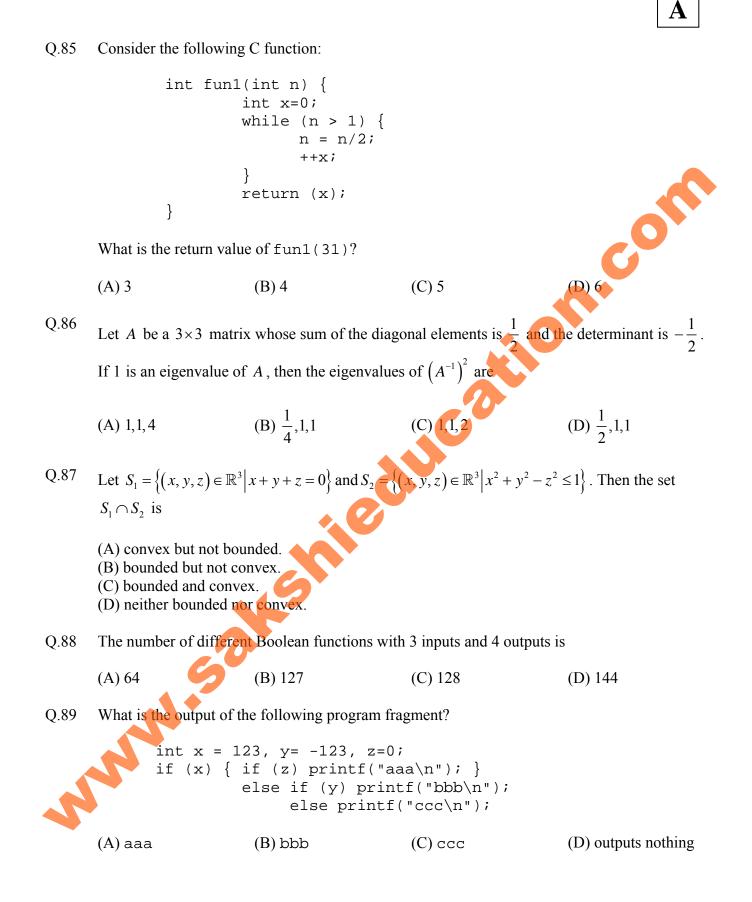




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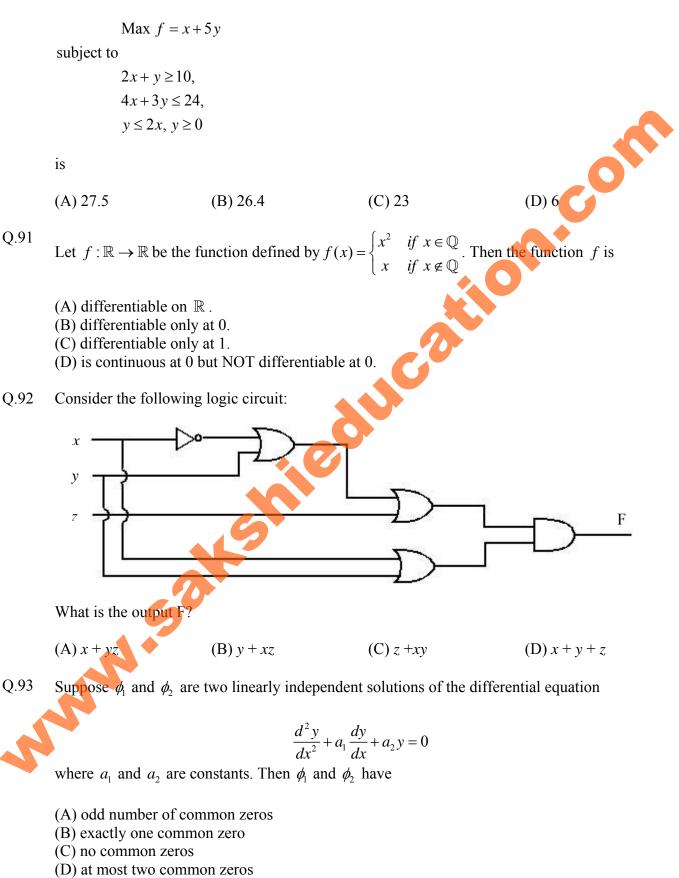


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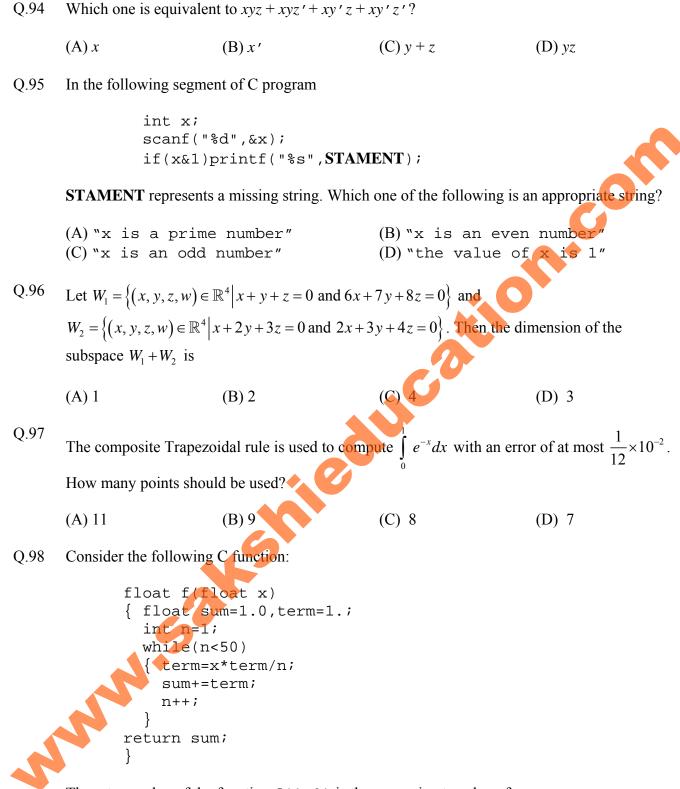




Q.90 The solution of the following LPP

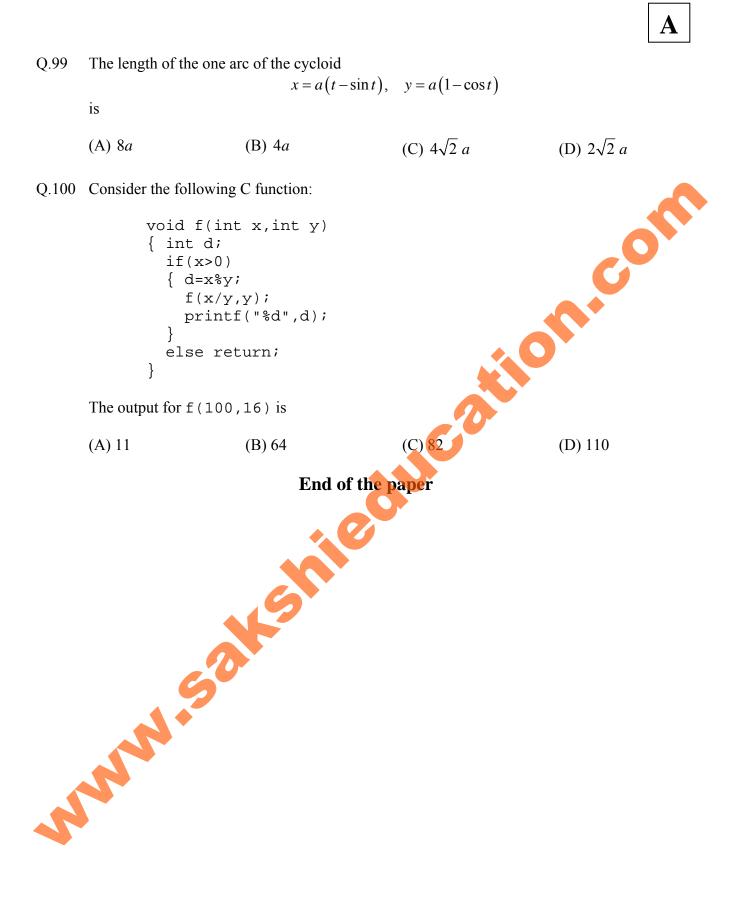


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The return value of the function f(1.0) is the approximate value of

(A) 0.0 (B)  $\sin(1.0)$  (C)  $\cos(1.0)$  (D) e



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