BCA(1)-102

2018

Time : 3Hrs

Full Marks : 80

Candidates are required to give their answers in their own words as far as practicable.

The questions are of equal value.

Answer any five questions in which Q. No.1 is compulsory.

1. Choose the correct answer from this given alternatives:

(a) If q is some integer, then any position odd integer is of the form

   (i) $6q+1$ (ii) $6q+3$

   (iii) $6q+5$ (iv) All of them

(b) $\log_{10}(-10) = \ldots\ldots\ldots$

   (i) 1 (ii) -1

   (iii) undefined   (iv) None of these

(c) If $z = 5+4i$, then $|z| = \ldots\ldots\ldots$

   (i) 3 (ii) $\sqrt{29}$

   (iii) $\sqrt{41}$ (iv) None of these

(d) If $-x, 4, 2x+1$ are in A.P. then $x = \ldots\ldots\ldots$

   (i) 7 (ii) 9

   (iii) -7 (iv) None of these

P.T.O.

(e) If $f : R \to R$ such that $f(x) = (3 - x^3)^{\frac{1}{3}}$, then

(fof) (x) = ...
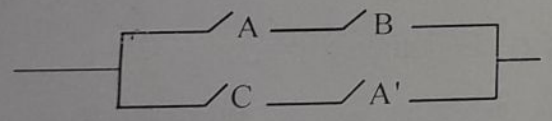
(i) $x^{\frac{1}{3}}$

(ii) x

(iii) x^3

(iv) None of these

(f) $\dfrac{d}{dx}(\operatorname{cosec} x) = \ldots\ldots\ldots$

(i) $-\operatorname{cosec} x.\tan x$

(ii) $-\operatorname{cosec} x.\cot x$

(iii) $\operatorname{cosec}^2 x$

(iv) None of these

(g) A Boolean function when expressed as a sum of all 2^n minterms of n variables is called

(i) Complete conjunctive normal form

(ii) Complete disjunctive normal form

(iii) Semi complete canonical form

(iv) None of these

(h) The switching circuit

is symbolically written as

(i) $A'B + CB$

(ii) $AA' + BC$

(iii) $AB + CA'$

(iv) $AC + BA'$

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2. (a) Using mathematical induction, show that
$$1^3 + 2^3 + 3^3 + \ldots\ldots n^3 = \left[\dfrac{n(n+1)}{2}\right]^2$$

(b) Find the modulus and amplitude of complex number
$$z = -3 + 2\sqrt{3}\, i$$

3. (a) How many numbers of three digits can be formed with the use of digits $0, 1, 2, 3, 4, 5$?

(b) Find the middle terms in the expansion of
$$\left(3x + \dfrac{1}{2x}\right)^{11}$$

4. (a) Evaluate $\displaystyle\lim_{x \to 0} \dfrac{1 - \cos x}{x \sin x}$

(b) If t_n denotes the nth term of an A.P., show that
$$t_m + t_{2n+m} = 2t_{m+n}$$

5. (a) Solve $3^{x+1} + 3^{2-x} = 12$

(b) Simplify : $\log \dfrac{\sqrt[4]{5} \cdot \sqrt[10]{2}}{\sqrt[3]{18} \cdot \sqrt{2}}$

6. (a) Prove that
$$\dfrac{\operatorname{Sin}(A-B)}{\operatorname{Sin} A \operatorname{Sin} B} + \dfrac{\operatorname{Sin}(B-C)}{\operatorname{Sin} B \operatorname{Sin} C} + \dfrac{\operatorname{Sin}(C-A)}{\operatorname{Sin} C.\operatorname{Sin} A} = 0$$

(b) Find $\dfrac{dy}{dx}$, when $y = \log(\sqrt{x-a} + \sqrt{x-b})$.

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7. (a) Find the area of the region bounded by the curve

$y^2 = 2y - x$ and the y-axis.

(b) Find the maximum and minimum value of

$3x^4 - 8x^3 + 12x^2 - 48x + 25$ on $[0, 3]$.

8. (a) What do you mean by signed numbers? Define 2's complement notation in binary system with examples and use it in performing addition and subtraction taking two binary numbers.

(b) A computer gives out the following groups of bytes to an output device. Give their octal and hexadecimal equivalents.

(i) 1000 1100

(ii) 0011 1010

(iii) 0010 1110

9. (a) What is Boolean function? Simplify the expression.

$T(x, y, z) = x' + y'z + yz + xz$

by eliminating redundant literals.

(b) Find the logic networks corresponding to Boolean expressions

(i) $AB + CD$

(ii) $X'Y'Z + X'YZ + XY'$

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