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(20516)

Roll No.

BCA-II Sem.

18010

B. C. A. Examination, May 2016

MATHEMATICS-II

(BCA-201)

(New)

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt questions from all Sections as per instructions.

Section-A

(Very Short Answer Questions)

Attempt all the five questions of this Section. Each question carries 3 marks. 3x5=15

1. If A and B are two sets such that $A \cup B$ has 50 elements, A has 28 elements and B has 32 elements. How many elements does $A \cap B$ have?
2. Show that $\log_b a \times \log_c b \times \log_b c = 1$, where a, b, c all are positive numbers.
3. Find $\frac{\partial f}{\partial x}$, if $f = ye^{(x^2+y^2)}$.

(2)

4. Show that the planes $3x - 2y + z + 17 = 0$ and $4x + 3y - 6z - 25 = 0$ are at right angles.
5. Evaluate $\int_0^3 \int_1^2 xy(1+x+y) dx dy$.

Section-B

(Short Answer Questions)

This Section contains three questions, attempt any two questions. Each question carries 7½ marks.

7½x2=15

6. A function f from set of rational numbers to itself is defined by $f(x) = 4x + 3$. Show that f is a bijective function. Also find its inverse function.
7. If $u = \sin^{-1} \left\{ \frac{x^2 + y^2}{x + y} \right\}$, show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \tan u$.
8. Find the distance of the point $(0, 0, 0)$ from the point of intersection of the line $\frac{x-2}{3} = \frac{y+1}{4} = \frac{z-2}{12}$ and the plane $x - y + z = 5$.

Section-C

(Detailed Answer Questions)

This Section contains five questions, attempt any three questions. Each question carries 15 marks.

15x3=45

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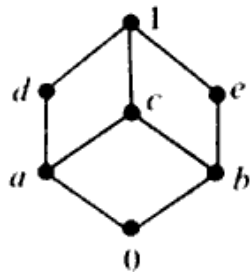
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9. (a) Let $X = \{1, 2, 3\}$ and f and g be functions from X to itself given by $f = \{(1, 2), (2, 3), (3, 1)\}$ and $g = \{(1, 1), (2, 2), (3, 1)\}$. Find $f \circ g$ and $g \circ f$.
- (b) Give examples of relations on the set $\{a, b, c\}$ which is :
- reflexive but is neither symmetric nor transitive.
 - Symmetric and transitive but not reflexive.

10. (a) Consider the lattice L in figure given below :



- Is L a complemented lattice?
 - Is L a complete lattice?
 - Find complements, if they exist, for the elements a, b, c .
- (b) Show that the relation of divisibility is a partial order on the set N of natural numberse.

11. (a) If $x = r \cos \theta$, $y = r \sin \theta$, show that :

(i) $\left(\frac{\partial r}{\partial x}\right)^2 + \left(\frac{\partial r}{\partial y}\right)^2 = 1$

(ii) $\frac{\partial^2 \theta}{\partial x^2} + \frac{\partial^2 \theta}{\partial y^2} = 0.$

- (b) Find the minima and maxima of $xy(a - x - y)$.

12. (a) Find the area between the line $y = x$ and curve $y = x^2$ enclosed in first quadrant.
- (b) Evaluate by changing the order of integration :

$$\int_0^1 \int_x^{\sqrt{2-x^2}} \frac{xdxdy}{\sqrt{x^2+y^2}}$$

13. (a) Find the equation of the tangent planes to the sphere $x^2 + y^2 + z^2 = 9$ which can be drawn through the line :

$$\frac{x-5}{2} = -\frac{y-1}{2} = \frac{z-1}{1}$$

- (b) Find the equation of the line through the point $(1, 2, 3)$ and parallel to the line