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KA-3784

First Year B.C.A. (Sem. I) Examination

September/October – 2012

102 : Mathematics

(Old Course)

Time : Hours] [Total Marks :

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ FIRST YEAR B.C.A. (SEM. I)

Name of the Subject :

☛ 102 : Mathematics *(Old Course)*

☛ Subject Code No. : 3 7 8 4 ☛ Section No. (1, 2,.....) : Nil

Seat No. :

Student's Signature

(2) **All** questions are **compulsory**.

(3) Figures to the **right** indicate **full** marks.

1 Answer the following questions :

(i) Define proper and improper subsets.

(ii) If $A=\{1,3,5,7\}$, $B=\{5,7,8,9\}$ then find $(A\cup B)-(A\cap B)$.

(iii) When do you say that given function is on to ?

(iv) Find the domain for which the functions $f(x)=2x^2-1$ and $g(x)=1-3x$ are equal.

(v) Define Tautology.

(vi) What is the difference between a sentence and a statement ?

(vii) If $A=\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ then find A^{-1}.

(viii) Define symmetric matrix.

(ix) What is the difference between co-factors and minor ?

(x) Find the equation of a line passing through origine and having slope $\frac{1}{6}$.

2 (a) State and prove De'Morgans law for intersection. **12**

(b) If $A=\{x|x\in R, x^2-3x-4=0\}$ and $B=\{x|x\in z, x^2=x\}$ then find (i) $A\cup B$ (ii) $A\Delta B$.

(c) If $A=\{1,2,3\}$, $B=\{2,6,7\}$, $C=\{2,7\}$ then prove that $A\times(B-C)=(A\times B)-(A\times C)$.

OR

2 (a) State and prove distributive law of intersection over union. **12**

(b) If $A=\{1,2,3\}$, $B=\{3,4\}$ and $C=\{1,3,5\}$ then find

(i) $A\times(B\cap C)$

(ii) $A\times(B\cap C)$

(iii) $(A\times B)\cup(A\times C)$

(c) If $A=\{1,2,3,4,5\}$, $B=\{1,3,5,6\}$, $C=\{1,2,3\}$ then verify

(i) $(A-B)\cup B=A\cup B$

(ii) $(A-B)\cup(B-A)=(A\cup B)-(A\cap B)$.

3 (a) The variable cost of processing 1 gm of coffee bean is Rs. 1 and fixed cost per day is Rs. 300. Give linear cost function and find the cost of processing 2000 gms of coffee beans in a day. **12**

(b) If $f(x)=\dfrac{x^2-25}{x-5}$; $x\in z-\{5\}$ and $g(x)=x+5$; $x\in z$. Is $f(x)=g(x)$?

(c) If $f(x)=\dfrac{x^2+5x-7}{x^2+2}$; $x\in z$ then find $\dfrac{f(1)+f(-2)}{f(-1)+f(0)}$.

OR

3 (a) Define Domain and Range of the function. **12**

If $f: A-B$ $f(x)=3x-2$ and range $R_f=\{-5,-8,7\}$ then find Domain.

(b) If $f(x) = 1/x + \frac{3}{x-1}$; $x \in R \div \{0, 1\}$ then find

$f(2), f(3), f\left(\frac{1}{2}\right), f(-2)$.

(c) If $f(x) = 1/x$; $x \in z - \{-1, 0, 1\}$ then prove that

$f(x+1) - f(x-1) = 2/1-x^2$.

4 (a) Let D_{16} be the set of positive divisors of 16. Define $+, \bullet \& /$ on D_{16} as

$a + b =$ l.c.m. of $a \& b$

$a \bullet b$ = g.c.d. of $a \& b$

$a^1 = 16/a$ then verify that $(D_{16}, +, \bullet, /, 1, 16)$ is a boolean Algebra.

(b) Verify using truth table $p \vee (q \wedge r) = (p \vee q) \wedge (p \vee r)$.

(c) In a boolean algebra B. Prove that $(x + y) \bullet (x' + y') = x' \bullet y'$

OR

4 (a) Let D_9 be the set of positive divisors of g. Define $+, \bullet, \&, /$ an D_9 as

$a + b$ = l.c.m. of $a \& b$

$a \bullet b$ = g.c.d. of $a \& b$

$a' = g/9$. Then verify that $(D_9, +, \bullet, /, 1, 9)$ is a boolean algebra.

(b) Verify using truth table.

$p \wedge (q \vee r) = (p \wedge q) \vee (p \wedge r)$.

(c) In a Boolean algebra prove that $(x + y)' = x' \bullet y'$.

5 (a) Without expanding prove that $\begin{vmatrix} x+y & y+z & z+x \\ z & x & y \\ 1 & 1 & 1 \end{vmatrix} = 0$.

(b) If $A = \begin{bmatrix} 2 & 1 & 3 \\ 1 & -2 & 4 \\ 0 & 3 & 5 \end{bmatrix}$, $B = \begin{bmatrix} 0 & 2 & 5 \\ 7 & -1 & 1 \\ 4 & 3 & 4 \end{bmatrix}$ and $3A + C = 4B$ then find C.

(c) If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ then prove that $A^2 - 4A - 5I = 0$.

OR

5 (a) Find the value of $\begin{vmatrix} x+y & z & 1 \\ y+z & x & 1 \\ z+x & y & 1 \end{vmatrix}$.

(b) If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ then find B such that $A + 2B = A^2$.

(c) Find the matrix A such that $2A - 3B + 5C = 0$ where $B = \begin{bmatrix} -2 & 2 & 0 \\ 3 & 1 & 4 \end{bmatrix}$ and $C = \begin{bmatrix} 2 & 0 & -2 \\ 7 & 1 & 6 \end{bmatrix}$.

6 (a) Prove that $(2,-1), (3,4), (-2,3)$ & $(-3,-2)$ are the vertices of a rhombus.

(b) Find the equation of a line passing through (1,3) and (3,4) and determine its intercept with co-ordinate axes.

(c) Find the area of the triangle having the vertices $A(-5,-5), B(-3,-5)$ & $C(10,5)$.

OR

6 (a) Find the equation of a line passing through (3,5) making equal intercept an axes also find slope.

(b) Find the area of the quadrilateral generated by the points (1,1), (3,4), (5,–2) & (4,7).

(c) Find the equation of a line whose. X-intercept is 3 and Y-intercept is 5. Also find its slope.