MF-3702

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

November / December – 2013

102 - Mathematics

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 :
☛ F.Y. B.C.A. (SEM. 1) (CBCS)
Name of the Subject :
☛ 102 - MATHEMATICS
☛ Subject Code No. : 3 7 0 2 ☛ Section No. (1, 2,.....) : Nil

Seat No. :

Student's Signature

(2) All questions are compulsory.

(3) Figures to the right indicates full marks.

1 Answer the following questions :

(1) Define Equal set and equivalent set with illustration.

(2) Define one-one function and Many-One function with illustration.

(3) Prove that :

(a) $p \wedge (p \vee q) = p$

(b) $p \vee (p \wedge q) = p$

(4) Explain transpose of a matrix with illustration. If A is symmetric then $A^T =$ _____ .

(5) A straight line makes intercepts 3 and –5 on x and y axes respectively find its equation.

2 (a) State and prove De'Morgan's law for union.

OR

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

(b) Attempt any two :

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

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

(ii) $A\times(B\cup C)=(A\times B)\cup(A\times C)$

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

(3) In a college there are 500 students out of which 300 have taken Maths, an 250 have taken Statistics. How many of them have taken both the subjects ?

(4) In usual notations prove that $A\times(B\cap C)=(A\times B)\cap(A\times C)$

3 (a) If $f(x)=x^2+x-1$ then find the value of $f(x+1)-3f(x-1)+2f(x)$

OR

(a) If $f(x)=1/x+\frac{2}{x-3}$; $x\in R-\{0,3\}$ then find $f(1), f(2), f(1/3)$ and $f(-3)$.

(b) Attempt any two :

(1) If the demand function is $x=\frac{50-2P}{3}$ then find the revenue function also find the no. of write for break even point.

(2) If $f(x)=1/x$; $x\in Z-\{-1,0,1\}$ then prove that $f(x+1)-f(x-1)=\frac{1}{1-x^2}$.

(3) If $f(x)=\frac{x^2-x}{x+3}$ then find $\frac{f(0)+f(-2)}{f(1)+f(3)}$.

(4) If $f(x)=x(x+1)(2x+1)$ then prove that $f(x)-f(x-1)=6x^2$

4 (a) If $A=\begin{bmatrix}1 & 2 & 0\\ -1 & 3 & -5\\ 2 & 0 & 4\end{bmatrix}$ then find $A^2-5A+3I$.

OR

(a) Find Inverse of $A=\begin{bmatrix}2 & 3 & 1\\ 0 & 5 & 6\\ 1 & 1 & 2\end{bmatrix}$

(b) Attempt any **two** :

(1) Solve using Cramer's rule.

$x+2y+3z-14=0$

$2x+y+z-7=0$

$5x+2y+z-12=0$

(2) Prove the following using truth table :

(i) $p\wedge(a\wedge r)=(p\wedge q)\wedge r$

(ii) $p\wedge(a\vee r)=(p\wedge q)\vee(p\wedge r)$

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

(4) If $A=\begin{bmatrix}2 & 5 & 7\\ 2 & -1 & 0\\ 3 & 4 & 8\end{bmatrix}$; $B=\begin{bmatrix}1 & 4 & 9\\ 3 & -2 & 4\\ -5 & 6 & 8\end{bmatrix}$ verify that

(i) $(A+B)^T=A^T+B^T$

(ii) $(AB)^T=B^T\cdot A^T$

5 (a) $D_{21}=\{1,3,7,21\}\ \forall\ x, y\in D_{21}$ **5**

$x+y=$ LCM of x, y

$x\cdot y=$ GCD of x, y

$x'=21/x$

show that D_{21} is a Boolean Algebra.

OR

(a) Check the validity of the following argument hypothesis : **5**

$S_1: p\Rightarrow q$, $S_2: q\Rightarrow r$, conclusion : $S: p\Rightarrow r$.

(b) Attempt any **two** :

(1) Construct the input / output table for :

(i) $f(x_1, x_2) = x_1 \cdot x_2$

(ii) $f(x_1, x_2, x_3) = (x_1 \cdot x_2') \cdot x_3$

(2) Prove that $(2, 3), (7, 4), (8, 7)$ and $(3, 6)$ are the vertices of a parallelogram.

(3) Find the area of a quadrilateral whose vertices are $(-1, 4), (3, 2), (2, -3), (-2, -4)$.

(4) Show that the points $(6, 6)$, $(2, 3)$ and $(4, 7)$ are the vertices of a right angled triangle.