30/5/2016

Integrated MCA-I (Second Semester)
End Semester Examination 2015-16
School of Technology, Doon University Dehradun
Mathematics-II (STM-511)

Time: 03Hours **Total Marks: 50**

Note: (i) Attempt ALL the questions. (ii) Do neat and clean work.

Roll No..

Section A

Attempt ALL: **(1x10=10)**

1. If $u = y^2$ *then* $\frac{\partial u}{\partial x}$ *is:* $(i) xy^{x-1}, (ii) 0, (iii) y^x \log x,$ (iv) *none of these*

2. *If* $u = \tan^{-1}(x + y)$ *then* $(u_x - u_y)$ *equals :* $(i) 0,\ (ii) 1\ (iii) -1,\ (iv) \sin x \cos y.$

3. *The conditions for f to be maximum is* $r < 0$ *and* $rt - s^2 > 0$ (True/False).

4. *The area bounded by the circle* $r = 4$ *is:* $(i) 16\pi,\ (ii) 6\pi\ (iii) 5\pi,\ (iv) \pi.$

5. *The minimum value of* $\sqrt{(x^2 + y^2)}$ *is:* $(i) 0,\ (ii) {}^1/_2\ (iii) -{}^1/_2,\ (iv) 1.$

6. *If a set A has n elements, how many relations are there from A to A?*

7. *The relation* $\{(3,1), (2,2), (3,0), (1,1), (1,3)\}$ *is a function* (True/False).

8. *The functions* $f(x) = x^2$, *where* $0 \le x \le 2, g(y) = y^2$ *where* $3 \le y \le 10$ *and* $h(z) = z^2$ *where* $z \in R$, *which of these functions are equal?*

9. *Describe the oneto one function by an example.*

10. *Which of the followings are posets?*

    (i) $(Z, =),\ (ii)(Z, \neq),\ (iii)(Z, >),\ (iv)(Z, \geq)$

Section B

Attempt any FIVE: **(5x5=25)**

1. Consider the divide relation on each of the following sets. Draw the Hasse diagram for each relation. Find, (a) All minimal and maximal element.(b) Greatest and least element. (i) S={2,3,5,30,60,120,180,360}, (ii) S={1,2,3,4,6,9}.
2. Let R be a relation from the set A={1, 3, 4} on itself and defined by $R = \{(1,1), (1,3), (3,3), (4,4)\}$then write a matrix for R and also draw the diagraph of R.
3. Describe POSET and hence show that the relation ≥is a partial ordering set of integers, Z.
4. If a mapping $f: A \to B$ is one to one and onto, then prove that inverse mapping $f^{-1}: B \to A$ is also one to one and onto.
5. Find the shortest distance between the lines $\frac{x-3}{1} = \frac{y-5}{-2} = \frac{z-7}{1} and \frac{x+1}{7} = \frac{y+1}{-6} = \frac{z+1}{1}$.
6. $if\ u = f(y-z, z-x, x-y), prove\ that\ u_x + u_y + u_z = 0.$

Section C

Attempt ALL: **(5x5=25)**

1. State Euler's theorem of homogeneous function and if u be homogenous function than prove that $x^2u_{xx} + 2xyu_{xy} + y^2u_{yy} = n(n-1)u.$
2. Show that the mapping $f: R \to R\ be\ defined\ by\ f(x) = ax + b, where\ a, b, x \in R, a \neq 0\ is\ invertible. Define\ its\ inverse.$
3. If R be a relation in the set of integers Z defined by $R = \{(x,y): x \in Z, y \in Z, (x-y) is\ multiple\ of$ 3. Show that it is an equivalence relation. What is the equivalence class of 0. How many equivalence class are there?
4. Let A={2,3,4,5}. The relation R and S on A defined by,
5. R={(2,2), (2,3),(2,40, (2,5)(3,4),(3,5),(4,5), (5,3)} and S={(2,3), (2,5),(3, $),(3,5),(4,2)(4,3)(4,5)(5,2), (5,5)}. Find the matrices of the above relations. Use the matrices to find the following composition of the relations R and S, (i) RoS, (ii) RoR, (iii)SoR.
