

20-3-17



**DOON UNIVERSITY,  
DEHRADUN**

**Mid Semester Examination, 2016-17  
School of Technology**

**Integrated M.C.A. (Semester II)  
Course: TMC – 151-Discrete Mathematics**

**Time Allowed: 2Hours**

**Maximum Marks: 30**

**SECTION A**

**Attempt any 6 of the following**

**(6×1=6 Marks)**

1. Draw the truth table of  $p \rightarrow q$ .
2. What is a well formed formula?
3. What is vacuous proof?
4. What is the problem with set-builder notation?
5. Find  $A \times B$  if  $A = \{a, 1\}$  and  $B = \{1, a\}$ .
6. What is an existential quantifier?
7. Define the power set of any set.

**SECTION B**

**Attempt any 4 questions**

**(4×3=12 Marks)**

8. Verify that  $p \rightarrow q \equiv \neg q \rightarrow \neg p$ .
9. Prove that if  $n$  is an integer then  $n$  is even iff  $7n+4$  is even.
10. Represent the statement by appropriate proposition: "Each student opts an elective course and each elective course is opted by a student".
11. Check the validity of given argument using proper notations and inference rules:  
If it rains, you run fast.  
You don't run fast if you are tired.  
It doesn't rain.  
So you don't run fast.
12. What is duality principle? How is the dual useful? Answer with reference to predicate calculus.

**SECTION C**

**Attempt any 2 questions**

**(2×6=12 Marks)**

13. In a software company 65% programmers know Java, 68% programmers know C++ and 74% programmers know C language. 34% programmers know both Java and C, 37% programmers know both C and C++ and 41% programmers know both C++ and Java. How many programmers know all the three languages? Also find if there are any programmers who don't know any of these three languages.
14. Let  $A = \{a, \phi\}$  and  $B = \{\{\phi\}\}$ . Find  $A \cup B$ ,  $A \cap B$  and  $A \times B$ . Write down all the subsets of  $A \times B$ . Using appropriate proof method, prove that  $\phi$  is the subset of any set and verify this statement for  $A \times B$  by using proper notations.
15. Let  $p$  represent the statement "*The subject is easy*",  $q$  represent the statement "*It is a scoring subject*" and  $r$  represent the expression  $((p \rightarrow q) \rightarrow p) \rightarrow q$ . Translate the given expression  $r$  in simple language. Simplify the logical expression  $r$  and after simplification retranslate the expression. Justify both the translated statements.

(End of the Paper)