Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐ Total No. of Pages : 01

Total No. of Questions : 08

Ph.D in Faculty of Applied Science (Mathematical Sciences)

ADVANCED NUMBER THEORY

M.Code : 77358

Time : 3 Hrs.                                                                 Max. Marks : 100

INSTRUCTIONS TO CANDIDATES :

1. Attempt any FIVE questions out of EIGHT question.
2. Each question carry TWENTY marks.

1. a) Prove that the number of partitions of n into m parts is the same as the number of n having largest part m. Similarly, the number of partitions of n into at most m parts is equal to pm(n) , the number of partitions of n into parts less than or equal to m.

   b) Prove that pd (n) = po(n) for n ☐ l.

2. a) State Sylvester's theorem, State and prove q- binomial theorem.

   b) Establish Jacobi's triple product identity.

3. a) What is Restricted partitions? Derive Rogers Lemma.

   b) What is Gaussian polynomials, prove q-Gauss theorem?

4. State q-Saalschutz's theorem, derive finite version of q-Saalschutz's theorem. State Biley's lemma(weak version).

5. a) State and prove Schur's theorem.

   b) Derive Gollnitz-Gordon identities.

6. State Watson's q-analogue of Whipple's theorem, and derive Rogers-Ramanujan identities as its application.

7. What is n-colour partitions, explain Rank and Crank of a partition with two examples?

8. What is Restricted n-colour partitions, explain conjugate and self-conjugate n-partition with three examples?