Directorate of Distance Education

B.R. Ambedkar Bihar University, Muzaffarpur

T.D.C. 5th Semester Examination 2014 (Session 2012-15)

Mathematics (Hons.)Paper-V

Model Paper

DDE, Bihar University, Muzaffarpur

TDC V Semester Exam. 2014 (2012-15)

Model Questions

Subject: Mathematics Hons.

Paper – V

1. (a) State & prove Young's theorem.

   (b) State and prove Moore-Osgood theorem.

2. (a) Define Continuity of a function of two variables and differentiability of a function of two real variables.

   (b) Show by an example that the double limits may exist at appoint without either of the repeated limits existing.

3. State and prove Implicit function theorem.

4. Discuss Lagrange's method of undetermined multipliers.

5. State and prove Taylers theorem.

6. Give found definition and limit definition of R-integration and show their equivalence.

7.(a) State & prove first mean value theorem.

   (b) The sum of two R-integrable functions is also R-integrable. Prove this.

8. State & prove Fundamental theorem of integral Calculus.

9.(a) Find the relation between Beta & Gamma functions.

   (b) Discuss the Convergence of the integral

$$\int_0^\infty e^{-x}x^{n-1}\,dx$$

10.(a) State & prove Dirichlet's test for the convergence fo an improper integral of the type $\int_0^\infty f(x)\, \phi(x)dx$

(b) State & prove Comparison test.

11. Discuss Cauchy's principle for uniform Convergence of a sequence of functions.

12. Define point wise and uniform convergence and construct an example of a print-wise convergent sequence which is not uniformly convergent.

13.(a) State and prove Weierstrass's M-test.

(b) State and prove Dini's test for uniform convergence of a series.

14.(a) State & prove Abel's test for uniform convergence of a series.

(b) State and prove term by term differentiation theorem on uniform convergence of a series.

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Mathematics (Hons.)Paper-VI

Model Paper

DDE, Bihar University, Muzaffarpur

TDC V Semester Exam. 2014 (2012-15)

Model Questions

Subject: Mathematics Hons.

Paper – VI

1.(a) Prove that the centre z of a group G is a normal subgroup of G.

(b) Define normaliser of an element of a group G and prove that it is a subgroup of G.

2.(a) What is class equation of a group. State & prove it.

(b) State & prove Cauchy's theorem for finite group.

3.(a) State & prove Sylow's theorem for an abelian group.

(b) Prove that the relation of conjugacy is an equivalence relation in a group.

4.(a) Define automorphism of a group and show that a a-1 is an automorphism of a group G iff G is abelian.

(b) Show that G = H x K is abelian iff H & K are both abelian.

5.(a) Show that the set of all automorphism of a group with resultant competition is a group.

(b) Let the group G be are internal direct product of its subgroups H & K then H & K have only the identity is common.

6.(a) Define a division ring and prove that it has no devisors of zero.

(b) Prove that any ring without unity can be embedded in a ring with unity.

7. Every integral domain can be embedded in a field. Prove it.

8.(a) Give an example of a subring which is not an ideal.

(b) Define characteristic of ring with example.

9.(a) Prove that every field is a principal ideal ring.

(b) Give an example of an ideal which is a prime ideal and also a maximal ideal.

10.(a) Prove that an ideal S of an Euclidean ring R is maximal if S is generated by some prime element of R.

(b) Show that every Euclidian domain is a principal ideal domain.

11.(a) Define Vector space. Prove that the union of two subspaces of a vector space V(F) is a subspace of V(F) if one is contained in the other.

(b) Determine whether or not the vectors (1, 1, 2); (1, 2, 5); (5, 3, 4) form a basis of R^3.

12. State & prove Cauchy – Hamilton theorem.

13.(a) Find A^{-1} where

$$A = \begin{vmatrix} 2 & -1 & 1 \\ 1 & 2 & 1 \\ -1 & 2 & 2 \end{vmatrix}$$

(b) Find A^{-1} where

$$A = \begin{vmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{vmatrix}$$

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