UNIVERSITY OF EDUCATION

"UExam" Semester-IV, 2019

M.Sc Mathematics Session:2017-19

Course Code: MATH4117

Subject: Differential Geometry

No. 19

Roll No. (in fig.)________

Roll No. (in words)________

Candidate's Signature.

Signature of Addl. Supdt.

SECTION: I (MCQ's)

Time Allowed: 20 Minutes **Max. Marks: 18**

NOTE: Encircle the correct/ best answer in each of the followings. Each Question carries 1 mark. Use of remover carries zero mark. Cutting and Overwriting is not allowed.

Q1.

- The homomorphic image ϕ(G) of a group G is itself a -------.
  a) Homomorphism b) subgroup c) group d) cyclic
- Every group is isomorphic to a subgroup of a ---------.
  a) Cyclic b) homomorphic c) symmetric group d) none
- Every group of prime order is cyclic and hence --------.
  a) Abelian b) cyclic c) group d) symmetric
- Every cyclic group of prime order has only ----- subgroups.
  a) 2 b)4 c)3 d)1
- Groups having no proper normal subgroups also called------
  a) Simple groups b) Normal subgroups c) proper subgroup d) none
- The center of a finite p-group is-------
  a) Non-trivial b) normal c) trivial d) none
- A commutative division ring is called---------
  a) Subring b) ring c) field d) none
- Every field is also------
  a) ring b) field c) division ring d) subring
- The ring of integers is a ------- of a ring of a real numbers.
  a) Subring b) division ring c) field d) cyclic
- A commutative ring is an ----------
  a) Field b) integral domain c) group d) subring
- In a torsion group in which each element is
  a) Finite b) Infinite c) Cyclic d) Non-cyclic
- The exponent of periodic group G is
  a) GCD b) LCM c) HCF d) All of these
- The another name of torsion group is
  a) Non-periodic b) Periodic group c) Torsion group d) None of these
- Every finitely generated abelian group G is isomorphic to T⊕F, where T and F are
  a) Torsion Free b) torsion c) Both a and b d) None of these
- Torsion free abelian group has no
  a) Trivial torsion element b) Non trivial torsion element c) Identity element d) None of these
- Torsion free abelian groups of $(a_1)k$
  a) 1 b) 2 c) 3 d) 4
- The example of free torsion group is
  a) (Z,0) b) (Z,1) c) Z d) None of these
- A group whose only element is finite order is the identity is called
  a) Torsion group b) Torsion free group c) Cyclic group d) None of these

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Time Allowed: 100 Minutes.

Max. Marks: 42

Section II (Short Answer)

Q.2- Write short answers of the following. **3x6 = 18**

i. Prove that order of an element divides the order of a finite group G.
ii. Define homomorphism and isomorphism with example.
iii. Prove that every cyclic group is abelian.
iv. Find all the subgroups of a cyclic group of order 12.
v. Define even permutation and odd permutation.
vi. Every group of order p^2 , where p is a prime number, is abelian.

Section III (Essay Type)

Answer the following Questions **6x4 = 24**

Q3. State and prove Cayley's theorem.

Q4. The intersection of any collection of normal subgroups is again a normal subgroup.

Q5. The collection of all left cosets of H in G defines a partition of G.

Q6. Let G be a finite group and H be a subgroup of G then both order and index of H in g divides the order of G.