PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2018
(Fifth Semester)

Branch – **MATHEMATICS WITH COMPUTER APPLICATIONS**

ABSTRACT ALGEBRA

Time : Three Hours Maximum : 75 Marks

SECTION-A (20 Marks)
Answer ALL questions
ALL questions carry EQUAL marks (10 x 2 = 20)

1 Define an Abstract Algebra.
2 Define a Subgroup.
3 Define an Isomorphism.
4 Define a Automorphism.
5 Define a Division rings.
6 Define a Ideal ring.
7 Define a Relatively prime.
8 Define a Prime element.
9 Define a Primitive.
10 Define a unique factorization domain.

SECTION - B (25 Marks)
Answer ALL Questions
ALL Questions Carry EQUAL Marks (5 x 5 = 25)

11 a Show that there is a one-to-one correspondence between any two right cosets of H in G.

OR

b Prove that HK is a subgroup of G if HK=KH.

12 a Stat and prove Cayley's theorem.

OR

b Prove that every permutation is the product of its cycles.

13 a If P is a prime number then show that J_p the ring of integers mod P, is a field.

OR

b If ϕ is a homomorphism of R into R^1 then prove that
(i) $\phi(0) = 0$ (ii) $\phi(-a) = -\phi(a)$ for every $a \in R$

14 a State and prove the Fermat theorem.

OR

b If R is a communicative ring with unit element and M is an ideal of R then prove that M is a maximal ideal of R if R/M is a field.

15 a State and prove Eisentian criterion theorem?

OR

b Prove that if R is a unique factorization domain so is R[x].

SECTION - C (30 Marks)
Answer any THREE Questions
ALL Questions Carry EQUAL Marks (3 x 10 = 30)

16 Prove that the subgroup N of G is a normal subgroup of G iff every left coset of N in G is a right coset of N in G.
17 State and prove Cauchy's theorem for abelian groups.
18 If U is an ideal of the ring R then show that R/U is a ring and is a homomorphic image of R.
19 State and prove unique Factorization theorem.
20 If f(x), g(x) are two non-zero elements of F(x) then show that deg.(f(x) g(x)=deg f(x)+deg g(x).