PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2018
(Third Semester)

Branch- **MATHEMATICS**

MECHANICS -1 (STATICS!

Time : Three Hours   Maximum : 75 Marks

SECTION-A 120 Marksl
Answer **ALL** questions
ALL questions carry **EQUAL** marks   (1 0 x 2 = 20)

1 What is the resultant of two perpendicular forces?
2 State the polygon law of forces.
3 "The effect of two equal and unlike parallel forces cannot be replaced by a single force". Why?
4 Define the moment of a force.
5 Define the moment of a couple.
6 State the equivalence of two couple.
  What are the necessary and sufficient conditions that a system of coplanar forces acting on a rigid body may be in equilibrium?
8 State the second form of the conditions of equilibrium of a system of coplanar forces.
9 Define the centre of gravity.
10 What is the centre of gravity of a thin plate?

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

11 a State and prove Lami's theorem.
                                    OR
   b State and prove an extended form of the parallelogram, law of forces.

12 a State and prove the generalized theorem of moments.
                                    OR
   b Find the conditions of equilibrium of three coplanar parallel forces.

13 a Find the resultant of a couple and force.
        , ,   OR
   b ABC is an equilateral triangle of side a: D, E, F dividing the sides BC, CA, AB respectively in the ratio 2:1. Three forces each equal to»P act at D, E, F perpendicularly to the sides and outward from the triangle. Prove that they are equivalent to a couple of movement ^{l}A Pa.

14 a Forces 3,2,4,5 kg.wt act respectively along the side AB, BC, CD and DA of a square. Find the magnitude of their resultant and the points where its line of action meets AB and AD.
                                    OR
   b State and prove the third form of the conditions of equilibrium of a system of coplanar forces.

15 a Prove that the centre of gravity of a body is unique.
                                    OR
   b Find the C.G of a uniform solid hemisphere.

SECTION - C (30 Marks)
Answer any **THREE** Questions
ALL Questions Carry **EQUAL** Marks (3 x 1 0 = 30)

16 i) State the parallelogram law of forces and also find an analytical expression for the resultant of two forces, (ii) State and prove the theorem on resolved parts.
17 State and prove the Varigon's theorem of moments.
18 Prove that if two coupes, whose moments are equal and opposite, act in the same plane upon a rigid body, they balance one another.
19 ABCDEF is regular hexagon: forces P,2P,3P,2P,5P,6P act along AB,BC,DC,ED,EF,AF respectively. Show that the six forces are equivalent to a