B. MECHANICAL 1ST YEAR 1ST SEM. EXAM- 2017 (OLD)(S)

(1st year,1st Semester)

Subject - Physics 1C (old)(s) Time -3Hrs Full marks -100

Answer any *five* questions

1.(a) State and explain Bernoulli's theorem. Water flows along a horizontal tube of which the cross-section is not constant. Calculate the change in pressure when the velocity of flow changes from 10cm/s to 20 cm/s? 10

(b) Define Surface tension and surface energy and establish a relation between them. 10

2. (a) Discuss Fraunhoffer diffraction at a single slit and obtain the condition of diffraction minima. 10

(b) Show when a ray is incident at the Brewster's angle the reflected ray is perpendicular to the refracted ray. When light is incident at an angle 60^0 to the normal, the reflected ray is plane polarized. Find the refracting index of the reflecting medium. 6+4

3.(a) Obtain an expression for the diameter of bright fringes in reflected system in Newton's ring experiment. 10

(b) Give theory of Fresnel biprism to determine the wave length of monochromatic light. 10

4. (a)What is Compton effect? Derive the expression for the change in wavelength of scattered X-rays. 14

(b) A photon recoils back after striking an electron at rest. What is the change in the wavelength of the Photon. 6

5.(a) What are continuous and characteristic X-rays? Discuss their origin. 14

(b) An X-ray tube is operated at 40 Kilovolts. Find out the short wavelength limit Continuous Spectra. 6

6. (a) State and prove Gauss's theorem in electrostatics. 10

(b) State Biot-Savart law. Calculate the magnetic field due to circular coil conductor. 10

7. (a) Describe Carnot's reversible engine and find the expression of its efficiency. 14

(b) Find the efficiency of a Carnot's engine which operates between 327^0C and 27^0 C. 6

8. Write short notes (any two) 10x2

(a) 2nd law of Thermodynamics

(b) Condition for interference

(c) Bragg's law of X-rays diffraction

(d) Bohr's atomic model