



Reg. No. :

Name :

**Third Semester B.Tech. Degree Examination, April 2015
(2013 Scheme)**

13.306 : HYDRAULIC MACHINES AND HEAT ENGINES (E)

Time : 3 Hours

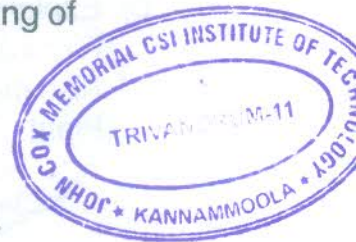
Max. Marks : 100

PART – A

Answer **all** questions. **Each** question carries **2** marks.

1. Compute density, specific gravity, specific weight of 3 litre of liquid of weight 24 N.
2. Explain Newton's law of viscosity.
3. What do you mean by the hydraulic coefficients of an orifice ? Write down the inter relationships among them.
4. How do you distinguish between impulse turbine and reaction turbine ?
5. What is the significant of Surge tank in connection with the working of Hydro- Electric Power Plant ?
6. Give reason why positive displacement pumps are called so.
7. Explain briefly the working of a single-acting reciprocating pump.
8. Explain the basic difference in the working principle of Two-stroke and Four-stroke engine with a neat sketch.
9. Explain the procedure for conducting Retardation test.
10. List out the specific applications of gas turbine.

(10×2=20 Marks)





PART – B

Answer **one full** question from **each** Module. **Each** question carries **20** marks.

Module – I

11. a) State and prove Bernoulli's theorem. Mention any two applications of it. 10
- b) The following are the data given of a change in diameter affected in laying a water supply pipe line. The pressure at A and B are 78.5 KN/m^2 and 58.9 KN/m^2 respectively with the end B being 3m higher than A. If the flow in the pipe line is 200 lit/sec, find
- i) Find the direction of flow and
- ii) Head loss due to friction between A and B. 10

OR

12. a) Derive an expression for discharge through triangular notch. What are the advantages of triangular notch over rectangular notch ? 10
- b) A horizontal Venturimeter with inlet diameter 20 cm and throat diameter 10 cm is used to measure the flow of water. The pressure at the inlet is 165 KN/m^2 and the vacuum pressure at throat is 30 cm of Hg. Find the discharge through venturimeter. Assume $C_d=0.98$. 10

Module – II

13. a) Give the classification of hydraulic turbine. 5
- b) Explain with a schematic diagram the layout of a Hydro-Electrical Power Plant and briefly mention the functions of each component in the system. Also mention the advantages and disadvantages of Hydro-Electrical Power Plant. 15

OR

14. a) Pelton wheel works at the foot of a dam because of which the head available at the nozzle is 400 m. The nozzle diameter is 160 mm and the coefficient of velocity is 0.98. The diameter of the wheel bucket circle is 1.75 m and the buckets deflect the jet by 150° . The wheel to jet speed ratio is 0.46. Neglecting friction, calculate
- a) The power developed by the turbine,
- b) Its speed and
- c) Hydraulic efficiency. 15
- b) Derive an expression for specific speed of a turbine. 5



Module – III

15. a) Distinguish between Roto-dynamic and Positive displacement pumps. **8**
b) Explain working principle of a double acting reciprocating pump with a neat sketch. What is an air vessel ? Explain the working and functions of air vessels with respect to the performance of a reciprocating pump. **12**

OR

16. a) Write a short note on Cavitation and its effect on the working of pumps. **8**
b) Explain the effect of acceleration and friction on indicator diagram with respect to the working of a reciprocating pump. **12**

Module – IV

17. a) Give the classification of IC Engines. **5**
b) A Four-Stroke, four cylinder diesel engine running at 2000 RPM develops 60 kW. Brake thermal efficiency is 30% and calorific value of fuel is 42 MJ/kg. Engine has a bore of 120 mm and stroke of 100 mm. Take the density of air = 1.15 Kg/m³, air-fuel ratio=15 : 1 and Mechanical efficiency = 80%. Calculate :
i) Fuel consumption (kg/s)
ii) Air consumption (m³/s)
iii) Indicated thermal efficiency
iv) Volumetric efficiency
v) Brake mean effective pressure. **15**

OR

18. a) Discuss the effect of following on the performance of Gas turbine. Draw T-s diagram.
i) Inter-cooling
ii) Reheating
iii) Regeneration. **15**
b) Give classification of Gas turbines. **5**

