## SECTION – D

**8.** What is Pool Boiling and Condensation Heat Transfer. What is the difference between Film Condensation and Drop wise condensation ? 20

**9.** A steam condenser is transferring 250 kW of thermal energy at a condensing temperature pf 650 C. The cooling water enters the condenser at 200C with a flow rate of 750Kg/hr. Calculate the log mean temperature difference. If the overall heat transfer coefficient for the condenser surface is 1250 $W/m^2$ -deg, what surface area is required to handle this load ? 20



*Roll No. .....*

# 24836

# B. Tech. 6th Sem. (Fire Tech. & Safety) Examination – May, 2016

## HEAT TRANSFER COMBUSTION AND EXPLOSIVES

**Paper : FT-312-F**

*Time : Three Hours ]* *[ Maximum Marks : 100*

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

***Note :*** Attempt any ***five*** questions in all. Question number ***one*** is ***compulsory*** and selecting at least ***one*** question from each section. Assume suitable data whenever required.

**1.** (a) What are the different modes of Heat Transfer ? Explain them in brief. 5

(b) What do you understand by Steady & Unsteady Heat Transfer ? Explain in brief. 5

(c) What do you understand by Forced convection ? Explain in brief. 5

(d) Write short note Boiling regimes. 5

## SECTION – A

**2.** Derive a General Expression for Heat Transfer in spherical Co-ordinates. State the assumptions made. 20

**3.** What is Insulation? Does providing Insulation increase or decrease heat transfer? Explain what is Critical thickness of Insulation? Derive an expression for Critical thickness of Insulation for a Cylinder. 20

## SECTION – B

**4.** What do you mean by fin ? Explain the various types of fins. List the various assumptions made in the formation of energy equation for one dimensional heat dissipation from an extended surface. 20

**5.** A composite slab consists of 5 cm thick layer of steel of thermal conductivity 146 kJ/m-hr-deg on the left side and a 6 cm thick layer of brass of thermal conductivity



276 kJ/m-hr-deg on the right hand side. The outer surfaces of the steel and brass layer are maintained at 100°C and 50°C respectively. The contact between the two slabs is perfect and heat is generated at the rate of $4.2 \times 10^5$ kJ/m$^2$ -hr at the plane of contact. The heat thus generated is dissipated from both sides of composite slab for steady state conditions. Calculate the temperature at the interface and heat flow through each slab. 20

## SECTION – C

**6.** Glass spheres of 2 mm radius and at 500° are to be cooled by exposing them to an air stream at 25°C. Make calculations for the maximum value of the convection coefficient that is permissible, and the minimum time required for cooling to a temperature of 60°C. Assume the following property values: density 2250 kg/m$^3$; sp. Heat 850 J/kg K and conductivity 1.5 W/m-deg. 20

**7.** Explain the difference between Laminar and Turbulent Flow in Tubes during Internal Forced Convection. 20