

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
DEPARTMENT OF MECHANICAL AND PRODUCTION ENGINEERING

Semester Final Examination
Course No: MCE 4805/4893
Course Title: Power Plant Engineering

Summer Semester : A.Y. 2021-2022
Time : 3 Hours
Full Marks : 150

Answer all questions. The right column also indicates the course objective (CO) and Program outcome (PO) addressed by each question.

1. (a) With neat diagrams, discuss the different types of *hydroelectric power plants*. 13
(CO1)
(PO1)
- (b) With the help of a schematic diagram, discuss *Pressurized Water Reactor (PWR)* power plants. 12
(CO1)
(PO2)
2. (a) How do you represent the relationship between load and steam consumption (i.e., throttle flow of steam) of a turbine? Discuss the change in *pressure* and *velocity* in *impulse* turbines and *reaction* turbines. 13
(CO1)
(PO1)
- (b) With the help of a schematic diagram, discuss *Fast Breeder Reactor (FBR)* power plants. 12
(CO1)
(PO2)
3. (a) "The full benefit can only be harnessed if regeneration is also added with compressor intercooling and turbine reheat"- elaborate with a neat schematic and *T-s* diagram. 10
(CO3)
(PO1)
- (b) With the help of a flow diagrams, briefly describe the working principle of *dual pressure HRSG*. 8
(CO3)
(PO3)
- (c) Briefly discuss the *water injection* in *gas turbine* with the help of a neat schematic. 7
(CO3)
(PO3)
4. (a) Briefly discuss the *Kalina cycle* with a schematic diagram and the corresponding *T-s* diagram 10
(CO3)
(PO1)
- (b) Define the term "*Pool boiling*". Draw the heat flux versus temperature difference between heating surface and bulk fluid temperature in case pool boiling. discuss the importance of *Departure from Nucleate Boiling* for safe operation of steam generators. 8
(CO3)
(PO1)
- (c) Briefly discuss the function of *steaming economizer*. From commercial point of view, why *steaming* of feedwater is prohibited in the *economizer*. 7
(CO3)
(PO3)

5. (a) What are the factors that affect pulverizer-grinding performance along with its processing capacity? With a neat sketch, discuss the *bin system* for processing, distributing, and burning of pulverized coal. 10
(CO3)
(PO1)
- (b) Upon defining the fluidized bed combustion, elaborate its transition from *fixed bed* to *turbulent fluidized bed* with appropriate figures. 8
(CO3)
(PO3)
- (c) With the help of a neat sketch, describe the working principle of a typical *BFBC boiler*. 7
(CO3)
(PO3)
6. (a) What is *Load Duration Curve* used in power plant economics and its application in *Industrial load* and *Residential Load*? Write down the importance of *load duration curve*. 10
(CO5)
(PO2)
- (b) Write short notes on (i) Demand Factor, (ii) Load factor, (iii) Diversity factor, (iv) Plant capacity factor, (v) Plant Use factor 8
(CO5)
(PO2)
- (c) Briefly discuss the different types of *loads* used in in *power plant economics*. 7
(CO5)
(PO2)