Registration No : | | | | | | | | | | |

Total Number of Pages : 03 **B.Tech.**

PME6D003

6th Semester Regular Examination 2017-18

POWER PLANT ENGINEERING

BRANCH : MECH

Time : 3 Hours

Max Marks : 100

Q.CODE : C516

Answer Part-A which is compulsory and any four from Part-B.

The figures in the right hand margin indicate marks.

Answer all parts of a question at a place.

Part – A (Answer all the questions)

Q1. Answer the following questions : multiple type or dash fill up type (2 x 10)

a) With the increase in _____ the efficiency obeys the 'law of diminishing returns'

(i) Pressure (ii) Temperature

(iii) Volume (iv) All of the above

b) In thermal power plants, the dust of flue gases is trapped by

(i) Precipitator (ii) Economizer

(iii) Superheater (iv) Air preheater

c) Primary air is that air which is used to .....

(i) Reduced the flame length (ii) Increase the flame length

(iii) Transport and dry the coal (iv) None of the above

d) Caking coals are those which.....

(i) Burn completely (ii) Burn freely

(iii) Do not foam ash (iv) Form lumps or masses of coal

e) The value of reheat factor is .....

(i) 0.5% to 0.6% (ii) 1.02% to 1.06%

(iii) 0.9% to 0.95% (iv) 1.2% to 1.6%

f) Critical pressure ratio of a convergent nozzle is defined as.....

(i) The ratio of inlet pressure to outlet pressure of nozzle

(ii) The ratio of outlet pressure to inlet pressure of nozzle

(iii) The ratio of outlet pressure to inlet pressure only when mass flow rate per unit area is minimum

(iv) The ratio of outlet pressure to inlet pressure only when mass flow rate per unit area is maximum

g) The pressure at the furnace is minimum in case of.....

(i) Forced draught system (ii) Induced draught system

(iii) Balanced draught system (iv) Natural draught system

h) The pressure at the furnaceis minimum in case of.....

(i) forced draught system (ii) induced draught system

(iii) Balanced draught system (iv) Natural draught system

i) The Da-Lavel impulse turbine is a.....

(i) Velocity compounded impulse turbine

(ii) Simple single wheel impulse turbine

(iii) Pressure compounded impulse turbine

(iv) Simple single wheel reaction turbine

j) In regenerative cycle feed water is heated by.....

(i) Exhaust gas (ii) Heaters

(iii) Draining steam from the turbine (iv) All of the above

Q2. Answer the following questions : Short answer type (2 x 10)

a) What do you underrated by captive power plant?

b) State the advantage of pulverized fuel firing.

c) What is the function of economizer?

d) Differentiate between closed feed heater and open feed water heater.

e) What do you understand by (i) sub sonic nozzle (ii) super sonic nozzle?

f) What are the methods used in ash handling system?

g) Enlist the various types of losses taking place in a steam turbine.

h) What is draught in boiler operations?

i) What is "half life" of nuclear fuels?

j) Define the term "Breeding".

Part – B (Answer any four questions)

Q3. a) Dry saturated steam at 5 bar enters a convergent-divergent nozzle at a velocity of 100 m/s. The exit pressure is 1.5 bar. The throat and exit areas are 1280 mm^2 and 1600 mm^2, respectively. Assuming isentropic flow up to the throat and taking the critical pressure ratio as 0.58, estimate the mass flow rate and nozzle efficiency. **(10)**

b) Explain Critical pressure ratio and choked flow in nozzle. **(5)**

Q4. a) The following particulars apply to a two-row velocity compounded impulse wheel : Steam velocity at nozzle exit = 500 m/s **(10)**

Nozzle angle = 16°

Mean blade velocity = 120 m/s

Exit angles : first row moving blades = 18°, fixed guide blades = 22°, second row moving blades = 36°

Steam flow = 5 kg/s

Blade friction coefficient = 0.85

Determine : (a) the tangential thrust (b) the axial thrust (c) the power developed (d) the diagram efficiency

b) Differentiate between velocity compounding and pressure compounding of turbines. **(5)**

Q5. a) During a trail on a steam condenser, the following observations were recorded. **(10)**

Condenser vacuum: 680mm Hg, Barometer reading:764 mm Hg, Mean condenser temperature:36.2°C, Hot well temperature: 30°C, Condensate formed per hour:1780 kg, circulating cooling water inlet temperature: 20°C, circulating cooling water outlet temperature: 32°C, Quantity of cooling water: 1250 kg/min. Determine :

(i) condenser vacuum corrected to standard barometer

(ii) vacuum efficiency

(iii) undercooling of condensate

(iv) condenser efficiency

(v) condition of steam as it enters the condenser

(vi) mass of air present per kg of condensed steam.

b) Differentiate between surface condenser and jet condenser. **(5)**

Q6. **a)** Explain with neat sketch, the construction and working of any one type once through boiler. **(10)**

b) With sketch explain a working of a mountings used in boiler. **(5)**

Q7. **a)** Explain : (i) Peak load (ii) Demand factor and (iii) Load factor Mention and explain various types of tariff. **(10)**

b) Peak load, Demand factor and Load factor **(5)**

Q8. **a)** Discuss the essential features of a steam power plant.Discuss the factors considered in selecting a site for steam power plant **(10)**

b) Explain reheat cycle and regenerative cycle with sketches. **(5)**

Q9. **a)** With the help of a sketch show all the important part of nuclear reactor. Describe briefly the functions of each part. **(10)**

b) Differentiate between BWR and PWR **(5)**