BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – B.Tech.(EE)]-2021/B.Tech.(EE)-2023
Course Name – Thermal Power Engineering
Course Code - ES-ME401
(Semester IV)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Select the basis to classify fire and water tube boilers.

a) Depending the combustion products formed
b) Depending the state of fuel
c) Depending on the steam formation
d) Depending tubular heating surface

(ii) Identify Cornish boiler is an example of which type of boiler.

a) Fire tube boiler
b) Water tube boiler
c) cVertical tube boiler
d) Externally fired boiler

(iii) Identify the type of boilers that use an orifice to control flow circulation

a) Natural circulation boilers
b) Forced convection boilers
c) Once-through boilers
d) Positive forced circulation boilers

(iv) Select the degree of reaction denoted as

a) D
b) R
c) r
d) d

(v) Identify the defination of steam turbine

a) Machine that uses pressurised steam to extract mechanical energy
b) Machine that uses pressurised steam to extract thermal energy
c) Machine that uses pressurised steam to extract kinetic energy
d) Machine that uses pressurised steam to extract electrical energy

(vi) Identify Steam turbine governing can be defined as

a) controlling the flow rate of steam
b) increasing the steam speed
c) adjusting the governors for particular speeds
d) none of the mentioned

(vii) Identify the Steam turbine performance is expressed in

a) heat & steam rate
b) heat rate
c) steam rate
d) none of the mentioned

(viii) Choose In Dual cycle, heat addition takes place

a) at Constant volume
b) first at constant volume then at constant pressure
c) constant pressure
d) none of the mentioned

(ix) Classify The thermal efficiency of a diesel engine on weak mixtures is
a) unaffected
b) lower
c) higher
d) none of the mentioned

(x) Identify The volumetric efficiency of a well-designed engine may be
a) 30 to 40%
b) 40 to 60%
c) 60 to 70%
d) 75 to 90%

(xi) Select for same compression ratio and same heat added
a) Otto cycle is more efficient than Diesel Cycle
b) Diesel cycle is more efficient than Otto Cycle
c) Efficiency depends on other factors
d) None of the mentioned

(xii) Identify For constant maximum pressure and heat input, the air standard efficiency of the gas power cycle is in the order.
a) Diesel cycle, Dual cycle, Otto cycle
b) Otto cycle, Diesel cycle, Dual cycle
c) Dual cycle, Otto cycle, Diesel cycle
d) Diesel cycle, Otto cycle, Dual cycle

(xiii) Select the Otto cycle efficiency is higher than Diesel cycle efficiency for the same compression ratio and heat input because in Otto cycle
a) combustion is at constant volume
b) expansion and compression are isentropic
c) maximum temperature is higher
d) heat rejection is lower

(xiv) Select a two-stroke engine gives more mechanical efficiency than a four-stroke cycle engine.
a) higher
b) lower
c) equal
d) none of the mentioned

(xv) Classify In a petrol engine, the mixture has the lowest pressure at the
a) beginning of suction stroke
b) end of suction stroke
c) end of compression stroke
d) none of the mentioned

Group-B
(Short Answer Type Questions) 3 x 5=15

2. Explain the different types of nozzle. (3)
3. Explain the need for safety valves in the boiler. (3)
4. Tabulate out the utility of an economiser in a boiler plant. (3)
5. Explain the function SI engine. (3)
6. Estimate the relative merits and demerits of a two stroke engine when compared with four stroke engine. (3)

OR

Distinguish between super saturated flow and isentropic flow in steam nozzles. (3)

Group-C
(Long Answer Type Questions) 5 x 6=30

7. Describe the working of the Cochran boiler with a neat sketch. (5)
8. Explain the principle of operation of a steam turbine. (5)
9. Explain the following boiler accessories .(i) Air-preheater (ii) Economizer (iii) Re-heaters. (5)
10. Calculate eficiency of Disel cycle (5)
11. An ideal Otto cycle with air as the working fluid has a compression ratio 9.5. Evaluate the amount of heat transferred. (5)
12. Explain the working function of ESP. (5)

OR

Describe working principle of cyclone separator (5)