



BRAINWARE UNIVERSITY
Term End Examination 2020 - 21
Programme – Diploma in Electrical Engineering
Course Name – Elements of Mechanical Engineering
Course Code - DEE305

Semester / Year - Semester III

Time allotted : 75 Minutes

Full Marks : 60

[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 60=60

1. (Answer any Sixty)

(i) The characteristic of a material or a body which is taken to be an indication of change in temperature is known as

- | | |
|----------------------------|--------------------------|
| a) Thermodynamics property | b) Thermostatic property |
| c) Thermometric property | d) none of these |

(ii) Clausius statement is related to

- | | |
|---|-----------------------------------|
| a) heat engine operating in a cycle | b) heat pump operating in a cycle |
| c) both heat engine operating in a cycle and heat pump operating in a cycle | d) none of these |

(iii) How are the efficiencies of any heat engine (η) and reversible heat engine (η_R) compared, when both are operating between same heat source and same heat sink?

- | | |
|--------------------|--------------------|
| a) $\eta = \eta_R$ | b) $\eta > \eta_R$ |
| c) $\eta < \eta_R$ | d) Cannot say |

(iv) What is the entropy change (dS_{iso}) of a reversible isolated ($dQ=0$) process?

- | | |
|-------------------|-------------------|
| a) $dS_{iso} = 0$ | b) $dS_{iso} > 0$ |
| c) $dS_{iso} < 0$ | d) none of these |

(v) What is the state, in which saturated liquid line with respect to vaporization

and saturated vapor line on p-v diagram of pure substance, meet called?

- a) saturation state
- b) critical state
- c) vaporization state
- d) superheated vapor state

(vi) Which is the affecting factor for the fact that turbine work output is more than pump work input in vapor power cycle for the same pressure ratio?

- a) specific heat added to the working fluid
- b) specific volume of working fluid
- c) both specific heat added to the working fluid and specific volume of working fluid
- d) none of these

(vii) Which loss does present in actual vapour power cycle at the exit of the boiler and at the entry of the turbine?

- a) friction loss
- b) constant pressure heat loss
- c) both friction loss and constant pressure heat loss
- d) none of these

(viii) How can we differentiate Rankine cycle from Carnot cycle?

- a) Heat addition process of Rankine cycle is reversible isothermal whereas heat addition process of Carnot cycle is reversible isobaric
- b) Heat addition process of Rankine cycle is reversible isobaric whereas heat addition process of Carnot cycle is reversible isothermal
- c) Heat addition process of Rankine cycle is reversible isentropic whereas heat addition process of Carnot cycle is reversible isothermal
- d) both cycles are identical except the working fluid used

(ix) What is the relation between efficiencies of Rankine cycle and Carnot cycle for the same pressure ratio?

- a) $(\eta_{Rankine}) = (\eta_{Carnot})$
- b) $(\eta_{Rankine}) > (\eta_{Carnot})$
- c) $(\eta_{Rankine}) < (\eta_{Carnot})$
- d) none of these

(x) How is the efficiency of the SI engine affected by change in specific heat ratio (γ) of the working fluid?

- a) the efficiency of the engine increases with increase in specific heat ratio (?) of the working fluid
- b) the efficiency of the engine decreases with increase in specific heat ratio (?) of the working fluid
- c) the efficiency of the engine does not affected by change in specific heat ratio (?) of the working fluid
- d) none of these

(xi) How is the heat added in the Diesel cycle?

- a) reversibly at constant pressure
- b) irreversibly at constant pressure
- c) reversibly at constant volume
- d) irreversibly at constant volume

(xii) The heat required to melt 1 tone of ice in 12 hours is equivalent to

- a) one tone of refrigeration
- b) two tone of refrigeration
- c) half tone of refrigeration
- d) four tone of refrigeration

(xiii) What is the main reason behind sub-cooling of liquid refrigerant at the condenser outlet in vapor compression refrigeration system?

- a) to increase the refrigerating effect
- b) to reduce the mass of vapor formed during expansion process
- c) to reduce vapor bubbles which obstruct the flow of liquid refrigerant
- d) all of the above

(xiv) Which compressor is used, when volume flow rate of refrigerant is very large?

- a) rotary compressor
- b) reciprocating compressor
- c) centrifugal compressor
- d) none of these

(xv) A heat pump

- a) extracts energy at low temperature heat source
- b) gives energy to high temperature heat source
- c) both of the mentioned
- d) none of the mentioned

(xvi) Which of the following can be used to transfer heat to the refrigerant passing through evaporator?

- a) outside air
- b) water from rivers
- c) the ground
- d) all of the mentioned

(xvii) The ideal gas refrigeration cycle is same as

- a) the Brayton cycle
- b) reversed Brayton cycle
- c) the Rankine cycle
- d) reversed Rankine cycle

(xviii) Coefficient of performance(COP) is defined as

- a) heat leakage/work input
- b) work input/heat leakage
- c) latent heat of condensation/work input
- d) work input/latent heat of condensation

(xix) Which of the following statements are true?

- a) a heat pump provides a thermodynamic advantage over direct heating
- b) COP for both refrigerator and pump cannot be infinity
- c) work input for both refrigerator and pump is greater than zero
- d) all of the mentioned

(xx) How is the condensation process carried out in vapour compression refrigeration cycle?

- a) at constant volume
- b) at constant pressure
- c) at constant enthalpy
- d) all of these

(xxi) In evaporation process of vapour compression refrigeration system

- a) heat is rejected from refrigerant to surroundings
- b) heat is rejected from surroundings to refrigerant
- c) only pressure change takes place
- d) none of these

(xxii) The boiler in which the tubes are surrounded by hot gases is called as

- a) fire tube boiler
- b) water tube boiler

- c) both fire tube boiler and water tube boiler d) none of these

(xxiii) How is the natural draught produced for exhaust gases?

- a) by using fan b) by using chimney
c) by using gravity d) none of these

(xxiv) The natural draught in the steam generator depends upon

- a) the air condition outside the chimney b) the temperature of exhaust gases
c) both the air condition outside the chimney and the temperature of exhaust gases d) none of these

(xxv) Which device used to separate condensate from the steam without letting steam escape?

- a) condenser b) steam valve
c) steam trap d) none of these

(xxvi) What is the pH value of water permissible for boiler?

- a) 0 b) 7
c) slightly less than 7 d) slightly more than 7

(xxvii) The mechanical work required to run vapour absorption system

- a) is more than the mechanical work required to run vapour compression system b) is less than the mechanical work required to run vapour compression system
c) is similar to the mechanical work required to run vapour compression system d) cannot say

(xxviii) What is the condition of refrigerant at the exit of evaporator in aqua-ammonia absorption system?

- a) low pressure ammonia vapour b) high pressure ammonia vapour
c) low pressure strong vapour mixture of d) high pressure strong vapour mixture of

ammonia and water

ammonia and water

(xxix) Da-laval turbines are mostly used.....

- a) Where low speeds are required
- b) For small power purposes and and low speeds
- c) For small power purposes and and high speeds
- d) Foe large power purposes

(xxx) The degree of reaction is defined as the ratio.....

- a) Heat drop in the fixed blades to the heat drop in the moving blades
- b) Heat drop in the moving blades to the heat drop in the fixed blades
- c) Heat drop in the moving blades to the total heat drop in the fixed blades
- d) Heat drop in the fixed blades to the total heat drop in the moving blades

(xxxii) The maximum efficiency of a Da-Level turbine is (where α = nozzle angle).....

- a) $\sin^2 \alpha$
- b) $\cos^2 \alpha$
- c) $\tan^2 \alpha$
- d) $\cot^2 \alpha$

(xxxiii) The stage efficiency (η_s) is given by (where η_b =blading efficiency and η_n =nozzle efficiency).....

- a) η_b / η_n
- b) η_n / η_b
- c) $\eta_b \eta_n$
- d) $\eta_n \eta_b$

(xxxiiii) The volume of air delivered by the compressor is called.....

- a) Free air delivery
- b) Compressor capacity
- c) Swept volume
- d) None of these

(xxxv) Ratio of indicated HP and break HP is known as.....

- a) Mechanical efficiency
- b) Volumetric efficiency
- c) Isothermal efficiency
- d) Adiabatic efficiency

(xxxv) The value of air sucked by the compressor during its suction stroke is called.....

- a) Free air delivery
- b) Compressor capacity
- c) Swept volume
- d) none of these

(xxxvi) Volumetric efficiency is.....

- a) The ratio of stroke volume to clearance volume
- b) The ratio of the air actually delivered to the amount of piston displacement
- c) Reciprocal of compression ratio
- d) Index of compressor performance

(xxxvii) The main function of nozzle is to _____

- a) Varying temperatures
- b) Pressure variations
- c) Load variations
- d) Heat variations

(xxxviii) Centrifugal pumps transfer energy from _____

- a) Rotor to fluid
- b) Fluid to rotor
- c) Draft to rotor
- d) Rotor to draft

(xxxix) Centrifugal pumps transport fluids by converting _____

- a) Kinetic energy to hydrodynamic energy
- b) Hydrodynamic energy to kinetic energy
- c) Mechanical energy to kinetic energy
- d) Mechanical energy to Hydrodynamic energy

(xl) In a diesel engine, the fuel is injected by.....

- a) Spark
- b) Injected fuel
- c) Ignitor
- d) Heat resulting from compression air that is supplied from combustion

(xli) Compression ratio of I.C. engine is.....

- a) The ratio of volumes of air in cylinder before compression stroke and after
- b) Volume displaced by piston per stroke and clearance volume in cylinder

compression ratio

- c) Ratio of pressure after compression and before compression
- d) None of these

(xlii) A diesel engine has.....

- a) One valve
- b) Two valve
- c) Three valve
- d) Four valve

(xliii) A spark plug gap is kept from...

- a) 0.3 to 0.7 mm
- b) 0.2 to 0.8 mm
- c) 0.4 to 0.9 mm
- d) 0.6 to 1.0 mm

(xliv) Theoretically correct mixture of air and petrol is ..

- a) 0.4173611111111111
- b) 0.6256944444444444
- c) 0.8340277777777777
- d) 1.0423611111111111

(xlv) If the intake air temperature of I.C. engine increases, its efficiency will.....

- a) Increases
- b) Decreases
- c) Remain same
- d) Unpredictable

(xlvi) An engine indicator is used to determine.....

- a) Speed
- b) m.e.p. and I.H.P.
- c) Volume of cylinder
- d) Volume of cylinder

(xlvii) Supercharging.....the power developed by the engine

- a) Has no effect on
- b) Increases
- c) Decreases
- d) None of these

(xlviii) A two stroke cycle engine gives.....the number of power strokes as compared to the four stroke cycle engine, at the same engine speed

- a) Half
- b) Same

c) Double

d) Four times

(xlix) In a four stroke engine, the working cycle is completed in.....

a) One revolution of the crankshaft

b) Two revolution of the crankshaft

c) Three revolution of the crankshaft

d) Four revolution of the crankshaft

(l) Supercharging is the process of.....

a) Providing the forced cooling air

b) Raising exhaust pressure

c) Supplying the intake of an engine with air at a density greater than the density of the surrounding atmosphere

d) Supplying compressed air to remove combustion product fully

(li) The thermal efficiency of petrol engine is.....

a) 0.15

b) 0.3

c) 0.5

d) 0.7

(lii) The brake power of an engine is always.....the indicated power

a) Equal to

b) Less than

c) Greater than

d) None of these

(liii) A standard ice point temperature corresponding to the temperature

a) Water at 0c

b) Ice at -4c

c) Solid and dry

d) Mixture of ice and water under equilibrium condition

(liv) Ammonia- absorption refrigeration cycle requires

a) Vary little work input

b) Maximum work input

c) Zero work input

d) None of these

(lv) The boiling point of ammonia

a) -100c

b) -50c

c) -33.3c

d) 0c

(lvi) The refrigeration for a refrigerator should have

a) High sensible heat

b) High total heat

c) High total heat

d) Low latent heat

(lvii) Rating of a domestic refrigerator is of the order of

a) 0.1 ton

b) 5 ton

c) 10ton

d) 40ton

(lviii) Air refrigeration operation on

a) Carnot cycle

b) Reverse cycle

c) Ericsson cycle

d) Brayton cycle

(lix) The higher temperature in vapour compression cycle occurs at

a) Receiver

b) Expansion valve

c) evaporator

d) Compression discharge

(lx) Aqua ammonia is used as refrigerant in the following type of refrigeration system

a) compression

b) Direct

c) absorption

d) None of these