

**DIPLOMA IN CIVIL ENGINEERING (DCLE(G)) /
DIPLOMA IN MECHANICAL ENGINEERING
(DME) / DCLEVI / DMEVI / DELVI / DECVI /
DCSVI**

Term-End Examination

June, 2018

00923

BET-024 : E/M ENGINEERING

Time : 2 hours

Maximum Marks : 70

Note : All questions are compulsory. Use of scientific calculator is permitted.

1. Select the correct answer from the given alternatives, of the following objective type questions : $14 \times 1 = 14$

- (a) When the gas is heated at constant pressure, then the heat supplied
- (i) raises the temperature of the gas.
 - (ii) increases the internal energy of the gas.
 - (iii) does some external work during expansions.
 - (iv) Both (ii) and (iii)

- (b) $Pv^n = \text{constant}$. Which of the following is correct for the equation ?
- (i) $n = 0$, if it is isothermal process
 - (ii) $n = 1$, if it is constant pressure process
 - (iii) $n = \gamma$, if it is adiabatic process
 - (iv) $n = 1.5$, if it is constant volume process
- (c) A thermodynamic process, in which a gas is heated or expanded in such a way that the product of its pressure and volume remains constant, is called
- (i) Isothermal process
 - (ii) Isobaric process
 - (iii) Adiabatic process
 - (iv) Polytropic process
- (d) Otto cycle is also known as
- (i) Constant pressure cycle
 - (ii) Constant volume cycle
 - (iii) Constant temperature cycle
 - (iv) Constant entropy cycle
- (e) Which of the following is *not* a part of refrigeration cycle ?
- (i) Compressor
 - (ii) Boiler
 - (iii) Condenser
 - (iv) Evaporator



- (f) The thermal efficiency of a two-stroke engine is _____ a four-stroke engine.
- (i) equal to
 - (ii) less than
 - (iii) greater than
 - (iv) None of the above
- (g) The principal constituents of a fuel are
- (i) carbon and hydrogen
 - (ii) oxygen and hydrogen
 - (iii) sulphur and oxygen
 - (iv) sulphur and hydrogen
- (h) Current in a conductor is due to
- (i) motion of free electrons in it
 - (ii) motion of +ve ions
 - (iii) free electrons and holes
 - (iv) protons
- (i) A transformer
- (i) transforms energy
 - (ii) transforms frequency
 - (iii) transforms voltage
 - (iv) generates emf
- (j) Henry is the unit of
- (i) Inductance
 - (ii) Capacitance
 - (iii) Capacitor
 - (iv) Permittivity

- (k) The free repulsion or attraction between two point charges Q_1 and Q_2 is
- (i) directly proportional to the sum of their charges.
 - (ii) inversely proportional to the product of their charges.
 - (iii) directly proportional to the square of the distance between them.
 - (iv) inversely proportional to the square of the distance between them.
- (l) A narrow hysteresis loop indicates
- (i) more dissipation of energy
 - (ii) less dissipation of energy
 - (iii) greater value of resistance
 - (iv) smaller value of resistance
- (m) An electric kettle rated at 220 V, 2.2 kW works for 3 hours. The current drawn will be
- (i) 2 amp
 - (ii) 10 amp
 - (iii) 25 amp
 - (iv) 30 amp
- (n) A wire of resistance R is cut into n equal parts. These parts are then connected in parallel. The equivalent resistance of the combination will be
- (i) nR
 - (ii) R/n
 - (iii) n/R
 - (iv) R/n^2

2. Attempt any *two* of the following :

2×7=14

(a) Define the following technical terms with respect to an I.C. Engine :

- (i) Volumetric efficiency
- (ii) Brake thermal efficiency
- (iii) Indicated thermal efficiency
- (iv) Air standard efficiency
- (v) Mechanical efficiency
- (vi) Brake power
- (vii) Indicated power

(b) A gas engine working on Otto cycle has a cylinder dia 178 mm and stroke length of 254 mm. The clearance volume is $1.5 \times 10^6 \text{ mm}^3$. Calculate the air standard efficiency.

(c) Explain working of four-stroke Otto cycle with the help of (P-v) diagram.

3. Attempt any *two* of the following :

2×7=14

(a) Explain with neat diagram, working of vapour absorption system of refrigeration.

- (b) Explain the following terms as applied to an I.C. engine :

Bore, Stroke, TDC, BDC, Clearance volume, Swept volume and Compression ratio.

- (c) By monitoring an engine, it is found that the engine requires 10 kW with all cylinders simply inhaling and exiting air. The engine produces 98 kW on full load. Find the mechanical efficiency at

- (i) Full load,
- (ii) Half load, and
- (iii) Quarter load.

4. Attempt any *two* of the following : 2×7=14

- (a) In the circuit shown in Figure 1, determine the current flowing through the 12 ohm resistance.

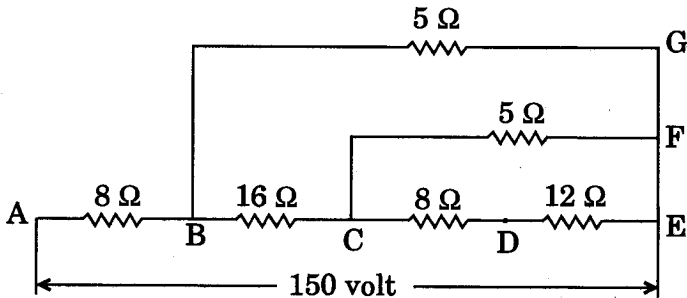


Figure 1

(b) Two capacitors of $4\mu\text{F}$ and $8\mu\text{F}$ are connected in parallel and this combination is connected in series with a capacitor of $24\mu\text{F}$. Determine

(i) Total capacitance

(ii) Total charge

(iii) Charge on each capacitor if applied voltage is 32 volts.

(c) Write short notes on the following :

(i) Hysteresis

(ii) Galvanometer converted into an Ammeter

5. Attempt any *two* of the following : $2 \times 7 = 14$

(a) Deduce the expression for e.m.f. induced by operation of D.C. generator.

(b) A D.C. shunt generator has an induced voltage of 125 V on open circuit. When the machine is loaded, the terminal voltage is 120 volts. The field resistance is 15 ohms and the armature resistance is 0.05 ohms. Determine the load current.

- (c) A 25 kVA transformer has 500 turns on the primary and 50 turns on the secondary winding. The primary is connected to 3300 V, 50 Hz supply. Find the full-load primary and secondary currents, the secondary e.m.f. and maximum flux in the core. Neglect leakage and no load primary current.
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