

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

Term-End Examination

00300

June, 2016

BET-024 : E/M ENGINEERING

Time : 2 hours

Maximum Marks : 70

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

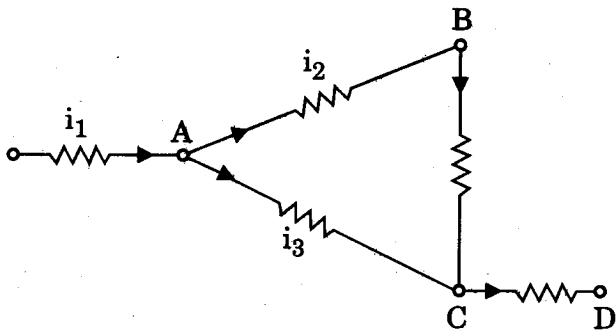
1. Select the correct answer from the given four alternatives for the following multiple choice objective type questions :

14×1=14

- (a) The ratio of clearance volume to swept volume is called
- (i) Cut-off ratio
 - (ii) Expansion ratio
 - (iii) Clearance ratio
 - (iv) None of the above

- (b) The difference between C_p and C_v is equal to
- (i) R
 - (ii) 2R
 - (iii) R/2
 - (iv) depends upon the atomicity of gas molecules
- (c) $W = P_1 V_1 \log_e (V_2 / V_1)$ when P_1, V_1 and P_2, V_2 are the initial and final pressures and volume respectively. W is the work done. The above equation is true for
- (i) Isothermal process
 - (ii) Adiabatic process
 - (iii) Polytropic process
 - (iv) Constant pressure process
- (d) The ratio of clearance volume to total volume is called
- (i) Cut-off ratio
 - (ii) Expansion ratio
 - (iii) Compression ratio
 - (iv) None of the above
- (e) In a vapour compression system, the lowest temperature during the cycle occurs after
- (i) Compression
 - (ii) Condensation
 - (iii) Expansion
 - (iv) Evaporation

- (f) In a four-stroke cycle engine, all the four operations are completed in _____ revolutions of crank shaft.
- (g) Which of the following refrigerants is highly toxic and inflammable ?
- (i) Ammonia
 - (ii) Carbon dioxide
 - (iii) Sulphur dioxide
 - (iv) Freon-12
- (h) The current in the arm CD of the circuit will be



- (i) $i_1 + i_2$
- (ii) $i_2 + i_3$
- (iii) $i_1 + i_3$
- (iv) $i_1 - i_2 + i_3$

- (i) The filament of an electric lamp draws a current of 0.4 amperes, which lights for 3 hours. The amount of charge that flows in the circuit is
- (i) 1.2 Coulomb
 - (ii) 4.32×10^3 Coulomb
 - (iii) 72.0 Coulomb
 - (iv) 4.32×10^6 Coulomb
- (j) The device used for producing current is called
- (i) Generator
 - (ii) Voltmeter
 - (iii) Ammeter
 - (iv) Galvanometer
- (k) Lenz's law is a consequence of the law of conservation of
- (i) charge
 - (ii) mass
 - (iii) momentum
 - (iv) energy
- (l) When a capacitor is connected to a battery
- (i) an alternating current flows in the circuit
 - (ii) no current flows at all
 - (iii) a current flows for some time and finally it decreases to zero
 - (iv) current keeps on increasing and reaches maximum after some time

- (m) A bird sitting on a high power line
- (i) gets killed instantly
 - (ii) gets a mild shock
 - (iii) is not affected practically
 - (iv) gets a fatal shock
- (n) Which of the following quantities remains constant in a step-down transformer ?
- (i) Current
 - (ii) Voltage
 - (iii) Power
 - (iv) None of the above

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

- (a) Explain the following terms as applied to I.C. engine :
- (i) Bore
 - (ii) Stroke
 - (iii) TDC
 - (iv) BDC
 - (v) Clearance volume
 - (vi) Swept volume
 - (vii) Compression ratio

- (b) Discuss the working of a two-stroke petrol engine with the help of neat sketches.
- (c) An I.C. engine rotates at 2400 r.p.m. The four-stroke engine has a cylinder bore diameter of 100 mm and crank radius of 100 mm. From indicator diagram, the mean effective pressure is found as 100 kPa. If the mechanical efficiency is 80%, find the brake power of the engine.

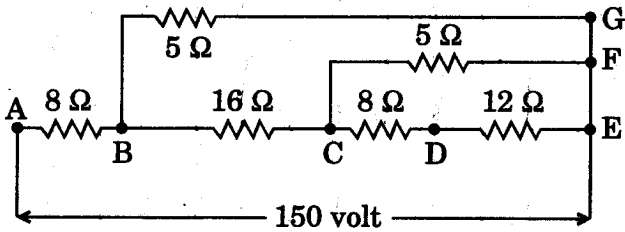
3. Attempt any *two* of the following : 2×7=14

- (a) Describe the vapour absorption refrigeration system with a neat sketch.
- (b) What is lift ? How do you classify them ? Describe any one in brief.
- (c) A Carnot cycle machine operates between the temperature limits of $T_1 = 30^\circ\text{C}$ and $T_2 = -15^\circ\text{C}$. Determine the COP when it operates as
- (i) a refrigeration machine, and
 - (ii) a heat pump.

4. Attempt any *two* of the following :

2×7=14

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



- (b) Calculate the permeability of a steel sheet at a magnetic field strength of $250 \frac{AT}{m}$ when the flux density is 0.8 T.
- (c) When the element combination in Figure (a) is connected to a 200 V, 400 Hz supply, what would be the current drawn? What would be the voltage across the resistance and capacitance?

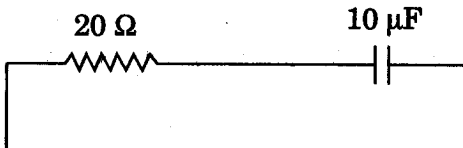


Figure (a)

5. Attempt any *two* of the following :

2×7=14

- (a) A 25 kVA transformer has 500 turns on primary and 50 turns on the secondary winding. The primary is connected to a 3300 V, 50 Hz supply. Find the full load primary and secondary currents, the secondary emf and the maximum flux in the core.
- (b) A 200 volts D.C. series motor runs on 500 r.p.m, when taking a current of 25 amperes. The resistance of armature is 0.5 ohms and that of the field is 0.3 ohms. If the current remains constant, calculate the necessary additional resistance in series with armature to reduce the speed to 250 r.p.m.
- (c) A long shunt compound generator supplies a load current of 50 amperes at 220 volts. Shunt field resistance is 110 ohms. Series field resistance is 0.01 ohm and armature resistance is 0.02 ohm. Find the emf generated and power developed in the armature. Take contact drop per brush as 1.5 volts.
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