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BET-024

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

00466

Term-End Examination

June, 2015

BET-024 : E/M ENGINEERING

Time : 2 hours *Maximum Marks : 70*

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

1. Select the correct answer from the given four alternatives for the following multiple choice type questions : *14×1=14*

(a) Wet Bulb temperature indicates the temperature of

(i) water

(ii) air

(iii) nitrogen

(iv) air, when the bulb of the thermometer is covered with wet wick or cloth

(b) A ton of refrigeration is

(i) 60 kcal/min

(ii) 75 kcal/min

(iii) 3000 kcal/hr

(iv) 3500 kcal/hr

(c) According to Boyle's law

(i) at constant temperature, pressure is proportional to the volume.

(ii) at constant temperature, pressure is inversely proportional to the volume.

(iii) pressure is proportional to the volume irrespective of its temperature.

(iv) None of the above

(d) Two stroke engines offer their advantage due to

(i) low initial cost and lower mechanical efficiency

(ii) low initial cost and higher mechanical efficiency

(iii) low initial cost and higher thermal efficiency

(iv) None of the above

(e) Mean effective pressure in a cylinder is

(i) $\frac{\text{Work done per cycle}}{\text{Stroke length}}$

(ii) $\frac{\text{Area of indicator diagram}}{\text{Length of the diagram}}$

(iii) $\frac{\text{Stroke Volume}}{\text{Work done per cycle}}$

(iv) None of the above

(f) Main function of piston in I.C. engines is to

(i) Rotate the engine

(ii) Complete the strokes

(iii) Seal the gases

(iv) Increase the power

(g) Which one of the following is ***not*** a component of vapour compression refrigeration system ?

(i) Compressor

(ii) Condenser

(iii) Expansion device

(iv) Separator

(h) A capacitor draws a current of 5 mA from 200 V, 50 Hz A.C. supply. If it draws from 40 V, 400 Hz supply, current will be

(i) 2 mA

(ii) 4 mA

(iii) 8 mA

(iv) 16 mA

(i) Which one of the following is ***not*** a merit of three-phase system over single-phase system ?

(i) More kVA rating

(ii) Less conducting material required for lines

(iii) More expensive

(iv) Economic

(j) Which transformer is used in street lighting ?

(i) Constant current transformer

(ii) Tapped transformer

(iii) Auto transformer

(iv) Potential transformer

(k) A 4·54 μF capacitor is connected with 230 V alternating voltage and 50 Hz frequency. What will be the current 'I' in ampere through the capacitor ?

(i) 0·28 A

(ii) 0·32 A

(iii) 0·36 A

(iv) 0·40 A

(l) A 5 kW, 50 Hz, 6-pole slip ring induction motor is running at a speed of 9600 rpm. Percentage slip will be

(i) 2%

(ii) 4%

(iii) 6%

(iv) 8%

(m) Specific gravity reading by hydrometer of a full charged battery is

(i) 1·10

(ii) 1·18

(iii) 1·20

(iv) 1·28

(n) Phase difference in coils of a three-phase alternator is

(i) 60°

(ii) 120°

(iii) 180°

(iv) 240°

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

(a) Explain the following terms as applied to I.C. Engine :

(i) Specific fuel consumption

(ii) Mechanical efficiency

(iii) Volumetric efficiency

(iv) Relative efficiency

(v) Indicated thermal efficiency

(vi) Brake thermal efficiency

(vii) Knocking

(b) Discuss the working of a four-stroke Diesel Engine with a suitable diagram.

(c) Describe an electric chain hoist. How can this hoist be used to move the load along the length of workshop ?

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

(a) 4 kg of air at pressure of 7 bar occupies a volume of 0·28 m^3. This air is expanded to a volume of 1·4 m^3 following a law $pV^{1·2}$ = constant. Find :

(i) Final temperature

(ii) The work done

(b) Explain the following :

(i) Sensible and Latent heat

(ii) Coefficient of performance of heat engine and heat pump

(c) Diameter of cylinder and stroke of the piston of an Otto cycle petrol engine are 10 cm and 16 cm respectively. Clearance volume is 250 cm^3. Find out the air standard efficiency of the engine. (take ν =1·4)

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

(a) Define Ohm's law. In the circuit given in Figure 1, calculate the current through each battery and potential difference between the terminals E and F of the given circuit.

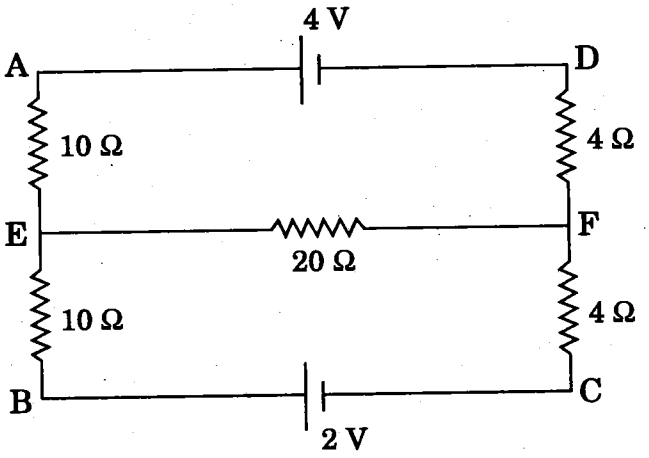

Figure 1

(b) 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 emf and the maximum flux in the core. Neglect leakage and no-load primary current.

(c) Three capacitors of capacity 10, 20 and 40 μF are placed in series across a 300 V source. Determine

(i) equivalent capacitance of the combination,

(ii) charge on each capacitor, and

(iii) voltage drop across each capacitor.

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

(a) Determine the value of the torque established by the armature of a 4-pole motor having 744 conductors, wave wound. The flux per pole is $2{\cdot}4 \times 10^{-2}$ Weber and the total armature current is 50 amperes.

(b) Explain the necessity of transformer in power system. Explain the principle of working of a transformer.

(c) A 400 V shunt generator has a full-load current of 200 A, its armature resistance is 0·06 Ω and field resistance, 100 Ω, the stray losses are 2000 W. Find the h.p. of its prime mover, when it is delivering full load and find the load for which the efficiency of the generator is maximum.