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BET-024

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Diploma in Civil Engineering / Diploma in Electrical and Mechanical Engineering DCLEVI/DMEVI/DELVI/DECVI/DCSVI/ ACCLEVI/ACMEVI/ACELVI/ACECVI/ACCSVI

Term-End Examination

December, 2011

BET- 024 : E/M ENGINEERING

Time : 2 hours *Maximum Marks : 70*

Note : *All questions are* ***compulsory****. Use of scientific calculator is permitted. Assume missing data if any.*

1. Select the correct answer from the given four alternatives for the following multiple choice objective type questions. **14x1=14**

(a) When the gas is heated at constant pressure, then the heat supplied :

(i) raises the temperature of gas

(ii) increases the internal energy of the gas

(iii) does some external work during expension

(iv) both (i) and (iii)

(v) both (ii) and (iii)

(b) The expension ratio (r) is the ratio of :

(i) v_1/v_2

(ii) v_2/v_1

(iii) $(v_1 + v_2)/v_2$

(iv) $(v_1 + v_2)/v_1$

where v_1 = volume at the beginning of expansion, and

v_2 = volume at the end of expansions.

(c) A thermodynamics 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) In an isolated system of thermodynamics :

(i) Only mass transfer takes place.

(ii) Only energy transfer takes place.

(iii) Neither mass nor energy transfer takes place.

(iv) Both mass and energy transfer takes place.

(e) Which of the following is **not** a part of refrigeration cycle ?

(i) Compressor.

(ii) Boiler.

(iii) Condenser.

(iv) Evaporator.

(f) A crane is used for :

(i) Boring holes in rocks.

(ii) Transporting heavy loads

(iii) Lifting and placing loads at desired place

(iv) Compacting earth fills.

(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) Energy in the current carrying coil is stored in the form of :

(i) Electric field

(ii) Magnetic field

(iii) Dielectric strength.

(iv) Heat

(i) One ton of refrigerator is equal to :

(i) 1000 kJ

(ii) 3.5 kW

(iii) 1 kW

(iv) 1000 kW

(j) Dimensional formula of magnetic flux is :

(i) $MLT^{-2}A^{-2}$

(ii) $ML^2T^{-2}A^{-2}$

(iii) $ML^{-2}T^{-2}A^{-2}$

(iv) $ML^2T^2A^{-2}$

(k) 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.

(l) Voltmeter is essentially a galvanometer having :

(i) A known high resistance in parallel.

(ii) A known high resistance in series.

(iii) Low ohms in series.

(iv) Low resistance in parallel.

(m) If the diameter of a conductor is increased to double keeping the length constant, the change in resistance is :

(i) Four times

(ii) One fourth

(iii) Double

(iv) Half

(n) The opposition to current flow that exists in every material is called :

(i) Resistance

(ii) Conductance

(iii) Inductance

(iv) Capacitance

2. Answer *any two* of the following : **2x7=14**

(a) State Boyl's Law and Charl's Law and prove that characteristics gas equation is $PV = mRT$.

(b) Explain adiabatic process. Derive an expression for the work done during the adiabatic expansion of an ideal gas.

(c) A gas engine has piston diameter of 150 mm, length of stroke 400 mm and mean effective pressure 5.5 kgf/cm^2. The engine makes 120 explosions per minute. Determine the mechanical efficiency of the engine, if its BP is 5 kW.

3. Answer *any two* of the following : **2x7=14**

(a) Explain the following terms as applied to an I.C. Engines.

Bore, Stroke, T.D.C., B.D.C. clearance volume, swept volume, compression ratio.

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

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

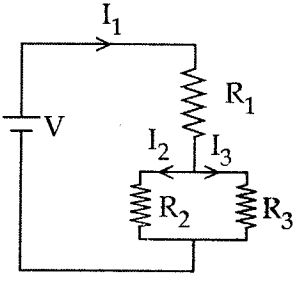
(i) Full load

(ii) Half load

(iii) Quarter load

4. Answer *any two* of the following : **2x7=14**

(a) If $R_1 = 5\ \Omega$, $R_2 = 2\ \Omega$ and $R_3 = 3\ \Omega$ and voltage of 10V connected across these for an arrangement shown in the figure, then calculate the current in all these three resistors.



(b) The air coil solenoid has $l = 15$ cm and inside diameter $D = 1.5$ cm. Calculate inductance if the coil has 900 turns with total flux $\phi = 1.33 \times 10^{-7}$ Wb, when coil current is 100 mA.

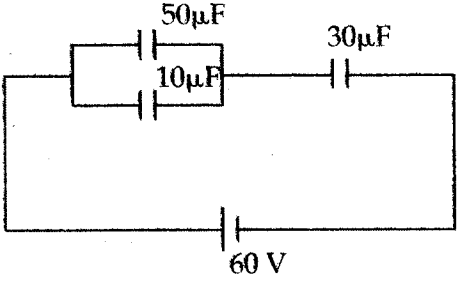
(c) Two capacitors of 5 μF and 10 μF are connected in parallel and this combination is connected in series with a capacitor of 30 μF as shown in the figure.

The applied voltage is 60 volts. Determine

(i) Equivalent capacitance

(ii) Total charge and

(iii) Charge on each capacitor



5. Answer ***any two*** of the following : **2x7=14**

(a) A 25 kVA transformer has 500 turns on primary and 50 turns on 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 the maximum flux in the core, neglect leakage and no. load primary current.

(b) (i) Deduce the expression for E.M.F. Induced by operation of a D.C. Generator.

(ii) What EMF will be generated in 8 poles Lap wound D.C. Generator if it is rotated at 200 R.P.M. The flux per pole is 0.05 wbs and the number of armature conductor is 960 ?

(c) A capacitor draws a current of 5 mA from 200 V, 50 Hz A.C. supply. What current does it draw from 40 V, 400 Hz supply ?