

**Diploma in Civil Engineering / Diploma
in Electrical and Mechanical Engineering**

00039

Term-End Examination

June, 2010

BET- 024 : E/M ENGINEERING

Time : 2 hours

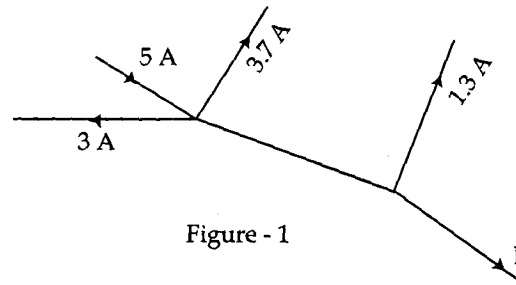
Maximum Marks : 70

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 objective type questions : **14x1=14**
- (a) Two capacitors of capacitance $3\mu\text{F}$ and $6\mu\text{F}$ are connected in series to a source of emf. of 180 V. Potential difference across $6\mu\text{F}$ Capacitor is :
- (i) 60 V (ii) 30 V
(iii) 120 V (iv) 180 V
- (b) Two copper wires, one of length 1 m and the other of length 9m, are found to have the same resistance. Their diameters are in the ratio :
- (i) 3 : 1 (ii) 1 : 9
(iii) 9 : 1 (iv) 1 : 3

- (c) Identify the material commonly used for making coils of a resistance box :
- (i) Molybdenum
 - (ii) Manganese
 - (iii) Manganin
 - (iv) Magnesium
- (d) 'Knock' in the CI engine is characterised by :
- (i) sudden auto-ignition of the mixture at the very beginning of the combustion process.
 - (ii) sudden auto-ignition of the mixture near the end of the combustion period.
 - (iii) 'Knock' does not occur in C.I. engines.
 - (iv) none of these.
- (e) The best possible location for the spark plug is :
- (i) near the inlet valve
 - (ii) near the exhaust valve
 - (iii) at the centre of the cylinder head
 - (iv) any place of the combustion chamber
- (f) Which of the following is an S.I. engine ?
- (i) diesel engine
 - (ii) petrol engine
 - (iii) gas engine
 - (iv) none of these
- (g) In a four - stroke cycle petrol engine, during suction stroke :
- (i) only air is sucked in
 - (ii) only petrol is sucked in
 - (iii) mixture of petrol and air is sucked in
 - (iv) none of these

- (h) The electrical resistance of metals :
- (i) increases with an increase in temperature.
 - (ii) decreases with an increase in temperature.
 - (iii) is independent of temperature.
 - (iv) sometimes increases, sometimes decreases with temperature
- (i) Figure 1 shows current in a part of electrical circuit, then current I is :



- (i) 2.4 A (ii) 3.2 A
 - (iii) 1.9 A (iv) 3 A
- (j) The magnetic field lines :
- (i) intersect at the neutral point.
 - (ii) intersect near north and south poles.
 - (iii) cannot intersect at all.
 - (iv) depend upon the position of the magnet.

- (k) "The e.m.f. developed in a circuit opposes the cause to which it is due". This is known as :
- (i) Lambert's law
 - (ii) Faraday's law
 - (iii) Lenz's law
 - (iv) Neumann's law
- (l) The presence of nitrogen in the products of combustion ensures that :
- (i) complete combustion of fuel takes place.
 - (ii) incomplete combustion of fuel occurs.
 - (iii) dry products of combustion are analysed.
 - (iv) air is used for the combustion.
- (m) The refrigerant used for absorption refrigerators working on heat from solar collectors is a mixture of water and :
- (i) carbon dioxide.
 - (ii) sulphur dioxide.
 - (iii) lithium bromide.
 - (iv) freon - 12
- (n) In milk chilling plants, the usual secondary refrigerant is :
- (i) ammonia solution
 - (ii) sodium silicate
 - (iii) glycol
 - (iv) brine

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

- (a) State Ohm's law. Define resistivity. State its SI units.
- (b) Three resistors 2Ω , 4Ω , and 5Ω are combined in parallel. What is the total resistance of the combination. If the combination is connected to a battery of emf 20V and negligible resistance, determine the current through each resistor and the total current drawn from the battery.
- (c) State Biot Savart Law. Use it to obtain an expression for magnetic field at the centre of a current carrying circular loop.

3. Answer *any two* of the following : $2 \times 7 = 14$

- (a) With the help of suitable diagram, explain in brief the construction and working principle of Galvanometer.
- (b) A 230 volts DC series motor runs on 525 rpm, when taking a current of 30 ampere. The resistance of the armature is 0.6 ohm and that of the field is 0.4 ohm. If the current remains constant, calculate the necessary additional resistance in series with armature to reduce the speed to 210 rpm.

- (c) A long shunt compound generator supplies a load current of 55 amperes at 230 volts. Shunt field resistance is 115 ohms. Series field resistance is 0.02 ohm and armature resistance is 0.03 ohm. Find the emf generated and power developed in the armature. Take contact drop per bush as 1.5 volts.

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

- (a) Explain in brief Kelvin - Planck statement of second law of thermodynamics.
- (b) Compare the relative advantages and disadvantages of Petrol engine and Diesel engine.
- (c) A Carnot engine working between 377°C and 37°C produces 120 kJ of work.

Determine :

- (i) The heat added in kJ, and
- (ii) The Thermal efficiency of the engine.

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

- (a) What do you mean by "Octane number", and "Cetane number" of fuels ? How are they determined ?

- (b) With the help of a neat diagram, explain in brief, a simple vapour absorption refrigeration cycle.
 - (c) What is a lift ? Where it is used ?
Distinguish between a lift and an escalator.
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