

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- Vth SEMESTER-EXAMINATION – MAY/JUNE - 2012

Subject code: 152001

Date: 01/06/2012

Subject Name: Electro Mechanical Energy Conversion

Time: 02:30 pm – 05:00 pm

Total Marks: 70

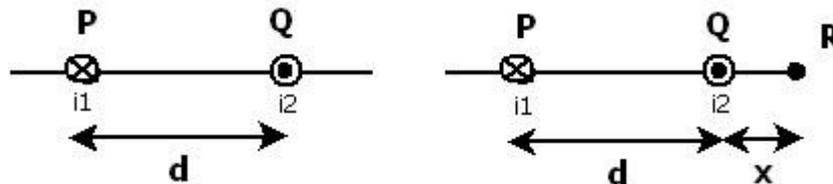
Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Q.1

07

- (a) Two parallel wires P and Q placed at a separation $d=6$ cm carry electric currents $i_1=6$ A and $i_2=3$ A in opposite directions as shown in figure. Find the point on the line PQ where the resultant magnetic field is zero.



- (b) Explain various effects of air gap in ferromagnetic circuits. **07**

Q.2

- (a) State and explain Ampere's and Biot-Savart's law **07**
 (b) Explain energy stored in capacitor and energy density in electric field with suitable expressions. **07**

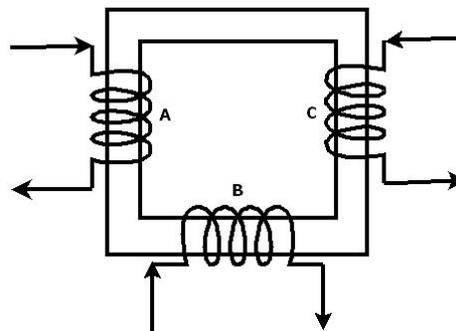
OR

- (b) Explain flux of an electric field through a surface. **07**

Q.3

- (a) Draw and explain approximate equivalent circuit of an iron core reactor. **07**
 (b) The core made of cold rolled silicon steel is shown in figure. B-H curve data is given below. It has a uniform c/s of 5.9cm^2 and mean length of 30cm. Coils A, B and C carry 0.4, 0.8 and 1 A currents respectively in the directions such that flux produced by all the three coils are in the same direction. Coil A and B have 250 and 500 turns respectively. How many turns coils C have to establish a flux of 1 mWb in the core? **07**

H (AT/m)	B (T)
0.05	1
0.1	1.35
0.2	1.45
0.3	1.63
0.5	1.69
1	1.78
2	1.86



OR

- Q.3** (a) Derive expression for induced voltages in a moving conductor placed in a magnetic field. **07**

- (b) Explain construction & working of an elementary generator. **07**
- Q.4** (a) Explain the principle of operation of an induction motor with suitable diagrams. **07**
- (b) Explain magnetization characteristics of separately excite DC generator. **07**
- OR**
- Q.4** (a) Explain energy conversion in 2-phase induction machine. **07**
- (b) Explain reluctance motor. **07**
- Q.5** (a) Explain general constructional features of an induction motor. **07**
- (b) Explain rotating magnetic field in 3-phase induction machine. **07**
- OR**
- Q.5** (a) Explain construction and working principle of a synchronous machine. **07**
- (b) Explain the classification of DC generator with suitable diagrams. **07**
