School of Engineering and Technology

Subject: BEEE   **Subject Code: 24BEELY104**

UNIT 2(DC Machines & Transformers)

Sample Questions: **2 Marks**

- ✓ Define an electrical machine?
- ✓ Define dc generator?
- ✓ Write short notes on functioning of following parts :(a) Pole (b) commutator (c) yoke (d) brushes.
- ✓ Define DC motor?
- ✓ Define Torque?
- ✓ A 6 pole DC motor has a lap wound armature with 400 conductors. The armature current is 20 A and flux per pole is 4 mwb. Calculate the torque developed by the motor.
- ✓ The armature of a 4-pole, 600 rpm, lap wound generator has 100 slots. If each coil has 4 turns calculate the flux per pole required to generate an emf of 300 V
- ✓ A 6-pole, lap wound armature rotated at 350 rpm is required to generate 300 V. The useful flux per poles is 0.05 Wb. If the armature has 120 slots; calculate the no. of conductors per slot.
- ✓ Mention any two applications of dc generators.
- ✓ Mention any two applications of dc motors.
- ✓ Mention any two applications of Transformers.
- ✓ Define transformation ratio of transformer?
- ✓ The number of primary and secondary windings is 80 and 120 respectively. The secondary voltage is given by 240V, which determines the primary voltage.
- ✓ The number of primary and secondary windings is 60 and 100 respectively. The secondary voltage is given by 250V, which determines the primary voltage.
- ✓ What is the primary function of the stator in an electric motor?
- ✓ What determines the speed of a DC motor? What is the function of a commutator in an electrical motor?

- ✓ If a transformer primary is energised from a square wave voltage source, its output voltage will be _____ wave.
- ✓ The primary winding of a 220/6 V, 50 Hz transformer is energised from 110 V, 60 Hz supply. The secondary output voltage will be _____
- ✓ Mention the main purpose of the commutator & brushes on a DC generator?
- ✓ Transformer Core is laminated to reduce _____ loss.
- ✓ What will happen if the back e.m.f. of a D.C. motor vanishes suddenly?
- ✓ According to Fleming's right-hand rule for finding the direction of induced e.m.f., when middle finger points in the direction of induced e.m.f., forefinger will point in the direction of _____.
- ✓ For a D.C. generator when the number of poles and the number of armature conductors is fixed, then which winding will give the higher e.m.f.?
- ✓ The material for commutator brushes is generally made of _____.
- ✓ In any dc generators, the emf generated in the armature is maximum mention the condition?
- ✓ Which of the following application requires high starting torque?
  - (a) Lathe machine
  - (b) Centrifugal pump
  - (c) Locomotive
  - (d) Air blower

Sample Questions: 5 Marks

- ✓ Derive the emf equation of the dc generator?
- ✓ Calculate the emf generated by a 6 pole DC generator having 480 conductors and driven at a speed of 1200 rpm. The flux per pole is 0.012 Wb. Assume the generator to be (a) Lap wound, (b) Wave wound.
- ✓ A wave connected armature winding has 19 slots with 54 conductors per slot. If the flux per pole is 0.025 Wb and the number of poles is 8, find the speed at which the generator should be run to give 513 V. Also find the speed if the armature is lap connected.

✓ With a neat sketch explain the construction of a dc motor?

✓ With a neat sketch explain the construction of a dc Generator?

✓ A 4 pole, 1500 r.p.m. d.c generator has a lap wound armature having 24 slots with 10 conductors per slot. If the flux per pole is 0.04 Wb, calculate the e.m.f. generated in the armature. What would be the generated e.m.f. if the winding is wave connected?

✓ A 6 pole, 1200 r.p.m. d.c generator has a wave wound armature having 20 slots with 20 conductors per slot. If the flux per pole is 0.06 Wb, calculate the e.m.f. generated in the armature. What would be the generated e.m.f. if the winding is lap connected?

✓ A 4 pole, 1500 r.p.m. d.c generator has a wave wound armature having 30 slots with 10 conductors per slot. If the flux per pole is 0.054 wb, calculate the e.m.f. generated in the armature. What would be armature speed to generate the same e.m.f. if the winding is lap connected?

✓ Define torque? With usual notation obtain the torque equation for D.C Motor. Equation of dc motor?

✓ How back e.m.f regulates the armature current in D.C Motor? Explain with relevant equation.

✓ A 4 pole DC motor takes an armature current of 50 A. The armature has 480 lap connected conductors. The flux per pole is 20 mWb. Calculate the gross torque developed by the motor.

✓ A 4 pole DC motor has a wave wound armature with 594 conductors. The armature current is40 A and flux per pole is 7.5 mwb. Calculate the torque developed by the motor.

✓ Derive an e.m.f equation of transformer with usual notation and define term transformation ratio.

✓ Explain the construction of core and shell type transformers?

Sample Questions: 10Marks

✓ (a)Derive an e.m.f equation of transformer with usual notation and define term transformation ratio.

(b)The primary winding of a transformer is connected to a 240V, 50 Hz supply. The secondary winding has 1500 turns. If the maximum value of the core flux is 0.00207 wb, determine (i) The secondary induced emf (ii) No. of turns in the primary (iii) Core area of cross section if flux density has a maximum value of 0.465 Tesla.

✓ (a)Explain the working principle of transformer?

(b)A single phase transformer has 400 primary and 1000 secondary turns. The net cross sectional area of the core is 60 cm2. If the primary winding is connected to a 50 Hz supply at 520 V. Calculate (i) the peak value of flux density in the core, (ii) the voltage induced in the secondary winding.

✓ (a)A four pole generator having wave-wound armature winding has 51 slots, each slot containing 20 conductors. What will be the voltage generated in the machine when driven at 1500 rpm assuming the flux per pole to be 7.0 mWb ?

(b) The primary coil of a transformer has 1,32,000 turns and is connected to A.C. input source of 220 V. The secondary coil has 2,400 turns. Find the output voltage.
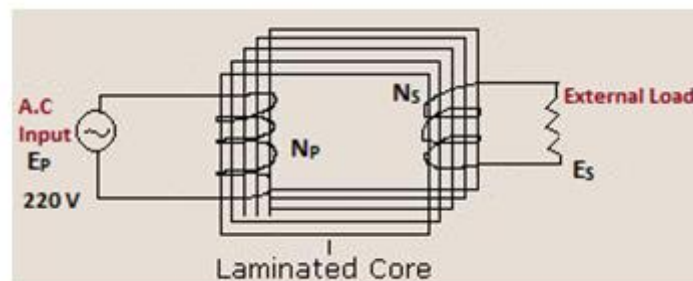
✓ (a)An armature of a 6 pole machine 75cm in diameter has 664 conductors each having an effective length of 30 cm and carrying a current of 100 A . If 70% of total conductors lie simultaneously in the field of average flux density 0.85Wb/m2 calculate armature torque.

(b)Calculate the value of torque developed by the armature of a 4 pole motor having 774 conductors, two paths in parallel, 24mWb flux per pole, when loaded the total armature current is 50 A.

✓ (a)The maximum flux density in the core of a 250/300 V, 50 Hz single phase transformer is 1.2 Wb/m2. If the emf per turn is 8 volt, determine (i) Primary and Secondary turns, (ii) Area of the core.

(b)A single phase transformer has 400 primary and 1000 secondary turns.The net cross sectional area of the core is 60 cm2. If the primary winding is connected to a 50 Hz supply at 520 V. Calculate (i) the peak value of flux density in the core, (ii) the voltage induced in the secondary winding.

✓ (a)Define torque? With usual notation obtain the torque equation for D.C Motor. Equation of dc motor?

(b) A 4 pole DC motor takes an armature current of 50 A. The armature has 480 lap connected conductors. The flux per pole is 20 mWb. Calculate the gross torque developed by the motor.