DEPARTMENT OF ELECTRONICS COMMUNICATIONS

QUESTION BANK (2018-19)

NAME OF SUBJECT : Electrical Mechanical (mid-1)

REGULATION : R16

COURSE : B.TECH

BRANCH : ECE

YEAR / SEMESTER : I/ II

UNIT-1 DC MACHINES

1.a) Explain constructional features and working principle and applications of a DC generator.

b) Draw and explain magnetization characteristics of DC shunt and compound Generators.

2.a) Explain the emf equation of DC generator

b) A 4-pole, lap-wound, DC shunt generator has a useful flux per pole of 0.07 Wb. The armature winding consists of 220 turns each of 0.004 resistance. Calculate the terminal voltage when running at 900 r.p.m. if the armature current is 50 A.

3.A) b) How the DC generators are classified. Explain with neat circuit diagrams

B) A 4-pole, long-shunt lap-wound generator supplies 25 kW at a terminal voltage of 500 V. The armature resistance is 0.03 ohm, series field resistance is 0.04 ohm and shunt field resistance is 200 ohm. The brush drop may be taken as 1.0 V. Determine the e.m.f. generated. Also calculate number of conductors if the speed is 1200 rpm and flux per pole is 0.02 Wb. Neglect armature reaction.

4.a) Explain the operation of three point starter and applications of DC motors.

B) Explain different speed control methods of DC motor. Which is the more popular method? Torque equation of dc motor?

5.a) What is a transformer? How does a transformer transfer electrical energy from one circuit to another? Derive its emf equation?

b) Derive the expression for induced e.m.f in a transformer in terms of frequency, maximum value of flux and number of turns on the windings . (c)In a 20 kVA, 2000/200 V, single-phase transformer, the iron and full-load copper losses are 350 and 400 W respectively. Calculate the efficiency at unity power factor on (i) full load (ii) half full-load.

6a) Define regulation and efficiency of a transformer

b) Derive the condition for maximum efficiency in a transformer

7. a) What are various losses in a transformer? Explain each one in detail.

b.) An 8 pole D.C shunt generator with 778 wave-connected armature conductors and running at 600 r.p.m supplies a load of 15 ohms resistance and at terminal voltage of 70 V. The armature resistance is 0.3 ohms and the field resistance is 260 ohms. Find the armature current the induced e.m.f and the flux per pole.

UNIT-2 AC ROTATING MACHINES

1.a)Explain the construction principle of operation of alternator

b) What is slip and write its expression. How does the slip vary with load?

2. a) Obtain the condition for maximum torque under running condition in Induction motor.

b) construction $principle of operation of 3-phase squirrel cage induction motor.

3a) Draw equivalent circuit of 3-phase induction motor on load. What is the effect of increasing air- gap length in an induction motor?

b) Define the efficiency and applications of three-phase induction motror?

4. a) Draw and explain the slip-torque characteristics of a 3-phase induction motor. How is speed of a DC motor reversed?

b) Write the expressions for starting and running torque of an induction motor.

5. a) Explain the various schemes of starting squirrel cage induction motor.

b) If the e.m.f. in the stator of an 8-pole induction motor has a frequency of 50 Hz and that in the rotor 1.5 Hz, at what speed is the motor running and what is the slip?

c) A 12 pole, 3-phase alternator is coupled to an engine running at 500 rpm. It supplies an induction motor which has a full load speed of 1 440 rpm. Find the percentage slip and the no. of poles of the motor.

6) Explain regulation of alternator by synchronous impedance method

UNIT-3 MEASURING INSTRUMEN TS

1 a). Explain how deflection torque is produced

1b) What is controlling torque and explain its significance

2a) Explain how damping torque is produced

2b) Explain how fluid friction and eddy current damping occurs?

3a) Explain about moving iron instruments

3b) Explain about moving coil (PMMC) instruments

4a) explain about ammeters

4b) explain about voltmeters

5a) explain the construction and working of wattmeter

5b) explain the construction and working of energy meters

6a)explain the construction of CRO

6b)Explain the working principle of CRO

DEPARTMENT OF CIVIL

QUESTION BANK

\

ELECTRICAL AND MECHANICAL

UNIT-IV

SHORT ANSWER QUESTIONS

1. What do you understand by TDC and BDC?
2. What do you understand by (i) Brake Power; (ii) Specific Fuel Consumption
3. What do you understand by (i) Frictional Power; (ii) Brake Thermal Efficiency
4. What do you understand by (i) Indicated Thermal Efficiency; (ii) Mechanical Efficiency?

LONG ANSWER QUESTIONS

1. Discuss in detail the differences between Four Stroke and Two Stroke engines.

2. A certain engine with a bore of 250 mm has an indicated thermal efficiency of 30%. The brake specific fuel consumption and specific power output are 0.35 kg/kWh and 90 kW/m_2. Find the mechanical efficiency and brake thermal efficiency of the engine. Take the calorific value of the fuel as 42 MJ/kg.

3. Discuss in detail the differences between Spark Ignition and Compression Ignition engines.

4. A four stroke Compression Ignition engine develops a brake power of 368 kW while 73.6 kW is used to overcome the friction losses. It consumes 180 kg/h of fuel at an air-fuel ratio of 20:1. The heating value of fuel is 42000 kJ/kg. Calculate
(i) Indicated Power; (ii) Mechanical Efficiency; (iii) Indicated Thermal Efficiency; (iv) Brake Thermal Efficiency

5. Discuss in detail the differences between Renewable and non Renewable energy resources.

6. What are the important basic components of an Internal Combustion engine? Explain them briefly.

UNIT-V

SHORT ANSWER QUESTIONS

1. Explain the distinction between Absorptivity and Reflectivity
2. Define Efficiency and Effectiveness of a Fin.
3. Explain the distinction between Laminar and Turbulent flows.
4. Explain Radiation Intensity of a Black body.

LONG ANSWER QUESTIONS

1. Explain the effect of extended surfaces on heat transfer. Discuss in detail the classification of fins with neat sketches.

2. A cubical tank of water of volume 1 m^3 is kept at a steady temperature of 65^0C by a 1 kW heater. The heater is switched off. How long does the tank take to cool to 50^0C, if the room temperature is 15^0C

3. Discuss in detail the differences between Forced and Natural Convection.

4. A thin metallic plate is insulated at the back surface and is exposed to the sun at the front surface. The front surface absorbs solar radiation at 900 W/m2 and dissipates it mainly by convection to the ambient air at 300C. If the heat transfer coefficient between the plate and the air is 15 W/m2K, what is the temperature of the plate?
5. Discuss in detail, Fourier's law of Heat conduction. What are the assumptions made?

6. An immersion water heater of surface area 0.1 m^2 and rating 1 kW is designed to operate fully submerged in water. Estimate the surface temperature of the heaterwhen the water is at 40^0C and the heat transfer coefficient is 300 W/m^2K. If this heater is by mistake used in air at 40^0C with heat transfer coefficient of 9 W/m^2K, what will be the surface temperature?

UNIT-VI

SHORT ANSWER QUESTIONS

1. What is a Worm and a Worm wheel? Where is it used.
2. What is the difference between Double-Helical and Herringbone gears?
3. Name the different gears used for (i) Parallel shafts; (ii) Intersecting shafts.
4. What do you mean by Initial Tension in a Belt Drive

LONG ANSWER QUESTIONS

1. How is a Lathe specified? Explain with a neat sketch the relevance of each of the specification points.
2. Explain how Brazing is different from welding. Why is Brazing more extensively used in industrial practice?
3. Distinguish between Arc and Gas welding processes from the point of view of Heat concentration, Temperature, Ease of operation and Running cost.
4. What is the requirement of fluxes in Brazing? Give details of some of the fluxes used in brazing with their applications
5. Explain the resistance welding process giving the equipment, parameters controlled and the applications.
6. Distinguish between Brazing and soldering from the point of view of the filler metals used, applications and the strength of the joint obtained.