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KHAJA BANDANAWAZ UNIVERSITY

FACULTY OF ENGINEERING AND TECHNOLOGY
SECOND SEMESTER B.E. DEGREE EXAMINATION - 2020
BASIC ELECTRICAL ENGINEERING (19KBELE25)
(COMMON TO ALL BRANCHES)

Time: 3 Hours   **Max. Marks: 100**

SECTION - A

I.   **Answer any TEN Questions from the following**   **(2 Marks Each)**

Q1. State Ohms Law?

Q2. Define Electromagnetic Induction?

Q3. Define coefficient of coupling and mention its formula?

Q4. Define Power factor?

Q5. Define Average value of current?

Q6. Define Peak factor and mention its numerical value?

Q7. Define voltage Regulation of a transformer?

Q8. Mention the desirable characteristics of a Fuse?

Q9. Define Transformer and mention the principle on which it operates?

Q10. Define Back EMF of a DC motor?

Q11. Define DC motor and mention the principle on which it operates?

Q12. What is the function of commutator in a DC generator?

Q13. Mention the two types of rotor used in 3-Φ Induction motor? Which one is more widely used between the two?

Q14. Define Slip of an Induction motor?

Q15. Define pitch factor and distribution factor with reference to an Alternator.

SECTION – B

II.   **Answer any FIVE Full Questions from the following**   **(8 Marks Each)**

Q1. State and explain Kirchhoff's law?

Q2. A coil consists of 600 turns and a current of 10A in the coil gives rise to a magnetic flux of 1 miliweber. Calculate
    i.   The self inductance
    ii.   The energy stored

iii.   The EMF induced when the current is reversed in 0.01 second

Q3. Explain a pure Inductance (L) circuit with all the relevant figures and necessary equations.

Q4. Obtain the relationship between line and phase currents and voltage in a 3- ø star connection.

Q5. Explain two way control of lamp (staircase wiring)?

Q6. Derive the E.M.F equation of a transformer?

Q7. Derive the torque equation of a DC motor?

Q8. A 3 phase Induction motor is wound for 4-poles and is supplied from a 50 Hz supply. Calculate
      a.   The synchronous speed
      b.   The speed of rotor when the slip is 4%
      c.   The motor frequency when the speed of the rotor is 600 rpm

SECTION – C

III.   Answer any FOUR Full Questions from the following   (10 Marks Each)

Q1. The number of turns in the two coupled coils is 600 and 1700 respectively. When a current of 6A flows in the second coil the total magnetic flux produced in this coil is 0.8 mwb and the flux that links with the first coil is only 0.5 mwb. Calculate L_1, L_2, K and M.

Q2. Show that two wattmeter's are sufficient to measure the total three phase power.
$P=\sqrt{3}.E_L I_L \cos ø$

Q3. A single phase 25 KVA 1000/2000V 50 Hz transformer has maximum efficiency of 98% at full load UPF. Determine its efficiency at
      a.   ¾ full load UPF
      b.   ½ full load 0.8 P.F
      c.   1.25 times full load 0.9 P.F

Q4.
    a. Mention the precautions that need to be taken to avoid electric shock.   **(5Marks)**
    b. With a neat figure explain plate earthing.   **(5Marks)**

Q5.
    a. Explain the necessity of starter for a DC motor   **(5Marks)**
    b. A 4-pole lap connected DC generator has 600 armature conductors and runs at 1200rpm. If the flux per pole is 0.06 wb, calculate the EMF induced. Find also the speed at which it should be driven to produce same EMF when wave connected.   **(5Marks)**

Q6.
    a. Derive the EMF equation of a DC generator   **(5Marks)**
    b. A 6-pole DC motor takes an Armature current of 110 A at 480V. The armature has 864 lap connected conductors. Calculate   **(5Marks)**
      i.   The speed
      ii.   The gross torque developed by the armature

Q7.
    a. A 3-ø, 16 pole alternator has a star connected winding with 144 slots and 10 conductors per slot. The flux / pole is 0.03 wb and the speed is 375 rpm. Find the frequency and the phase and the line EMF. Assume pitch factor as unity and distribution factor as 0.96.   **(6Marks)**
    b. Derive an expression for frequency of Rotor induced EMF.   **(4Marks)**