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Name of Examination : **Winter 2020** - (Preview)

Course Code & Course Name : **EE221U - Electrical Machines and Drives**

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Maximum Marks : **60**   Duration : **3 Hrs**

Edit   Print   View Answer Key   Close   **Answer Key Submission Type:** Marking scheme with model answers and solutions of numerical

Instructions:

1. *All questions are compulsory.*
2. *Illustrate your answer with suitable figures/sketches wherever necessary.*
3. *Assume suitable additional data; if required.*
4. *Use of logarithmic table, drawing instruments and non programmable calculators is allowed.*
5. *Figures to the right indicate full marks.*

1)   Solve all sub-questions

a) Phase Voltage & current of a star connected inductive load is 150 V & 25 A. Power factor of the load is 0.707 lagging. Assuming that the system is 3 wire & power measured   [6]
using two wattmeters, find the readings of wattmeters.

b) Define   [6]
   i)   Candle power
   ii) Luminous efficiency
   iii) Luminous intensity

2)   Solve any two sub-question

a) Explain the three point starter used for D. C. motor.   [6]

b) A d.c. generator has an armature e.m.f. of 100 V when useful flux per pole is 20 milliwebers & speed is 800 r.p.m. Calculate the generated e.m.f.   [6]
   i) with same flux & speed of 1000 r.p.m.,
   ii) with flux per pole is 24 milliwebers & speed of 900 r.p.m.

c) Derive the expression of torque equation of DC motor.   [6]

3)   Solve any two sub-question

a) Explain the losses taking place in transformer in detail.   [6]

b) Derive the EMF equation of single phase transformer.   [6]

c) A 300 kVA, 1Ø, transformer has iron losses of 1.9 kW. The full load copper loss is 2100 W. Calculate;   [6]
   i) Efficiency at full load with 0.8 lagging p.f.
   ii) kVA supplied of maximum efficiency.
   iii) Maximum efficiency at 0.8 lagging p.f.

4)   Solve any two sub-question

a) Draw & explain Torque and Slip Characteristic of 3-phase induction motor   [6]

b) A 4-pole, 3-phase induction motor operates from a supply whose frequency is 50 Hz. Calculate ;   [6]
   i) Speed at which the magnetic field of the stator is rotating.
   ii) Speed of the rotor when the slip is 0.04.
   iii) Frequency of the rotor currents when the slip is 0.03.

c) Explain the Hunting of synchronous motor.   [6]

5)   Solve all sub-questions

a) A stepper motor has a step angle of 2.5°. Determine;   [6]
   i) Resolution
   ii) Number of steps required for the shaft to make 25 revolutions and
   iii) Shaft speed, if the stepping frequency is 3600 pps.

b) Explain the DC Servomotor in detail   [6]

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