Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – Nov/Dec – 2016**

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|  |  | **Semester :** | **2016-17 ODD** |
| **Code :** | **14EE3007** | **Duration :** | **3hrs** |
| **Sub. Name :** | **GENERALIZED THEORY OF ELECTRICAL MACHINES** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Generalize the voltage equations for Kron’s Primitive machine in matrix form and identify the observations are made from the impedance matrix of this machine. | CO1 | 14 |
| b. | Originate an expression of transformer voltage and speed voltage in the armature of an electrical machine. | CO1 | 6 |
| (OR) | | | | |
| 2. |  | Formulate an expression for the electrical torque of the Kron’s Primitive machine. Show that no torque is produced by interaction between the flux and current on the same axis. | CO1 | 20 |
| 3. |  | A three phase Induction motor has the following per phase parameters referred to stator:  Stator resistance ---- 0.30 ohm  Rotor resistance ---- 0.45 ohm  Stator and rotor leakage reactance ---- 2.1 ohm each  Magnetizing reactance ---- 30.00 ohm  Calculate the parameters of an equivalent 2-phase Induction motor if it’s per phase turns are:  i. same as that of the 3-phase Induction motor.  ii. 3/2 times that of the 3-phase Induction motor.  iii. √3/2 times of the 3-phase Induction motor | CO1 | 20 |
| (OR) | | | | |
| 4. | a. | In order to ensure power invariance in transforming one set of variables to another, show that the transpose of the transformation matrix should be equal to its inverse. | CO1 | 10 |
| b. | Demonstrate the term ‘Linear transformation’ as used in electrical machines? Illustrate your answer with suitable examples. | CO1 | 10 |
| 5. |  | The separately excited d.c. generator running at 4500 / π rpm, has the following parameters: rf = 80 Ω; Lf = 40 H; ra = 0.1 Ω; La = 0.3 mH; Motional Inductance Md = 0.8 H; (or generated e.m.f constant Kg = Md ώr = 120 volts / field amp)  a. The field is unexcited and the armature is open. Find the armature voltage as a function of time and sketch it, if a constant voltage of 160 volts is suddenly impressed across the field terminals.  b. Dramatize the rise of armature current in part (a), if the armature terminals are initially short circuited.  c. Armature voltage has attained steady value in part (a). Now the armature is suddenly connected to a load of resistance 1.1 Ω in the series with an inductance of 1.7 mH. Conclude (i) armature current and (ii) the armature terminal voltage as functions of time.  d. In part (c), calculate the electrical torque as a function of time. Obtain the mean value of torque also. | CO2 | 20 |
| (OR) | | | | |
| 6. |  | Paraphrase the principle of regenerative braking and counter current braking of d.c.motors. | CO2 | 20 |
| 7. |  | Develop the three phase induction machine stator and rotor voltage, flux linkages, torque equations in terms of arbitrary qdo reference frame. | CO3 | 20 |
| (OR) | | | | |
| 8. | a. | Investigate the Stator transient inductance of three phase induction machine in detail. | CO3 | 14 |
| b. | Draw the relationship between abc and arbitrary qdo reference frame of Induction machine. | CO3 | 6 |
|  | | **Compulsory:** |  |  |
| 9. | a. | Explain in detail about the steady state operation of Synchronous machine. | CO2 | 10 |
| b. | Develop the sub-transient Inductance of Synchronous machine. | CO2 | 10 |

ALL THE BEST