Reg No.:_____ Name:_____

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

Fifth semester B.Tech degree examinations (S) September 2020

**Course Code: EE311**

**Course Name: ELECTRICAL DRIVES & CONTROL FOR AUTOMATION**

Max. Marks: 100 Duration: 3 Hours

**PART A**

***Answer any three full questions, each carries 10 marks.*** Marks

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|---|---|---|---|
| 1 | a) | Give the classification of dc generators based on their field winding excitation with diagrams. | (5) |
| | b) | What are the applications of dc generator? | (3) |
| | c) | What is meant by critical speed of a dc shunt generator? | (2) |
| 2 | a) | A 6 pole dc shunt generator with 780 wave connected armature conductors and running at 500rpm supplies a load of 12.5 ohms resistance at a terminal voltage of 250 V..The armature resistance is 0.25 ohms and field resistance is 250 ohms. Find the following i)Armature current ii)induced EMF iii)Flux per pole | (4) |
| | b) | Draw and explain load characteristics of dc shunt generator. | (4) |
| | c) | What are the effects of armature reaction in a dc generator? | (2) |
| 3 | a) | Derive an expression for gross armature torque developed by a dc motor. | (3) |
| | b) | Draw and explain torque speed characteristics of dc series motor. | (2) |
| | c) | With the help of a neat sketch explain the load test of a dc shunt motor. | (5) |
| 4 | a) | A 4 pole, 245 V wave connected shunt motor gives 11.19KW power when running at 1000 rpm and drawing armature and field currents of 50A and 0.8A respectively. It has 542 armature conductors. Its resistance is 0.15 ohms. Assuming a drop of 1 volt per brush. Find i) Total torque ii) useful torque iii) rotational losses iv) efficiency | (5) |
| | b) | What are the applications of dc shunt, series and compound motors? | (3) |
| | c) | Explain why we are using starters for starting a dc motor. | (2) |

## PART B

***Answer any three full questions, each carries 10 marks.***

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|---|---|---|---|
| 5 | a) | Draw and explain phasor diagram of a transformer at capacitive load. | (4) |
| | b) | Explain with diagram current transformer and potential transformer. | (6) |
| 6 | a) | The maximum flux density in the core of a 240/3000V,50 Hz single phase transformer is 1.3Wb/$m^2$ . If the EMF per turn is 8Volt. Determine i) primary and secondary turns ii)area of the core | (2) |
| | b) | What do you meant by all day efficiency of a single phase transformer | (2) |
| | c) | Explain open circuit and short circuit test of a single phase transformer with circuit diagrams. | (6) |
| 7 | a) | Differentiate between slipring and squirrel cage induction motors. | (5) |
| | b) | Draw and explain the torque slip characteristics of a three phase induction motor. | (5) |
| 8 | a) | Prove that a three phase supply will produce a rotating magnetic field of constant magnitude in a three phase induction motor. | (5) |
| | b) | What is meant by circle diagram of an induction motor? What are the parameters we get from the circle diagram? | (2) |
| | c) | Explain with diagram auto transformer starting of a three phase induction motor. | (3) |

## PART C

***Answer any four full questions, each carries 10 marks.***

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|---|---|---|---|
| 9 | a) | Explain with diagram the working of universal motor. | (4) |
| | b) | Draw and explain V curves of a synchronous motor. | (3) |
| | c) | What are the methods of starting a synchronous motor? | (3) |
| 10 | a) | How voltage regulation of an alternator is determined by EMF method. Explain. | (8) |
| | b) | Define winding factor of an alternator. | (2) |
| 11 | a) | Single phase induction motor is not self-starting. Justify? | (4) |
| | b) | Explain the working of capacitor start single phase induction motor with diagram. Also list its applications. | (6) |
| 12 | a) | Draw the schematic diagram of a permanent magnet stepper motor and explain its working. | (6) |
| | b) | Draw and explain the torque speed characteristics of a stepper motor. | (4) |

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|---|---|---|---|
| 13 | a) | Explain with schematic diagram the working of a hybrid stepper motor. | (6) |
| | b) | Explain programmable logic controllers with neat diagram. | (4) |
| 14 | a) | Explain the working of a digital controller. | (4) |
| | b) | Write short notes on axis controller and machine tool controller | (6) |

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