| U.S.N. | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|

# B.M.S. College of Engineering, Bengaluru-560019

**Autonomous Institute Affiliated to VTU**

## January / February 2025 Semester End Main Examinations

**Programme: B.E.** **Semester: VI**

**Branch: Electrical and Electronics Engineering** **Duration: 3 hrs.**

**Course Code: 19EE6PE3ED** **Max Marks: 100**

**Course: Control of Electric Drives**

**Instructions**: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.





| | | | UNIT - I | *CO* | *PO* | Marks |
|---|---|---|---|---|---|---|
| 1 | a) | | Describe the Electric drive with a neat block diagram. | *CO1* | *PO1* | **10** |
| | b) | | A motor drives two loads. One has rotational motion. It is coupled to the motor through a reduction gear with a=0.1 and an efficiency of 90 %. The load has a moment of inertia of 10 kg-m² and a torque of 10 N-m. Other load has translation motion and consists of 1000 kg weight to be lifted up at a uniform speed of 1.5 m/s. Coupling between this load and the motor has an efficiency of 85 %. Motor has an inertia of 0.2 kg-m² and runs at a constant speed of 1420 rpm. Determine equivalent inertia to the motor shaft and power developed by the motor. | *CO1* | *PO1* | **10** |
| | | | **OR** | | | |
| 2 | a) | | A drive has the following parameters: J=10 kg-m$^{2,}$ T=100-0.1 N, N-m, passive load torque $T_l$=0.05N, N-m, where N is the speed in rpm. Initially, the drive is operating in a steady state. Now it is to be reversed. For this motor characteristics are changed to T=-100-0.1N, N-m. Calculate the time reversal. | *CO1* | *PO1* | **12** |
| | b) | | Explain the stability of an electric drive. | *CO1* | *PO1* | **08** |
| | | | **UNIT - II** | | | |
| 3 | a) | | With a neat waveform demonstrate the three-phase fully controlled converter control of DC separately excited DC motor when α=60 and α=90. | *CO2* | *PO2* | **12** |
| | b) | | A 220 V, 200 A, 800 rpm DC separately excited motor has an armature resistance of 0.06 Ω. The motor armature is fed from a variable voltage source with an internal resistance of 0.04 Ω. Calculate the internal voltage of the variable voltage source when the motor is operating in regenerative braking at 80 % of the rated motor torque and 600 rpm. | *CO2* | *PO2* | **08** |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | **OR** | | | |
| | 4 | a) | Demonstrate single-phase semi-controlled converter control of DC separately excited DC motor. | *CO2* | *PO2* | **10** |
| | | b) | A 220 V,970 rpm, 100 A DC separately excited motor has an armature resistance of 0.05 Ω. It is braked by plugging from an initial speed of 1000 rpm. Calculate:<br>(i) Resistance to be placed in the armature circuit to limit braking current to `twice the full load.<br>(ii) Braking torque.<br>(iii) Torque required when speed fallen to zero. | *CO2* | *PO2* | **10** |
| | | | **UNIT - III** | | | |
| | 5 | a) | Describe the operation of induction motor when unbalanced voltage is applied. | *CO2* | *PO2* | **10** |
| | | b) | With neat sketch explain the DOL starter used for staring of a 3 Phase induction motor. | *CO2* | *PO2* | **10** |
| | | | **OR** | | | |
| | 6 | a) | Discuss the operation of induction motor when non sinusoidal input is applied. | *CO2* | *PO2* | **08** |
| | | b) | With a neat sketch explain the auto transformer starting of a 3-Phase induction motor. | *CO2* | *PO2* | **12** |
| | | | **UNIT - IV** | | | |
| | 7 | a) | Explain the V/F control of induction motor. | *CO2* | *PO2* | **10** |
| | | b) | With a neat circuit explain the control of induction motor by using Voltage source inverter. | *CO2* | *PO2* | **10** |
| | | | **OR** | | | |
| | 8 | a) | With a neat diagram explain the CSI fed induction motor. | *CO1* | *PO1* | **10** |
| | | b) | With a neat sketch explain the static Kramer drive. | *CO1* | *PO1* | **10** |
| | | | **UNIT - V** | | | |
| | 9 | a) | With a neat diagram explain the construction and working of a BLDC motor. | *CO3* | *PO3* | **10** |
| | | b) | Explain the designing of a drive system for Rolling mills. | *CO3* | *PO3* | **10** |
| | | | **OR** | | | |
| | 10 | a) | With a neat diagram explain the construction and working of a SRM motor. | *CO3* | *PO3* | **10** |
| | | b) | Explain the designing of a drive system for Rolling mills. | *CO3* | *PO3* | **10** |

**********