2017-18
B. E. (WINTER SEMESTER) EXAMINATION
ELECTRICAL DRIVES
EEE-413N

Maximum Marks: 60 Credits: 04 Duration: Two Hours

Answer all the questions.
Assume suitable data if missing.
Notations used have their usual meaning.

1(a) Discuss about the modulator in an electrical drive system. (06)

(b) A drive has following equations for motor and load torques
   \[ T = 1 + 2\omega_m \] and \[ T_L = 3\sqrt[3]{\omega_m} \]
   Obtain the equilibrium points and determine the steady state stability. (06)

2 A 220V, 500 A, 600 rpm separately excited motor has armature and field resistance of 0.02 and 10 \(\Omega\) respectively. The load torque is given by the expression, \(T_L = 2000 - 2N\) N/m where N is the speed in rpm. Speeds below the rated are obtained by armature voltage control and speeds above are obtained by field control.
   (a) Calculate motor terminal voltage and armature current when the speed is 450 rpm. (12)
   (b) Calculate motor terminal voltage and armature current when the speed is 750 rpm.

OR

2' A 200V, 875 rpm, 150A, separately excited dc motor has an armature resistance of 0.06 \(\Omega\). It is fed from a single phase fully controlled rectifier with an ac source voltage of 220V, 50 Hz. Assuming continuous conduction, Calculate
   (a) firing angle for rated motor torque and 750 rpm
   (b) firing angle for rated motor torque and -500 rpm.
   (c) motor speed for \(\alpha=160^\circ\) and rated torque

3 With the help of suitable diagram explain the working of a rectifier fed separately excited dc motor closed loop speed control scheme for control below and above base speed (12)

4(a) Mention six methods of speed control of induction motor? Which of them are used for wound rotor motor? (04)
(b) What are the various methods of braking of an induction motor? Discuss any one of them.

OR

4' Discuss the V/f method of speed control of an Induction motor. What are its advantages over stator voltage control method of Induction motor?

5 With the help of suitable block diagram explain the working of a closed loop control of static scherbius drive.

OR

5' With the help of suitable block diagram explain the working of a closed loop control of static rotor resistance control drive.
2017-18
B.E. (WINTER SEMESTER) EXAMINATION
ELECTRICAL ENGINEERING
SOLAR ENERGY AND APPLICATIONS
EEE-423

Maximum Marks: 60 Credits: 04 Duration: Two Hours

Answer all the questions.
Assume suitable data if missing.
Notations used have their usual meaning.

Q.No. Question M.M.
1(a) Describe percentage-wise distribution of various components in extraterrestrial radiations with their wavelength range. [06]

1(b) With the help of neat sketch, describe Pyrheliometer used for measurement of beam radiations. [06]

OR

1(b') With the help of suitable diagram, describe Central Tower Receiver Collector. What is its concentration ratio? Which type of collector is it? [06]

2(a) Discuss the effect of various parameters on the performance of liquid flat plate collector. [06]

2(b) Name the techniques those are commonly used for passive cooling of the buildings. With the help of schematic diagram explain a solar passive-space cooling system through dehumidification. [06]

OR

2(b') Name different forms in which process heat is supplied for several industrial process heat requirements. With the help of suitable diagram, describe hot air solar heating system. [06]

3(a) How the electron-hole pair is generated by photon absorption? Also draw ideal and practical equivalent circuit of solar cell. [06]

3(b) Explain the effect of variation of insolation and temperature on the PV characteristics. [06]

OR

3(b') Explain the effect of shadowing on the solar PV cell. [06]

Contd.... 2
4(a) Explain grid interactive inverter with the help of diagram.

4(b) Why charge controller is needed in the PV system? Also explain different set points in charge controller algorithm.

OR

4(b') Explain the precise design methodology of PV system.

5(a) i. What are main drawbacks of Amorphous Silicon solar cell?
    ii. Discuss briefly about the production of silicon wafer.

5(b) Describe manufacturing process of Multicrystalline Silicon Solar Cell.

OR

5(b') Explain the classification of solar cell on the basis of thickness of active material.
2017-18
B.E. (WINTER SEMESTER) EXAMINATION
BRANCH: ELECTRICAL ENGINEERING
POWER QUALITY
EEE-437

Maximum Marks: 60 Credits: 04 Duration: Two Hours

Answer all the questions.
Assume suitable data if missing.
Notations used have their usual meaning.

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<tr>
<th>S.No.</th>
<th>Question</th>
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<tbody>
<tr>
<td>1(a)</td>
<td>How is Power quality related to equipment immunity? Also discuss the criteria for Equipment immunity.</td>
<td>5</td>
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<td>1(b)</td>
<td>A single-phase fully controlled bridge converter is fed from a supply of 230V at 60 Hz at a thyristor firing angle of 30°. Consider continuous load current of 10 A. Compute (a) total harmonic distortion (THD) of AC mains current (b) distortion factor (DF), (c) Power factor (PF).</td>
<td>7</td>
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<td><strong>OR</strong></td>
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<td>1(b)'</td>
<td>For a trapezoidal wave (90° flat portion) of current with an amplitude I of 100A (shown in Fig. 1), calculate (a) crest factor (CF), (b) distortion factor (DF), and (c) total harmonic distortion (THD).</td>
<td>7</td>
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![Fig. 1](graph.png)

2(a) What are the main causes of voltage sag in a Power System? Discuss various methods used for voltage sag mitigation.

**OR**

Contd...
2(b) How Capacitor bank switching and interruption of fault currents can produce Transients in a power system? A 2000 kVAR, 13.8-kV, Y-connected capacitor bank is connected at the end of a 25-mile transmission line with an inductive reactance of 0.5 Ω per mile. Find the natural frequency of the current that would be drawn during turn on.

3(a) A 2000-kVA, 13.8-kV to 480/277-V transformer with a leakage reactance of 6.0% feeding a bus containing two 500-hp adjustable speed drives. A 750-kVAR Y-connected capacitor bank is installed on the 480-V bus for power factor correction. Perform an analysis to determine the conditions for harmonic resonance.

3(b) What are ill effects of Current and Voltage Harmonics on AC motors?

OR

3(b)' Differentiate between the working of Active and Passive Power Filters for harmonic mitigation.

4(a) What are the benefits of monitoring Power Quality? What are the parameters on which instruments needed monitoring of Power Quality are choosen?

4(b) Briefly discuss the principle of operation of Dynamic Voltage Restorer (DVR).

5 Write a short note on any two of the following

(a) Distribution Automation
(b) Effects of Grounding on Power Quality
(c) Energy Auditing