GANPAT UNIVERSITY
B. TECH SEM- VI (ELECTRICAL)
REGULAR EXAMINATION APRIL-JUNE 2017
2EE603: ELECTRICAL DRIVES

TIME: 3 HRS

TOTAL MARKS: 60

Instructions: (1) This Question paper has two sections. Attempt each section in separate answer book.
      (2) Figures on right indicate marks.
      (3) Be precise and to the point in answering the descriptive questions.

SECTION- I

Que.-1   **(A)**   Discuss operation of induction motor under unbalanced voltage.   **[05]**

    (B)   A 500 kW, 3-phase,3.3 kv,50 Hz, 0.8(lagging) power factor,4pole,star connected   **[05]** synchronous motor has following data: $XS=15\ \Omega, RS=0$. Rated field current is 10 A. Calculate
      (I) Armature current and power factor at half the rated torque and rated current.
      (II) Field current to get unity power factor at the rated torque.

OR

Que.-1   **(A)**   What are the disadvantages of variable frequency drive? Explain the concept to   **[05]** overcome these limitations.

    (B)   A 440 V, 3- phase, 50 Hz, 6 pole, 945 rpm, delta connected induction motor has   **[05]** following parameters referred to stator : Rs = 2.0 Ω ; R r' = 2.0 Ω; X s =3 Ω; X r' = 4 Ω. When driving a fan load at rated voltage it runs at rated speed. The motor speed is controlled by stator voltage control. Determine motor terminal voltage, current and torque at 800 rpm.

Que.-2   **(A)**   Derive the expression for torque of a salient pole wound field motor with the help of   **[05]** equivalent and neat phasor diagram.

    (B)   Write a brief note on Static Kramer drive.   **[05]**

OR

Que.-2   **(A)**   Explain Static Scherbius drive with necessary diagrams.   **[05]**

    (B)   Describe the closed loop torque control using block diagram.   **[05]**

Que.-3   **Attempt the following questions**

    (A)   Draw and explain slip torque characteristics of Induction motor.   **[04]**

    (B)   Explain electric braking of DC shunt motor.   **[03]**

    (C)   Discuss electric braking of DC series motor   **[03]**

Que.-4 **(A)** A 200 V, 875 rpm, 150 A separately excited motor has armature resistance of 0.06 Ω [05]
This motor is controlled by a single-phase fully-controlled rectifier with an ac source
voltage of 220 V, 50 Hz. Assuming a continuous conduction, calculate
a) Firing angle for rated motor torque and speed = 750 rpm
b) Firing angle for rated motor torque and speed = (-500) rpm
c) Motor speed for α = 160° and rated torque

(B) Draw & Discuss the operation of two quadrant chopper. [05]

OR

Que.-4 **(A)** Why the starter required in DC motors. Draw and explain basic arrangement of starter. [05]

(B) A 220 V, 24 A, 100 rpm, separately excited dc motor has an armature resistance of 2 [05]
Ω. Motor is controlled by a chopper with frequency of 500 Hz and source voltage of
230 V. Calculate the duty ratio for 1.2 times rated torque and 500 rpm.

Que.-5 **(A)** Explain fundamental torque equations and derive loads with translational motion. [05]

(B) A 230V, 1440 rpm, 115 A dc separately excited motor has an armature resistance of [05]
0.06 Ω. It is braked by plugging from an initial speed of 1000 rpm. Calculate
a) Resistance to be placed in armature circuit to limit the braking current to twice
the full load value
b) Braking torque
c) Torque when speed has fallen to zero.

OR

Que.-5 **(A)** Enlist the factors influencing the choice of electric drives. [05]

(B) A motor running at speed N rpm is driving a rotational load L1 directly coupled to its [05]
shaft and another load L2 through a gear to reduce its speed by a factor K. The inertia
of motor and loads L1, L2, are Jm,, J1 and J2 respectively. The load torque of L1 and
L2 are T1 and T2. Find expression for effective inertia and torque on the motor.

Que.-6 **Attempt the following questions**
(A) How can loads be classified as per Speed-Torque curves? [04]

(B) Discuss of close loop speed control scheme are used in multi motor drives? [04]

(C) What are the advantages of electric drive over mechanical drive? [02]

END OF PAPER