

**UNIVERSITY COLLEGE TATI (UC TATI)****FINAL EXAMINATION QUESTION BOOKLET**

COURSE CODE	: BET 4054
COURSE	: DRIVE TECHNOLOGY (FLEXIBEL)
SEMESTER/SESSION	: 1-2023/2024
DURATION	: 3 HOURS

Instructions:

1. This booklet contains 4 questions. Answer **all** questions.
2. All answers should be written in answer booklet.
3. Write legibly and draw sketches wherever required.
4. If in doubt, raise your hands and ask the invigilator.

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO

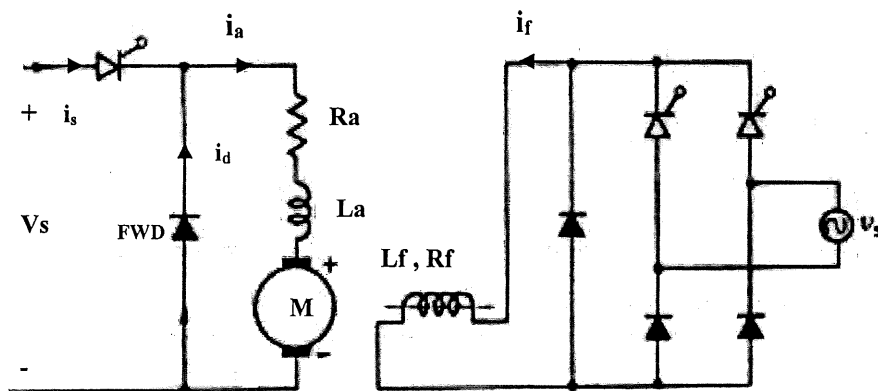
THIS BOOKLET CONTAINS 5 PRINTED PAGES INCLUDING COVER PAGE

QUESTION 1

- a) Define Electrical Drive. (3 marks)
- b) Modern electrical drives offer efficient operation, flexible in application and small in size compared to conventional electrical drives.
- i. Draw the block diagram of modern electrical drives with power electronics element. (5 marks)
- ii. Describe any two (2) components in (i) (4 marks)
- c) Explain operations of quadrant 2 and 4 in 4 quadrants mode of electrical motor including their application in real life. (6 marks)

QUESTION 2

- a) List three (3) class of DC drives. (3 marks)
- b) Describe two (2) methods to control the speed of series dc motor. (4 marks)
- c) Figure 1 shows the DC motor fed by single phase controlled rectifier. Given the emf is 7V and the armature resistance is 17 ohm. Gate current supply to the single phase rectifier at the armature in delay of 60 degree and the $V_{\max}$ 330.41V ac. For the field side, the single phase semi conductor have delay angle of 75 degree, field resistance of 7 ohm and $V_{\max}$ of 330.41V. Calculate the following :
- Armature voltage, V_a . (2 marks)
 - Armature current, I_a . (2 marks)
 - Armature voltage, V_a if the firing angle increase to 80 degree. (3 marks)
 - Field voltage, V_f of the single phase semi conductor. (3 marks)

**Figure 1**

- d) Explain operation of single phase dual converter drive fed dc motor. (10 marks)

QUESTION 3

- a) Explain the operation of induction motor. (4 marks)
- b) State three (3) methods to control speed of induction motor. (3 marks)
- c) Discuss the operation of Variable Frequency Drives (VFD) in controlling speed of induction motor. (6 marks)
- d) Thyristor voltage controller is one of the method used in induction motor drive.
 - i. Draw the circuit of Thyristor Voltage Controller (4 marks)
 - ii. Explain the operation of the circuit in (i) to drive induction motor. (8 marks)
- e) Describe method of constant Volt/Hz in maintaining the speed of the induction motor. (2 marks)

QUESTION 4

- a) Describe the method on control speed of stepper motor (2 marks)
- b) The synchronous machine drive control the speed by varying the frequency in two different modes of operation.
- i. State the two (2) mode of operation in the synchronous machine drive. (2 marks)
 - ii. Explain both mode of operations in b(i). (15 marks)
- c) Explain the operation of the switched reluctance motor. (6 marks)
- d) State three (3) advantages of stepper motor. (3 marks)

-----End of question-----

