



UTHM

Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2018/2019**

COURSE NAME : ELECTRONIC DRIVES AND APPLICATION
COURSE CODE : BND 32703
PROGRAMME CODE : BND
EXAMINATION DATE : JUNE / JULY 2019
DURATION : 3 HOURS
INSTRUCTION : ANSWER FIVE (5) QUESTIONS ONLY

THIS PAPER CONSISTS OF FIVE (5) PAGES

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- Q1** (a) Draw the magnetic flux lines produced by a permanent magnet. (6 marks)
- (b) Demonstrate what will happen if:
- (i) DC shunt motor is connected across AC supply. (4 marks)
- (ii) The back emf of a DC motor vanishes suddenly. (4 marks)
- (c) State **TWO (2)** basic speed control scheme of DC shunt motor. (6 marks)
- Q2** (a) Identify the difference between synchronous generator and asynchronous generator. (4 marks)
- (b) Illustrate a phasor diagram showing resultant stator current at:
- (i) No load condition.
- (ii) Part load condition.
- (iii) Full load condition. (6 marks)
- (c) List **FIVE (5)** advantages and disadvantages of synchronous motors. (10 marks)
- Q3** (a) **Figure Q3(a)** shows the Dynamic (run-up) behaviour of primitive DC motor with no mechanical load.
- (i) Explain the relationship between speed and current in terms of DC motor operation during no load. (6 marks)
- (ii) Describe the influence of resistance on the ability of the motor to maintain speed when load is applied. (6 marks)
- (b) Consider a conductor with resistance of 0.5Ω , carrying a current of 4 A , and moving at a speed such that the motional emf. is 8 V . Calculate:
- (i) Supply voltage.
- (ii) Electrical input power and output power.
- (iii) Motor efficiency. (8 marks)

- Q4** (a) A complete drive system is shown in block diagram form in **Figure Q4(a)**.
- (i) Explain the general function of the system. (4 marks)
 - (ii) Describe the methods of obtaining variable-voltage output from a constant-voltage (Switching Control) with the aid of a diagram. (6 marks)
- (b) **Figure Q4(b)** shows an example of a speed controller motor drives.
- (i) Explain how the speed control works in full load condition. (4 marks)
 - (ii) Distinguish what will happen to the system if the tachometer (TG) is faulty. (6 marks)
- Q5** (a) Name **FOUR (4)** types of DC generator. (4 marks)
- (b) A 50 HP, 250 V, 1200 rpm, DC motor with compensating winding has an armature resistance of 0.06Ω . Its field circuit is separately excited by 200 V, has a field resistance of 50Ω , and an external resistance of 30Ω . which produces a no-load speed of 1200 rpm. There are 1200 turns per pole on the field winding.
- (i) Determine the speed and torque of the motor when the input current is 100A, 200A and 300A respectively. (12 marks)
 - (ii) Based on the speed and torque values determined in Question 5(b)(i), plot the torque-speed characteristic of this motor. (4 marks)
- Q6** (a) A separately excited DC motor (210 V, 900 rpm, 90 A) as in **Figure Q6(a)** has an armature resistance of 0.08Ω . It is fed from a single-phase AC source of 210 V, 50 Hz. Assuming continuous conduction, determine the firing angle to achieve speed of 600 rpm and -600 rpm. (12 marks)
- (b) If you are hired for a job of maintaining DC drives of a manufacturing plant, outline the maintenance plan. (8 marks)

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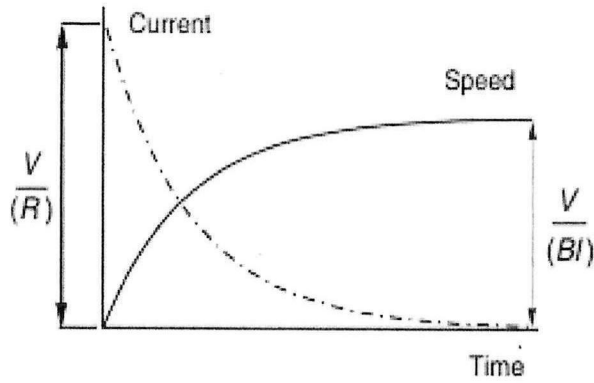


Figure Q3(a)

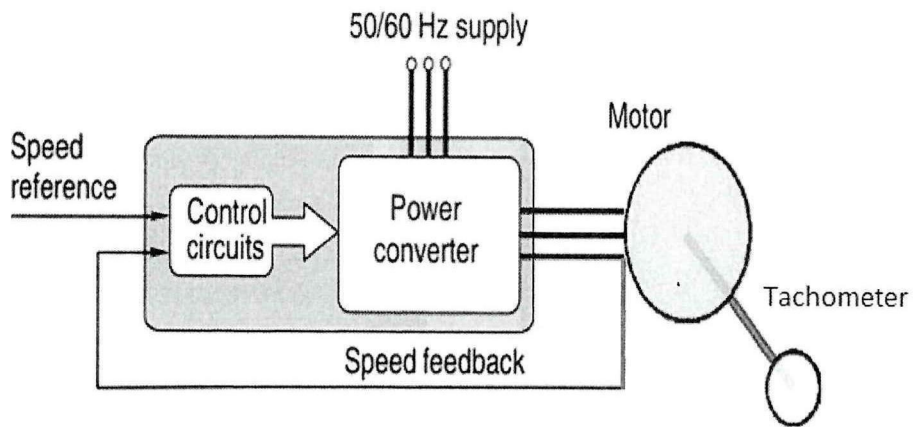


Figure Q4(a)

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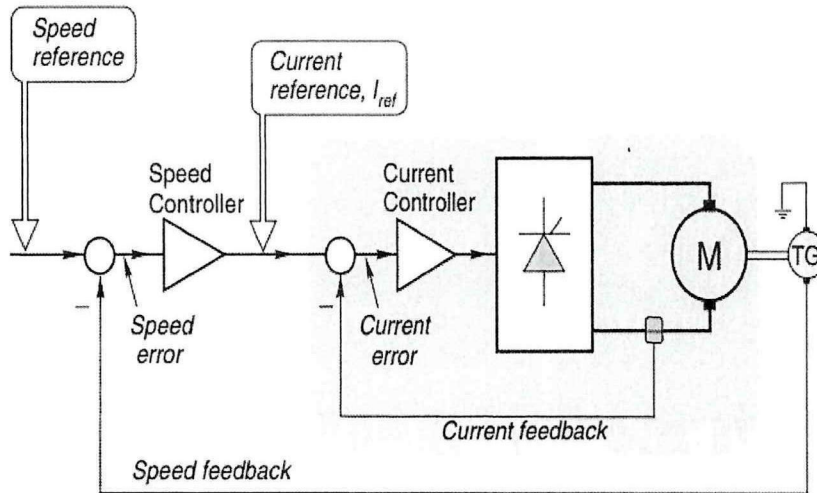


Figure Q4(b)

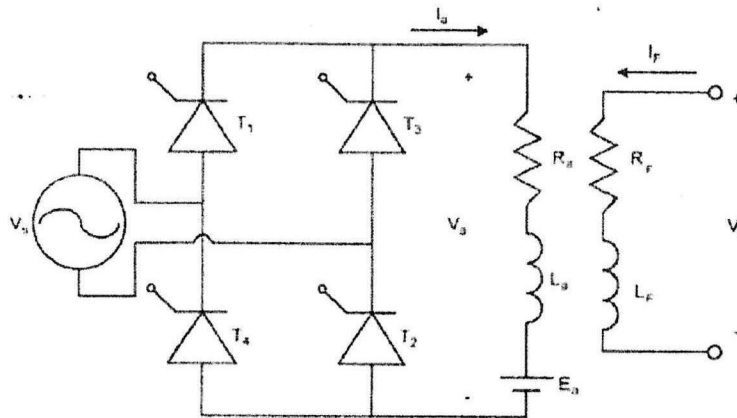


Figure Q6(a)