UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
(TAKE HOME)
SEMESTER I
SESSION 2020/2021

COURSE NAME	:	ELECTRICAL MACHINES AND DRIVES
COURSE CODE	:	DAE 32303
PROGRAMME CODE	:	DAE
EXAMINATION DATE	:	JANUARY / FEBRUARY 2021
DURATION	:	2 HOURS 30 MINUTES
INSTRUCTION	:	ANSWER **ALL (3)** QUESTIONS **OPEN BOOK EXAMINATION**

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES.

Name: **Matrix:** **Sect:**

Q1 (a) Name **four (4)** major parts of the DC generator.

(2 marks)

(b) Give **two (2)** advantages of DC machines

(2 marks)

(c) State the function of the following:-

(i) slip ring in AC generator,
(ii) carbon brush in AC generator.

(4 marks)

(d) If the no-load of a separately excited generator is 240 V at 3,000 rpm, find the voltage if the speed is reduced to 2,500 rpm ?
(Assume constant field excitation)

(4 marks)

(e) Give **three (3)** comparisons between DC series generator and DC series motor .

(6 marks)

(f) Give a reason in real practice of the DC machine, why an input power always greater than an output power.

(2 marks)

(g) State the relationship between power losses and efficiency in the DC machines.

(3 marks)

(h) Give **two (2)** opinion how to reduce the losses in DC machine.

(2 marks)

Q2 (a) (i) State the maximum speed of single-phase induction motor.

(1 mark)

(ii) Give a reason for the answer in **Q2(a)(i).**

(2 marks)

(b) Explain the operating principle of the universal (series) motor.

(4 marks)

(c) Determine the following for the single phase induction motor with the rotor speed, N_r of 2970 rpm and using power supply of 240 V, 50 Hz

(i) synchronous speed, N_S

(2 marks)

(ii) number of poles, p

(2 marks)

(iii) percentage of slip, % S.

(2 marks)

(d) Give **two (2)** reasons why the shaded pole motors are suitable for toys, cassette recorders and clinometer.

(2 marks)

(e) Give **three (3)** reasons why the universal motors are suitable for hand drills, saws and shears.

(3 marks)

(f) Give the relationship between the percentage slip (%S) of the motor, rotor speed (Nr), time consumption, cost and productivity.

(4 marks)

(g) Give **three (3)** reasons why if the percentage slip is greater than 5% is not allowed in industrial applications.

(3 marks)

Q3 (a) Do **four (4)** comparisons between Gate Turn Off Thyristor (GTO) and Insulated Gate Bipolar Transistor (IGBT) based-on voltages, current and switching frequencies.

(4 marks)

(b) State the functions for each of the following:-

(i) DC / DC converters (chopper)

(2 marks)

(ii) AC / AC converters (AC voltage controller)

(2 marks)

(c) Give **two (2)** examples of applications for each of the following:-

(i) AC / DC converters (rectifier)

(2 marks)

(ii) DC / AC converters (inverter)

(2 marks)

(d) Briefly explain the speed control of the DC motor drives using the field flux (current) control method.

(5 marks)

(e) Briefly explain the speed control of the AC motor drives using the pole changing method.

(5 marks)

(f) Give **three (3)** reasons, why the DC motor drives are widely used in industries such as rolling mills, paper mills and textile mills.

(3 marks)

- **END OF QUESTION -**