UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2016/2017

COURSE NAME	:	ELECTRICAL MACHINE
COURSE CODE	:	BBV 30203
PROGRAMME CODE	:	BBE
EXAMINATION DATE	:	JUNE 2017
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

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THIS QUESTION PAPER CONSISTS OF **THREE (3)** PAGES

Q1   (a)   By using a suitable diagram, explain how a DC voltage is generated from a DC generator.

(7 marks)

(b)   Describe the function of the following parts in electrical machinery

(i)   rotor
(ii)   stator
(iii) brush
(iv)   commutator

(8 marks)

(c)   A DC shunt generator supplies a 16 kW load at 220 V through cable of resistance, R = 100 mΩ. If the field winding resistance R_f = 60 Ω and the armature resistance, R_a = 40 mΩ, determine

(i)   the terminal voltage
(ii)   generated e.m.f in the armature

(10 marks)

Q2   (a)   Draw and label the equivalent circuit of DC motor listed below

(i)   shunt-wound motor
(ii)   series-wound motor
(iii) compound-wound motor

(6 marks)

(b)   A 240 V shunt motor takes a total current of 30 A. If the field winding resistance R_f = 150 Ω and the armature resistance Ra = 0.3 Ω, determine

(i)   the armature current
(ii)   back e.m.f
(iii) maximum efficiency of the motor

(9 marks)

(c)   A separately excited DC generator is connected to a 50 Ω load and a current of 8 A flows. The armature resistance is 0.8 Ω and the excitor voltage is 240 V. Calculate

(i)   the terminal voltage
(ii)   the generated e.m.f

(10 marks)

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Q3 (a) Describe type of losses below

(i) copper loss
(ii) iron loss
(iii) windage loss
(iv) friction loss

(8 marks)

(b) A synchronous generator with 4 poles is attached to prime mover. Determine the speed of the generator in order to produce a voltage with frequency of

(i) 50 Hz
(ii) 60 Hz

(4 marks)

(c) Explain the advantages of AC generator compared with DC generator.

(5 marks)

(d) For the large AC three phase generator, it is more practical to rotate the magnetic field and fix armature winding. By using a suitable diagram, explain how the three phase AC voltage is generated by the large three phase generator.

(8 marks)

Q4 (a) By using a suitable diagram, explain the stage of losses for an induction motor.

(7 marks)

(b) A three phase squirrel cage induction motor with 4 poles running 1460 rpm at full load. If the motor supplied by 415 V / 50 Hz, determine

(i) synchronous speed
(ii) slip percentage

(6 marks)

(c) A six (6)–pole three phase, 400 V / 60 Hz induction motor rotate at 1140 rpm. The motor power input is 40 kW and the stator losses is 1 kW. If the windage and friction losses is 2 kW, determine

(i) slip
(ii) rotor copper losses
(iii) mechanical output power
(iv) efficiency

(12 marks)

- END OF QUESTIONS -

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