August 2021

INDUSTRIAL ELECTRONICS-II

Time Allowed: 1.5 Hours *Full Marks: 70*

Answer to Question No. 1 is compulsory and Answer <u>any two</u> questions from the rest.

1. A. Choose the correct answer from the given alternatives (any ten): 2x10

i) A variable reluctance stepper motor is constructed of _____ material with salient poles.
a) Paramagnetic
b) Ferromagnetic
c) Diamagnetic
d) Non-magnetic

ii) A stepper motor having a resolution of 300 steps/rev and running at 2400 rpm has a pulse rate of PPS.
a) 4000
b) 8000
c) 6000
d) 10,000

iii) A chopper may be thought as a-
a) Inverter with DC input
b) DC equivalent of an AC transformer
c) Diode rectifier
d) DC equivalent of an induction motor

iv) A chopper is a-
a) Time ratio controller
b) AC to DC converter
c) DC transformer
d) High speed semiconductor switch

v) The load voltage of a chopper can be controlled by varying the-
a) duty cycle
b) firing angle
c) reactor position
d) extinction angle

vi) The values of duty cycle (α) lies between-
a) $0<\alpha<1$
b) $0>\alpha>-1$
c) $0<=\alpha<=1$
d) $1<\alpha<100$

vii) A type C chopper consists of _____ diodes and _____ switches in anti-parallel.
a) 2, 2
b) 3, 3
c) 4, 4
d) 3, 4

viii) A single phase full bridge inverter has a dc voltage source Vs = 230 V. Find the rms value of the fundamental component of output voltage.
a) 90 V
b) 207 V
c) 350 V
d) 196 V

ix) A single phase full bridge inverter has load R = 2 Ω, and dc voltage source Vs = 230 V. Find the rms value of the fundamental load current.
a) 96 A
b) 0 A
c) 103 A
d) none of the mentioned

x) In a half wave bridge inverter circuit, the power delivered to the load by each source is given by-
a) Vs x Is
b) (Vs x Is)/2
c) 2(Vs x Is)
d) None of the mentioned

xi) A single phase full bridge inverter circuit, has load R = 2 Ω and dc source Vs = 230 V. Find the value of power delivered to the load in watts only due to the fundamental component of the load current.
a) 5361.5 W
b) 2142.5 W
c) 21424.5 W
d) 214.2 W

xii) AC voltage controllers convert-
a) fixed ac to fixed dc
b) variable ac to variable dc
c) fixed ac to variable ac
d) variable ac to fixed ac

xiii) In AC voltage controllers the-
a) variable ac with fixed frequency is obtained
b) variable ac with variable frequency is obtained
c) variable dc with fixed frequency is obtained
d) variable dc with variable frequency is obtained

B. Answer the following questions (any five): 4x5

i) Write down the applications of Hybrid stepper motor.
ii) What is static switch?
iii) Write down the difference between online UPS and Offline UPS?
iv) Draw a circuit for controlling a Dc motor speed.
v) How can u control a speed of an induction motor?
vi) What is servo system?
vii) Write a ladder programming for and EX-OR gate.

2. a) What are the advantages of DC chopper and what are the applications of DC chopper?
b) What is meant by TRC and Duty cycle? 7+8

3. a) Describe the working of four quadrant chopper.
b) What is meant by PWM of a DC Chopper? 7+8

4.	a)	Write down the applications and classifications of Inverter.	
	b)	Explain the operation of single phase VSI Full Bridge with R Load.	7+8
5.	a)	What are the two methods of control in ac voltage controllers?	
	b)	With circuit diagram explain the operation of bridge type step up cycloconverter.	7+8
6.	a)	Explain the operation of 120-degree mode three-phase voltage source inverter (VSI).	
	b)	With block diagram explain the operation of short-break UPS.	7+8
7.	a)	With block diagram explain the operation of battery charger.	
	b)	Write down the working of permanent magnet stepper motor.	7+8
8.		Draw the block diagram of a PLC system and applications of PLC.	7+8