

C.U.SHAH UNIVERSITY

Summer Examination-2018

Subject Name: Power Electronics II

Subject Code: 4TE07PEL1

Branch: B.Tech (Electrical)

Semester: 7

Date: 20/03/2018

Time: 10:30 To 01:30

Marks: 70

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
- (2) Instructions written on main answer book are strictly to be obeyed.
- (3) Draw neat diagrams and figures (if necessary) at right places.
- (4) Assume suitable data if needed.

Q-1 Attempt the following questions:

(14)

- a) In buck-boost converter at 50% duty cycle voltage is
(a) Double (b) Half (c) Zero (d) Constant
- b) In H-bridge 5-level inverter number of DC source required is
(a) five (b) two (c) three (d) one
- c) Effect on flying capacitor when number of level obtained is $+V_{dc}/2$?
(a) Charging (b) No effect (c) discharging (d) both (a)&(c)
- d) Which of the following phase switching sequence represents half-step operation of VR Stepper motor?
(a) A, B, C, A... (b) A, C, B, A... (c) AB, BC, CA, AB... (d) A, AB, B, BC....
- e) Number of clamping diodes of unequal voltage rating per phase is
(a) $2(N-1)$ (b) $N-1$ (c) $3(N-1)$ (d) $(N-1)/2$
- f) The average value of the output voltage in a buck converter is given by
(a) $V_0 = V_s$ (b) $V_0 = D V_s$ (c) $V_0 = V_s / D$ (d) $V_0 = V_s / (1 - D)$
- g) A Switched Reluctance motor differ from VR stepper motor in sense that it as
(a) it has rotor pole of ferromagnetic material (b) rotates continuously (c) it was design for open loop operation (d) has lower efficiency.
- h) Draw only buck converter diagram.
- i) If we required output voltage less than input voltage in buck boost converter, duty cycle should be
a) $D = 0.5$ b) $D < 0.5$ c) $D > 0.5$ d) All of the above
- j) For bidirectional operation of converters
a) Parallel combination of controllable switch and a diode is used.
b) Parallel combination of controllable switch and capacitor is used
c) A series combination of controllable switch and a diode is used
- k) For a buck converter to reduce the conduction losses in diode.....
A) high on - resistance switch can be added in parallel
B) low on - resistance switch can be added in parallel
C) A high on - resistance switch can be added in series
- l) How does the series resonant circuit behave under the resonance condition?
a) Current amplifier b) Trans conductance amplifier c) Voltage amplifier
- m) If a hybrid stepper motor has a rotor pitch of 36° and a step angle of 9° , the number of



its phases must be.....

- a) 4 b) 2 c) 3

n) List the application of Multilevel inverter?

Attempt any four questions from Q-2 to Q-8

- Q-2 Attempt all questions (14)**
- (a) Explain construction and working of stepper motor drive. (07)
- (b) Explain 3-level diode clamped capacitor and advantage and disadvantage. (07)
- Q-3 Attempt all questions (14)**
- (a) Draw the block diagram of online UPS and explain each block the function of each block in detail. (07)
- (b) What is the main function of resonant switch converter? Explain ZCS resonant converter (07)
- Q-4 Attempt all questions (14)**
- (a) The output voltage of the fly back circuit is $V_O=24V$ at a resistive load of $R=0.8 \Omega$. The duty-cycle ratio is $K=50\%$ and the switching frequency is $f=1kHz$ the on-state voltage drop of transistor and diode are $V_T=1.2V$ and $V_d=0.7V$ and turns ratio of transformer is $a=0.25$ Determine (07)
- i) Average input current
- ii) Efficiency
- iii) Average transistor current
- iv) Peak transistor current
- v) RMS transistor current
- vi) Open-circuit voltage.
- (b) Draw and explain 12 pulse converters with circuit diagram. (07)
- Q-5 Attempt all questions (14)**
- (a) Explain operation of forward converter with waveform. (07)
- (b) Explain Bidirectional DC power supplies with diagram. (07)
- Q-6 Attempt all questions (14)**
- (a) Derive the equation for DC-link capacitor voltage balancing. (07)
- (b) Explain operation of push-pull converter with waveform. (07)
- Q-7 Attempt all questions (14)**
- (a) Explain half bridge series resonant inverter with unidirectional switches. (07)
- (b) Explain H-bridge 5-level Inverter with diagram. (07)
- Q-8 Attempt all questions (14)**
- (a) Explain control of Brushless DC Drives. (07)
- (b) Draw the circuit diagram of buck converter and explain its operation with necessary waveforms (07)

