Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2018

Subject Code: 2172410 **Date: 03/12/2018**

Subject Name: Power Electronics Design

Time: 10:30 AM TO 01:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Enlist various attributes of ideal gate drive circuits.	**03**
	(b)	Draw the ideal shape of base drive pulse for power transistor and give circuit configuration to produce such a base drive signal.	**04**
	(c)	Discuss the steps in engineering design process for power electronics with appropriate example	**07**
Q.2	**(a)**	Explain the concept of snubber Circuit.	**03**
	(b)	Discuss importance of isolation for gate drive circuit.	**04**
	(c)	Discuss crow-bar protection scheme using SCR.	**07**
		OR	
	(c)	An inductor is having rectangular core with following dimensions: Ag=Ac= 9 cm2, lg= 0.05 cm., lc= 30 cm., N= 500. μ_r =72300 for core material. Find inductance L of the winding, Where c stands for core; g stands for air gap.	**07**
Q.3	**(a)**	Explain multi-layer PCB in brief.	**03**
	(b)	Explain Baker's Clamp Circuit with diagram and also discuss requirements of it in base driver circuit of Power Transistor.	**04**
	(c)	Write a short note on SCR ratings.	**07**
		OR	
Q.3	**(a)**	Derive the r.m.s value of current whose equation is given by i(t)=5+10cos(wt+30).	**03**
	(b)	Give significance of proportional base control drive and also draw the driver circuit for the same.	**04**
	(c)	Enlist and explain the steps to design a transformer for line frequency power converters.	**07**
Q.4	**(a)**	What is energy equation of inductor ?	**03**
	(b)	Describe the isolated gate driver for SCR with pulse transformer.	**04**
	(c)	Describe the function of PUT with suitable example circuit.	**07**
		OR	
Q.4	**(a)**	Explain characteristics of UJT.	**03**
	(b)	What is di/dt trouble for SCR ? Discuss remedies for the same.	**04**
	(c)	Write a brief note on PCB designing	**07**
Q.5	**(a)**	For a full wave rectifier minimum how many isolated power supplies will be required for driver circuits ? Justify your answer.	**03**
	(b)	Describe the isolated base driver for MOSFET with opto-coupler IC.	**04**

	(c)	The maximum junction temperature of a bipolar junction transistor is $T_{J(max)} = 150°C$ and the maximum power dissipation is 2.0 W at ambient temperature $T_A = 25°C$ and 40 W at case temperature $T_C = 25^0C$. Calculate the maximum allowable power dissipation of the transistor operating in ambient temperature of 50°C in free air environment.	**07**

OR

Q.5	**(a)**	Compare active and passive heat sink.	**03**
	(b)	Explain totem pole configuration of MOSFET drive circuit.	**04**
	(c)	Give the concept of thermal resistance. Describe the analogy between thermal and Electrical quantities.	**07**

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