GUJARAT TECHNOLOGICAL UNIVERSITY

| GUJAKAI ILCIINULUGICAL UNIVERSIII DE GENEETED VIQIEND EVAMINATION GUMMED 2017 | | | | | |
|--|------------|--|-----------------|--|--|
| BE - SEMESTER-VI (NEW) - EXAMINATION - SUMMER 20 Subject Code: 2161006 | | | | | |
| Subject Code: 2101006 Date: 0 | | | | | |
| Subjec | et Na | me: Power Electronics Devices and Circuits | | | |
| Time: | 10:3 | 0 AM to 01:00 PM 7 | otal Marks: 70 | | |
| Instruct | ions: | | | | |
| 1 | 1. At | tempt all questions. | | | |
| | 2. M | ake suitable assumptions wherever necessary. | | | |
| | 3. Fi | gures to the right indicate full marks. | | | |
| | | | | | |
| | | | MARKS | | |
| 01 | | Short Questions | 14 | | |
| Q.1 | 1 | What is a line commutation? | 14 | | |
| | 2 | What is a freewheeling diode and what is its purpose? | | | |
| | 2 | What is difference between rectifier and controlled rectifier? | | | |
| | 3 | | | | |
| | 4 | what is GIU? | | | |
| | 5 | Draw symbol of UJ1. | | | |
| | 6 | What is an inverter? | | | |
| | 7 | What is a latching current of thyristor? | | | |
| | 8 | What is derating factor of series connected thyristor? | | | |
| | 9 | What is difference between SCR and TRIAC? | | | |
| | 10 | What is rectification mode of converters? | | | |
| | 11 | What is extinction angle? | | | |
| | 12 | What is cycloconverter? | | | |
| | 13 | What is motoring mode in DC drives | | | |
| | 14 | Define string efficiency of parallel connected SCRs. | | | |
| Q.2 | (a) | Give classification of thyristors family. Also draw and exp | plain 03 | | |
| | | SCR V-I characteristics. | | | |
| | (b) | List all SCR triggering circuits and explain any one of them i | n 04 | | |
| | | detail using circuit diagram, Waveforms and equations. | | | |
| | (c) | Discuss the various turn on methods of a thyristor. | 07 | | |
| | | OR | | | |
| | (c) | Explain the construction and characteristics of IGBT. | 07 | | |
| Q.3 | (a) | What do you understand by phase control of SCR? | 03 | | |
| | (b) | Explain the working of the Single Phase Full wave converter | with 04 | | |
| | | the help of circuit diagrams and waveforms. | | | |
| | (c) | Draw and explain Three Phase Half wave controlled rect | ifier 07 | | |
| | | with required waveforms and equations. | | | |
| | | OR | | | |
| Q.3 | (a) | List the applications of dc to dc converter. | 03 | | |
| | (b) | Explain the classification of DC converters with the hel | pof 04 | | |
| | | circuit diagram and the quadrant of operation. | | | |
| | (c) | An SCR with latching current of 4 mA is connected | with 07 | | |
| | | inductance of 0.1H and DC source voltage is 100 V. Calcu | ulate | | |
| | | minimum gate pulse width to turn-on SCR. | | | |
| 04 | (a) | How do you classify the inverters? | 03 | | |
| V '' | (h) | Draw and explain two-quadrant type A(class-C) chopper | 04 | | |
| | (c) | Explain the McMurray inverter (auxiliary commutated inve | rter) 07 | | |
| | | with circuit diagram and waveform. | , 07 | | |

| | | UK | |
|-----|----------------|---|----|
| Q.4 | (a) | What is the principle of operation of step-down converter? Explain with circuit diagram and waveforms | 03 |
| | | | |
| | (b) | Draw and explain full bridge invertors with waveforms. | 04 |
| | (c) | A chopper circuit is operating on Time Ratio Control (TRC) | 07 |
| | | principle at a frequency of 2 KHz on a 220V dc supply. If the | |
| | | load voltage is 170 V, calculate the conducting and the blocking | |
| | | period of the power device in each cycle. | |
| Q.5 | (a) | What is UPS? Draw and explain Online UPS system | 03 |
| | (\mathbf{u}) | Explain single phase to single phase evaluation amploying a | 04 |
| | (0) | centre-tapped transformer with resistive load. | 04 |
| | (c) | Draw and explain basic single phase circuit for series DC motor speed control. | 07 |
| | | OR | |
| Q.5 | (a) | Explain speed control by motor resistance for AC drives. | 03 |
| | (h) | Explain three phase to single phase cycloconverter with schematic | 04 |
| | (0) | diagram and waveforms. | •• |
| | (c) | Draw the circuit of battery charging control and explain its | 07 |
| | | working. | |
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