|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |

**C Reg. No. :**

**Question Paper Code: 51P52**

M.E. DEGREE EXAMINATION, NOV 2017

First Semester

Power Electronics and Drives

15PPE102 - ANALYSIS OF POWER CONVERTERS

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART - A (5 x 1= 5 Marks)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. | In a single phase full converter for discontinuous load current and extinction angle b>π, each SCR conducts for | | | | | | CO1- R | | | | |
|  | (a) α+β | | | | (b) β-α | | | | | | |
|  | (c) α | | | | (d) β | | | | | |
| 2. | A fully controlled natural commutated 3-phase bridge rectifier is operating with a firing angle d=30°. The peak to peak voltage ripple expressed as a ratio of the peak output dc voltage at the output of the converter bridge is | | | | | | | CO2 -U | | | |
|  | (a) √3/2 | | (b) | | | (c) √3/2+1 | | (d) None | | | |
| 3. | A step –down chopper is operated in the continuous conduction mode in steady state with a constant duty ratio D. If V0  is the magnitude of the dc output voltage and if Vs is the magnitude of the dc input voltage the V0/Vs is given by | | | | | | | CO3- U | | | |
|  | (a) D | | (b) 1- D | | | (c) 1/(1-D) | | (d) D/(1-D) | | | |
| 4. | A SCR is rated at 75A peak, 20A average. The greatest possible delay in the trigger angle if the dc is at rated value is | | | | | | | CO4 -R | | | |
|  | (a) | | (b) | | | (c) | | (d) | | | |
| 5. | Three phase to three phase cycloconverter employing 18 SCRs  are 36 SCRs have the same voltage and current ratings for their  component thyristors. The ratio of power handled by 36 SCR  device to that handled by 18 SCR device is | | | | | | | CO5- U | | | |
|  | (a) 4 | | | (b) 2 | | (c) 1 | | (d) 1/2 | | | |
|  | PART – B (5 x 3= 15 Marks) | | | | | | | | | | |
| 6. | Define firing angle. CO1-U | | | | | | | | | | |
| 7. | What is meant by operational freewheeling? When do you employ this? CO2-R | | | | | | | | | | |
| 8. | Compare TRC and CLC. CO3-Ana | | | | | | | | | | |
| 9. | What are the advantages of ZVS technique. CO4-R | | | | | | | | | | |
| 10. | Mention the application of Matrix Converter . CO5-U | | | | | | | | | | |
|  | PART – C (5 x 16= 80 Marks) | | | | | | | | | | |
| 11. | (a) | A single phase fulll converter is connected to 230V , 50 Hz source, is feeding a load R=10Ω in series with a large inductance that makes the load current ripple free. For a firing angle of 45 degree, calculate the input and output performance parameters of this converters | | | | | | | CO1- U | (16) | |
|  |  | Or | | | | | | |  |  | |
|  | (b) | Explain the operation of 1φ fully controlled bridge converter with RLE load for Continuous conduction. | | | | | | | CO1- U | (16) | |
|  |  |  | | | | | | |  |  | |
| 12. | (a) | Discuss the continuous and discontinous mode of operation of a 3 phase semi converter with RL load. | | | | | | | CO2- Ana | (16) | |
|  |  | Or | | | | | | |  |  | |
|  | (b) | Discuss the effect of source impedence on the performance of a three phase fully controlled bridge converter and also derive an expression for the output voltage. | | | | | | | CO2- Ana | (16) | |
|  |  |  | | | | | | |  |  | |
| 13. | (a) | Analyse the operation of Boost converter in continuous and discontrinuous mode | | | | | | | CO3-Ana | (16) | |
|  |  | Or | | | | | | |  |  | |
|  | (b) | Analyse the operation of Buck- Boost converter in continuous and  discontrinuous mode | | | | | | | CO3-Ana | (16) | |
|  |  |  | | | | | | |  |  | |
| 14. | (a) | Derive the expression for the RMS output voltage RMS load current and RMS thyristor current of a 1 φ full wave AC voltage controller with RL load. | | | | | | | CO4 -App | (16) | |
|  |  | Or | | | | | | |  |  | |
|  | (b) | Distinguish between on-off control and phase angle control in AC voltage controllers? | | | | | | | CO4 -App | (16) | |
| 15. | (a) | Discuss in detail the operation of 1φ to 3φ cycloconverter with neat diagram. | | | | | | | CO5 -U | (16) | |
|  |  | Or | | | | | | |  |  | |
|  | (b) | With neat sketch and relevanty waveforms , Explain the operation of single step step up cycloconverter. | | | | | | | CO5-U | (16) | |
|  |  | | | | | | | | | | |