Menoufiya University **Faculty of Engineering Shebin El-Kom Final Exam** Academic Year: 2017-2018



... Department: Electrical Engineering. Year: Master. Subject/Code: Design of power electronics circuits **Time Allowed:** 3 hours Date: 8 / 5/2018

Remarks: No. of pages: 2 Assume any required data

No. of questions: 6 Allowed Tables and Charts: (None)

أجب عن الأسئلة التالية (100 درجة) [100Mark] أجب عن الأسئلة التالية (

| <u>Q</u> | uestion (1) (20Marks) | N | Aarks | | | |
|----------|--|-------------|-------|--|--|--|
| | Discus the fault finding procedure in power electronic circuits and fault clearance steps for | | | | | |
| [a] | each section of the circuit? | - | | | | |
| [b] | The thyristor in fig. (1), is used to control power delivered to the load, supply voltage is DC source with 300 V, maximum allowable di/ dt and dv/dt for thristor are 60 a/ μ sec and 250 v/ μ sec respectively. Determine the values of the inductor and snubber circuit components Rs and Cs. | Vin = 400 V | [13] | | | |
| | | Fig. | 1 | | | |

Question (2)

[a]

Marks

| | electronic circuits, after complete the circuit design |
|-----|--|
| [b] | A full bridge single phase inverter shown in |
| | fig.2 used to fed a load with 1 Kw, supplied |
| a | from solar cell system. the load parameters are: |
| | 220 volt, 50 Hz, at duty cycle with turn on time |
| | 0.01 sec. for all switches, power factor 0.85 and |
| | ripple voltage 5 % of output and ripple current |
| | is 20 % of load current. Assume the transformer |
| | loaded by 80 % of full load power. design the |
| | inverter to choose all switches data and |
| | inductance, capacitor at output terminals. |

(25Marks)



| <u>)</u> | nestion (3) (25Marks) Mark | S | | | | | |
|----------|--|------|--|--|--|--|--|
| [a] | Explain the principle of operation of cyclo-converter to control the output frequency to one-third of input frequency? | | | | | | |
| [b] | Design a boost converter shown in fig.3, with input Voltage 12v to produce output constant Voltage 30V and output load current 1.5 amp. which use in design of Solar energy home applications. If the switching frequency is 200 Kh, ripple current at Load terminals is 200 m.amp, and the supply terminals is 500 m.amp. consider the voltage ripple at load terminals is 500 mV, and at the input terminals is 200 mv. Estimate inductance, capacitances value, then choose switches used. Then find the system efficiency. Fig. 3 | [25] | | | | | |

| Question (4) (30Marks) | Mar | ks |
|---|---|------|
| [a] Write the classification of different type of DC chop | per? | [10] |
| We wish to charge a 120 v battery from a 600 v source Using step-down dc chopper. The average battery current Should be 20 A, as shown in fig 4., with a peak to peak ripple current of 2 A. If the chopper switching frequency is 200 Hz. Calculate: - The dc current drawing from source | $\begin{array}{c} & \\ Q1 \\ \hline \\ Vin = 600 v \\ \hline \\ D1 \\ \hline \\ Vb = 120 v \end{array}$ | [20] |
| DC current in the diode - The duty cycle The inductance of the inductor | Fig.4 | |

| | - 5 - 9 | el. | Nat | ional Ac | ademic Refere | nce Stand | dard(NAR | S) | |
|--------------|---------------------------|-------------------------|-----------------------------|------------------------|---------------------|---------------|----------|----------------------|--|
| Field | Knowledge & Understanding | | | Intellectual Skills | Professional Skills | | | General Skills | |
| Course ILOs | a-4-1 | a-8-1 | a-8-2 | a-19-1 | b-2-1 | c-13-1 | c-13-2 | c-17-1 | |
| Question No. | 1(a), 3(b) | 1(b), 3(a), 4(a), | 1(b), 2(a,b), 4(a,b), | 2(a), 3(a), | 3(a), | 1(b), 2(a) | 3(b), | 2(a), 3(a), 4(b), | |

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