

Name:	
Enrolment No:	

**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**End Semester Examination, December 2019**

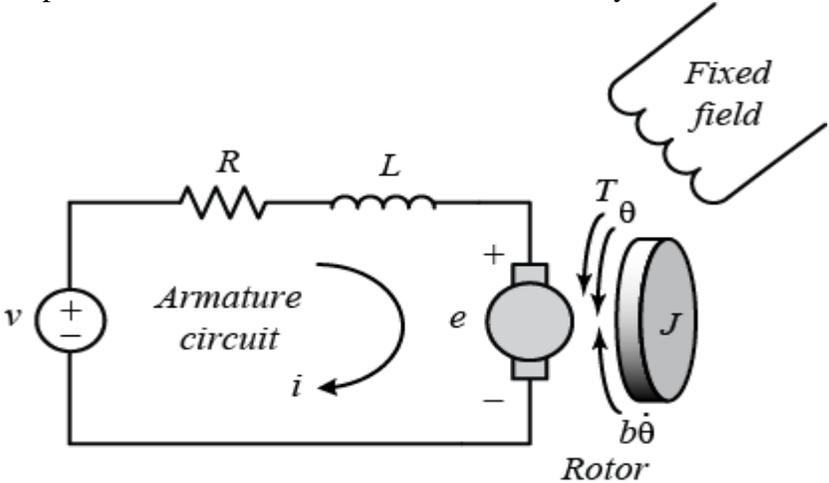
<b>Course: Power Electronics and Drives (EPEG 3006)</b>	<b>Semester: V</b>
<b>Programme: B. Tech (Mechatronics)</b>	
<b>Time: 03 hrs.</b>	<b>Max. Marks: 100</b>
<b>Instructions: All Section are compulsory</b>	

**SECTION A**

S. No.	Question	Marks	CO
Q 1	How the secondary breakdown occurs in Power BJT? Show it on I-V characteristics of Power BJT.	4	CO1
Q 2	What are the control strategies used in DC-DC converters?	4	CO3
Q 3	What are the methods used for control the output voltage of inverter?	4	CO5
Q 4	Describe the different turn-on methods of SCR.	4	CO3
Q 5	Discuss the concept of electric drive. Illustrate your answer with example.	4	CO3

**SECTION B**

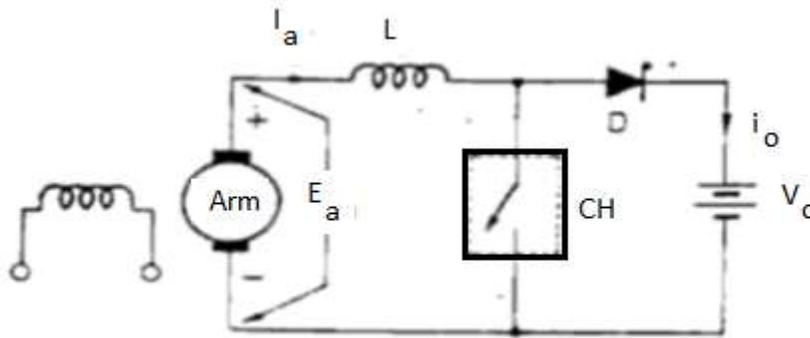
Q 6	Explain the need of commutation in thyristor circuits. What are the different methods of commutation schemes? Discuss Class A commutation circuit with a neat schematic and waveforms.	10	CO4
Q 7	What is current limit control? How does it differ from TRC? Which of these control strategies is preferred over the other and why?	10	CO3

Q 8	<p>Derive the basic performance equations for armature controlled DC motor. Sketch also the characteristics of this motor indicating the two regions of constant-torque mode and constant-power mode. Consider below circuit for analysis.</p> <div style="text-align: center;">  </div>	10	CO5
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Q 9	<p>What are the two main types of inverters? Distinguish between them explicitly. Explain the difference between line-commutated and force-commutated inverters.</p> <p style="text-align: center;"><b>OR</b></p> <p>A single phase full converter, connected from 230 V, 50 Hz source, is feeding a load <math>R= 25 \Omega</math> in series with a large inductance that makes the load current ripple free. For a firing angle <math>30^\circ</math>, calculate the input and output performance parameters of this converter.</p>	10	CO3
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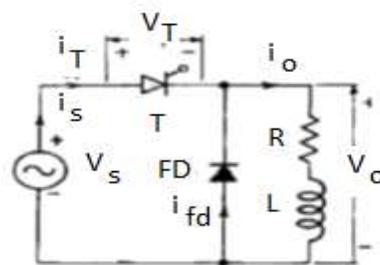
**SECTION-C**

Q 10 A	<p>What is meant by step-up chopper? Explain its operation. Sketch the input voltage, input current, output voltage and output current waveforms. State the various assumption made. How can a step-up chopper be used for the regenerative braking of DC motors? Discuss with below circuit.</p>	12+8	CO5
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Q 10 B	<p>Analyze with appropriate voltage and current waveforms, the working of a single-phase full-converter fed DC drive.</p>	20	CO4
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Q 11	<p>An RL load with freewheeling diode is fed from single-phase supply through a thyristor. Derive an expression for load current in terms of supply voltage, frequency, R, L etc. For this thyristor-load combination, draw waveforms for load voltage, load current, source current and voltage across the thyristor.</p> <p>Hint: Consider below circuit</p>	10+10	CO4
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**OR**

- A) Discuss with relevant waveform, class B commutation techniques employed for thyristor circuits.
- B) With neat characteristics curve explain DIAC and TRIAC operation. List out different condition under which DIAC and TRIAC are used.