

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2018

Course: Power Electronics and Drives (EPEG 3006)

Semester: V

Programme: B. Tech (Mechatronics)

Time: 03 hrs.

Max. Marks: 100

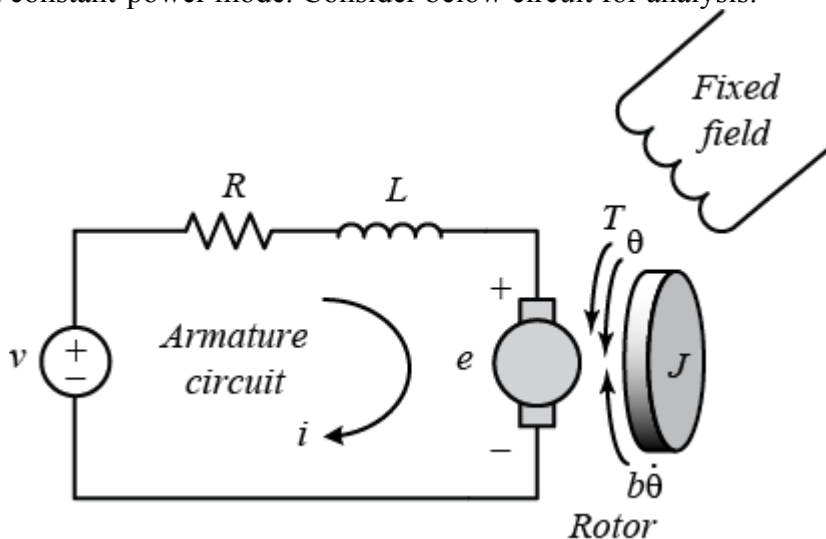
Instructions: All Section are compulsory

SECTION A

S. No.		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	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.	10	CO5

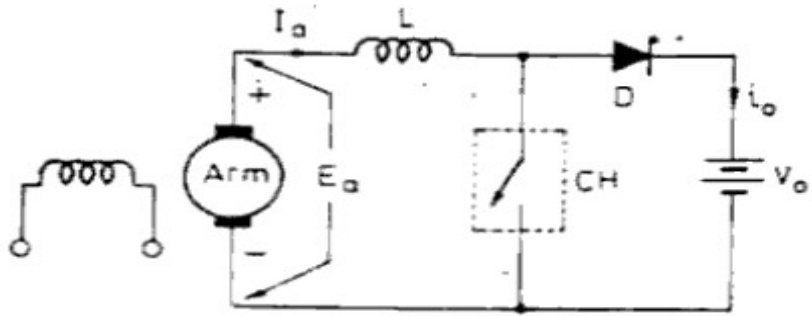


Q 9	What are the two main types of inverters? Distinguish between them explicitly.	10	CO3
-----	--	----	-----

Explain the difference between line-commutated and force-commutated inverters.
OR
 A single phase full converter, connected from 230 V, 50 Hz source, is feeding a load $R= 25 \Omega$ in series with a large inductance that makes the load current ripple free. For a firing angle 30° , calculate the input and output performance parameters of this converter.

SECTION-C

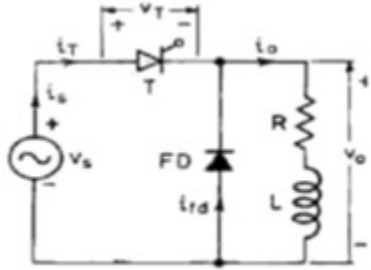
Q 10 A What is meant by step-up chopper? Explain its operation. Sketch the input voltage, input current, output voltage and output current waveforms. State the various assumption made. How can a step-up chopper be used for the regenerative braking of DC motors? Discuss with below circuit.



12+8 CO5

Q 10 B Analyze with appropriate voltage and current waveforms, the working of a single-phase full-converter fed DC drive.

Q 11 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.
 Hint: Consider below circuit



20

CO2

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.

10+10