

Name:	
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2020

Course: Automotive Electrical and electronics system (ECEG 2026) **Semester: III**
Programme: B. Tech (ADE) **Time: 03 hrs.**
Max. Marks: 100
Instructions: All Section are compulsory

SECTION A

S. No.		Marks	CO
Q 1	Clearly differentiate generator with alternator with respect to automotive technology.	5	CO3
Q 2	What is CAN? Briefly explain CAN important features.	5	CO5
Q 3	Explain working of alternator with all the necessary constructional part.	5	CO3
Q 4	Why starting system circuit requires two relay? Clearly explain significance of both starter motor relay and starter control relay.	5	CO2
Q 5	What is cut out in an automobile? What will happen if a cut out is not provided in a DC generator?	5	CO4
Q 6	Discuss the various possible causes and their remedies for the following: [1] Overcharging/ excessive output from alternator/Generator [2] Noisy Generator	5	CO2

SECTION B

Q 7	Explain working of thermocouple. What are the different classification of thermocouple? Consider a Nickel-Chromium thermocouple it was found that $c = 2.75 \times 10^{-2} \text{ mV/}^\circ\text{C}$ and $k = 3.15 \times 10^{-3} \text{ mV/}^\circ\text{C}^2$. If $T_1 = 250^\circ\text{C}$ and the cold junction T_2 is kept at 0°C , compute the resultant electromotive force developed across the thermocouple.	10	CO1
Q 8	Explain working of overrunning clutch system. Sketch and list the component that make up the control and load circuit.	10	CO3
Q 9	With neat diagram, explain working of Bendix drive system.	10	CO5
Q 10	What is armature reaction? With neat diagram, explain working of armature reaction. How armature reaction is eliminated using third brush regulation.	10	CO4
Q 11	Explain charging circuit with neat diagram. Explain current flow diagram from source load in charging system.	10	CO4

SECTION C

Q 12 A What is OBD? Explain important features of OBD.

Q 12 B Design 24-volt series parallel system using appropriate relay to run 24-volt starter motor using two 12-volt batteries. In the design consider two control input to energize

a) Starter switch

b) Thermocouple Switch

10+10

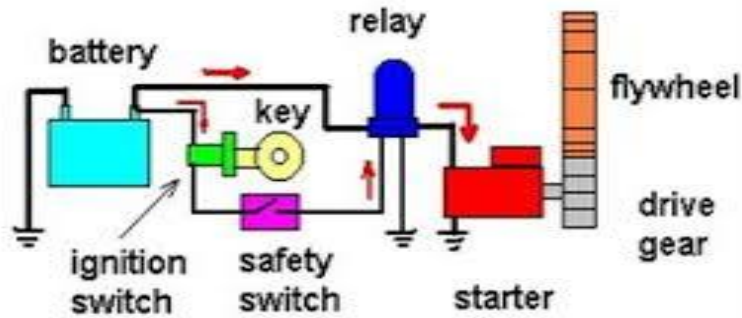
CO5

Q 12

OR

Consider below automotive starting system with following specification and assumption:

- 1) Flywheel attached mass is 15 Kg. (Consist of Crankshaft, pistons, disc and connecting rods of internal combustion engine)
- 2) Flywheel requires 400 RPM to run the IC engine.
- 3) Gear reduction between flywheel ring gear and motor pinion gear is 12: 1
- 4) Starter Motor rating (Efficiency is 80%, Voltage = 12V).
- 5) Flywheel having radius of axle is 15 Centimeter.
- 6) For torque calculation use $T = m \cdot g \cdot r$.



20

CO5

Analyze the system then Calculate the following component:

- i. Power required to run the engine. (Without Loss) (in Horse Power)
- ii. Power required to run the engine. (With Loss) (in Horse Power)
- iii. Mechanical output in watts.
- iv. What should be RPM of the Motor?
- v. How much current required to run the Engine.
- vi. What should be rating of battery to run the engine (CCA rating)?