

Name:

Enrolment No:



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

Course: Automotive Electrical and electronics system (ADEG 213)

Semester: III

Programme: B. Tech (ADE)

Time: 03 hrs.

Max. Marks: 100

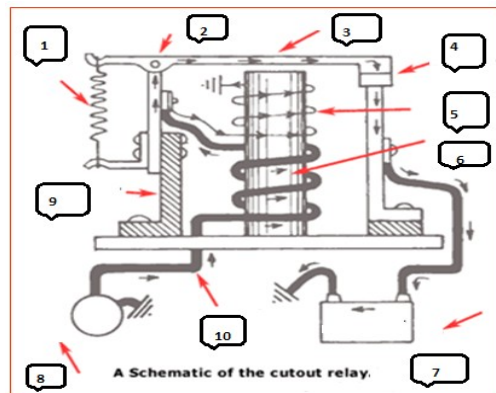
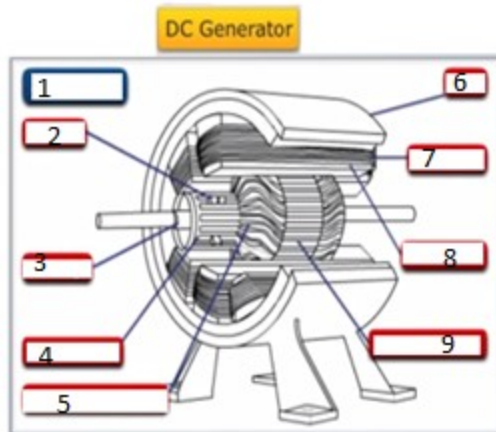
Instructions: All Section are compulsory

SECTION A

S. No.		Marks	CO
Q 1	What is Pukert's law? How long lead acid battery will work if 40 amp hour battery will give 6 A of current. Assume discharge time is 10 hour and Pukert constant is 0.8.	4	CO1
Q 2	What is CAN? List out 4 important features of CAN bus.	4	CO3
Q 3	Explain the purpose of a mass air flow sensor? With neat diagram, explain its working.	4	CO5
Q 4	What is the basic electrical principle governing the operation of an alternator?	4	CO3
Q 5	For what purpose two solenoid are used in a starting circuit.	4	CO3

SECTION B

Q 6 In the below Figure 1 and Figure 2 identify the components of DC generator and cut out relay of an automobile.



10

CO4

Q 7 Describe engagement and disengagement mechanism of overrunning based starter drive system. Why and what is the approximate gear ratio between the cranking motor pinion gear and engine flywheel ring gear.

10

CO3

Q 8 What is cutout in an automobile? With neat diagram, explain working of cutout. What will happen is a cutout is not provided in a DC generator.

10

CO5

Q 9 What is third brush regulation? Elaborate the limitation of armature reaction.

10

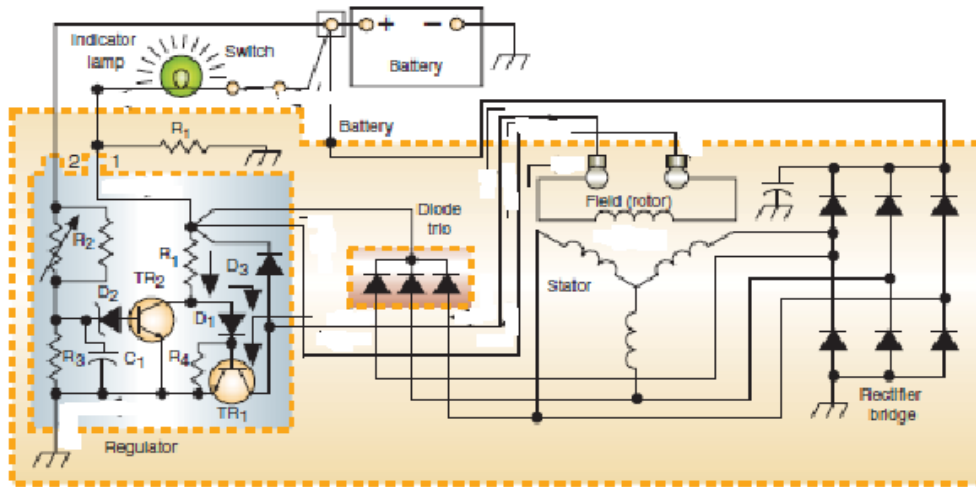
CO3

OR

What are main purpose of temperature sensor in the automobile? Explain different temperature sensing techniques with approximate temperature range.

SECTION-C

Q 10 A In the below figure explain how current is flowing in charging circuit. Apart from that, explain need of major components like Regulator, Diode Trio, stator field winding, rectifier circuit etc.



10+10 CO5

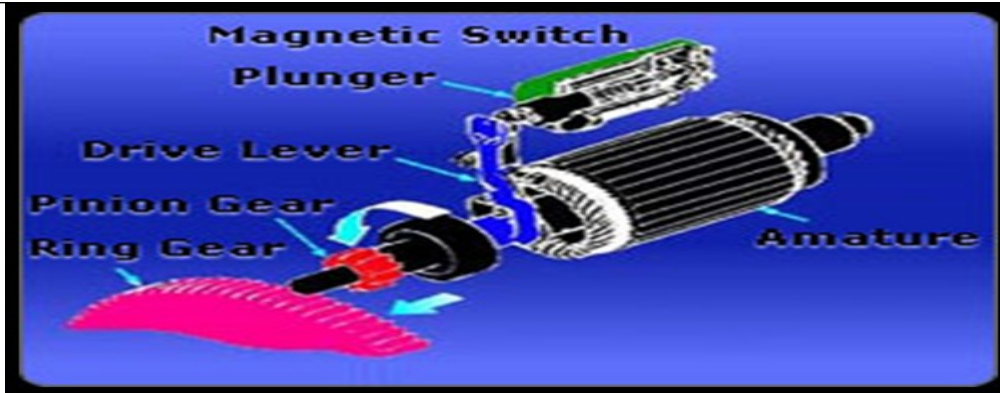
Q 10 B With neat diagram, illustrate the operation of voltage regulator in DC generator.

Q 11 From below diagram assume following data:

Crankshaft weight is 12 Kg. (Consist of Crankshaft, pistons and connecting rods for a typical internal combustion engine)

- ✓ Crankshaft required 300 RPM to start the engine.
- ✓ Gear reduction between flywheel ring gear and motor pinion gear is 15: 1
- ✓ Starter Motor rating (efficiency is 85%, Voltage = 12V).
- ✓ Starter motor shaft diameter is 20 Centimeter.

20 CO2



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)?

OR

For the below figure determine:

- a) Draw Basic Electrical circuit with respect to Voltage, resistor, Inductor, capacitor and Switches.
- b) Assume $L = 40 \mu\text{H}$, $R_{\text{Coil}} = 1.5 \Omega$, Contact Breaker Switching speed = 4000 RPM. Calculate Primary Voltage.

c) If ration of Number of turns between primary and secondary is 1: 15 then Calculate voltage developed across spark plug which is connected across secondary side of Ignition coil.

