Name: **Enrolment No:**	UPES

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

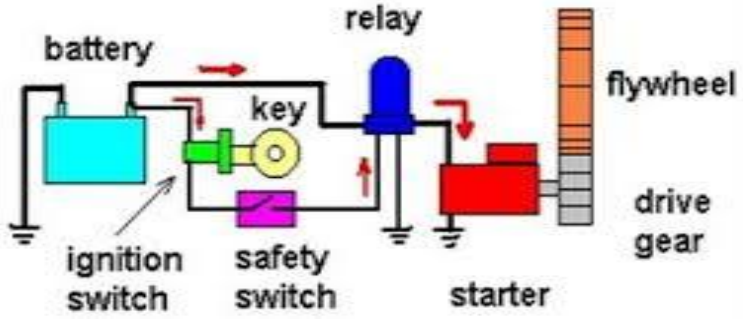
Course: Automotive Electrical and electronics system (ECEG 2026) **Semester: III**
Programme: B. Tech (ADE)
Time: 03 hrs. **Max. Marks: 100**
Instructions: All Section are compulsory

SECTION A

S. No.		Marks	CO
Q 1	During experiments with a copper- constantan thermocouple it was found that c = 3.75 $x\ 10^{-2}$ mV/°C and $k = 4.50x10^{-5}$ mV/°C^2. If T_1 =100°C and the cold junction T_2 is kept in ice, compute the resultant electromotive force across thermocouple.	**4**	**CO1**
Q 2	What is OBD? Briefly explain OBD system used in the vehicle.	**4**	**CO5**
Q 3	With neat diagram, explain the working of accelerator pedal sensor.	**4**	**CO2**
Q 4	What is the approximate gear ratio between the cranking motor pinion and flywheel ring gear? Why it is necessary for the starter pinion to disengage from the flywheel as soon as engine starts?	**4**	**CO3**
Q 5	What is cut out in an automobile? What will happen if a cut out is not provided in a DC generator?	**4**	**CO4**

SECTION B

Q 6	Match the following with suitable option [10×1 =10] a. Third brush regulation b. Electromagnetic induction law c. ECU used in automobile need d. Positive plate e. Negative Plate f. Temperature and Voltage In CCA g. Temperature and Voltage In RC h. Voltage level in spark plug i. Gap in spark plug J. Specific Gravity 1.26 means	1. To overcome armature reaction; 2. When conductor cuts magnetism a voltage is induced in the conductor; 3. Used in series configuration; 4. In kilo Volt ; 5. Uses Pb ; 6. Uses PbO2; 7. 25 deg; 1.75 V; 8. 25 deg; 1.2V; 9. - 18 deg; 1.2 V; 10. Fully Charged; 11. 70% Charged; 12. 0.5 mm to 5 mm; 13. 5 mm to 20 mm; 14. 5-12 AC input; 15. 5-12 DC input; 16. Voltage level is proportional to the rate at which the conductor cuts magnetism; 17. For constant Voltage;	**10**	**CO4**

Q 7	Explain working of overrunning clutch based drive techniques used in conventional automobile with neat diagram. List the component that make up the control and load circuit.	**10**	**CO3**
Q 8	With neat diagram explain working of Bendix drive system.	**10**	**CO5**
Q 9	What is third brush regulation? Elaborate the limitation of armature reaction. **OR** What are main purpose of temperature sensor in the automobile? Explain different temperature sensing techniques with approximate temperature range.	**10**	**CO4**
	SECTION-C		
Q 10 A Q 10 B	Discuss the various possible causes and their remedies for the following: a. No cranking of engine , Light dim slightly b. Overcharging of batteries c. Lamps do not give sufficient illumination d. Low output from alternator/generator 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) Engine Start switch b) Digital thermocouple (temperature) Switch	**10+10**	**CO5**
Q 11	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*g*r. 	**20**	**CO4**

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 Head Light system diagram:

Consider Head Light system in automobile, Shown in below figure if it required 3A of current to turn it ON. If there is dark light detection sensor is installed in vehicle and if vehicle passes through Tunnel modify below circuit on following conditions.

1. The below circuit is not practical circuit, list out different bug in the system circuit and accordingly modify the circuit.

2. Use of Photodiode/Phototransistor for Dark Light Detection in below Circuit and with help of sensor modify the circuit.

3. Use Optocoupler for System protection in below Circuit and accordingly modify the circuit.