UPES SAP ID No.: ___________________

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
Examination, July 2020

Programme: B. Tech	**Semester : 6th**
Course Name: Automobile Engineering	**Max. Marks : 100**
Course Code: MEAD 3010	**Attempt Duration : 3 Hrs.**
No. of page/s: 02	

Note:

1. Read the instruction carefully before attempting.
2. This question paper has two section, Section A and Section B.
3. There are total of six questions in this question paper. **One** in **Section A** and **five** in **Section B**
4. **Section A** consist of multiple choice based questions and has the total weightage of 25%.
5. **Section A** will be conducted online on BB Collaborate platform
6. **Section B** consist of long answer based questions and has the total weightage of 75%. The questions for section B shall also appear in BB Collaborate
7. The maximum time allocated to **Section A** is one Hrs.
8. **Section B** to be submitted within 24 hrs from the scheduled time (*exceptional provision due extraordinary circumstance due to COVID-19 and due to internet connectivity issues in the far-flung areas*).
9. No submission of **Section B** shall be entertained after 24 Hrs.
10. **Section B** should be attempted after **Section A**
11. **Section B** should be attempted in blank white sheets (hand written) with all the details like programme, semester, course name, course code, name of the student, Sapid at the top (as in the format) and signature at the bottom (right hand side bottom corner)
12. Both section A & B should have questions from entire syllabus.
13. The COs mapping, internal choices within a section is same as earlier
14. Assume any missing data, if required (Q2-Q6 only)

Section – A (Attempt all the questions)

(25 × 1 marks)

Q1. MCQs

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Section – B (Attempt all the questions)

(5 × 15 marks)

Q2. A cone which is to be designed for an engine developing 10 kW at 1000rpm. The width of the face may be considered to be 20% of the mean diameter and the cone angle may be taken as 25^{o}. The maximum allowable normal pressure between the contact faces is 80 kPa. Determine the principal dimensions of the clutch and the axial force required. Assume μ=0.25.

Q3. An automobile with 3.0 liters engine accelerates from a standing start up a 6% grade at an acceleration of $2m/s^2$. The curb weights, as obtained from the automobile's specification sheet, are 885 kg on the front axle and 500 on the rearaxle; the wheelbase is 270cm, and front passenger's weight is distributed 49% on the front axle and 51% on the rear axle. Assuming a 90kg driver, and that the CG of the automobile, h=51cm, determine the load distribution in the axles at the given condition.

Q4. Determine the traction limited acceleration for the rear wheel drive passenger car with and without a locking differential on a surface of moderate friction level. The required information is given as; Weights: Front=2100lb, Rear=1850lb, Total=3950lb, CG height=21in, Wheelbase=108in, Coefficient of friction=0.62, Thread=59in, Final drive ratio=2.9, Tyre size 13in radius, Roll stiffnesses front=1150 ft-lb/deg, Rear=280ft-lb/deg.

Q5. An automobile engine developes 38 h.p. at 1500 r.p.m. and its bottom gear ratio is 3.06. If a propeller shaft of 4cm outside diameter is to be used, determine the inside diameter of mild steel tube to be used, assuming a safe shear stress of 562.5 kgf/cm^2 for the mild steel.

Q6. A motor vehicle has a wheelbase of 104.3cm and pivot centre of 106.5cm. The front and rear wheel track is 121.7cm. Calculate the correct angle of outside lock and turning circle radius of the outer front and inner rear wheels when the angle of inside lock is 40^{o}.

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