Name:

Enrolment No:

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2022

Course: Mechanics of Vehicle
Semester: IV
Program: B.Tech ADE **Time : 03 hrs.**
Course Code: MEAD-2008 **Max. Marks: 100**
Instructions:

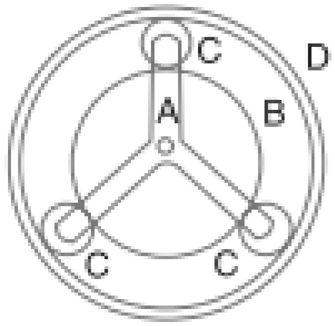
SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Draw line diagram of Reverted Gear Train.	**5**	**CO1**
Q.2	Define following terms A) Pitch Circle of Gear B) Pitch Circle of Cam	**5**	**CO1**
Q.3	Balancing of rotating parts are necessary in vehicle, Justify.	**5**	**CO2**
Q.4	Discuss the three types of instantaneous centers for a mechanism.	**5**	**CO2**

SECTION B

(4Qx10M= 40 Marks)

Q.5	What is the significance of degrees of freedom of a kinematic chain when it functions as a mechanism? Give examples.	**10**	**CO3**
Q.6	What is the difference between ideal mechanical advantage and actual mechanical advantage?	**10**	**CO3**
Q.7	In an epicyclic gear of the 'sun and planet' type shown in Figure, the pitch circle diameter of the internally toothed ring is to be 224 mm and the module 4 mm. When the ring D is stationary, the spider A, which carries three planet wheels C of equal size, is to make one revolution in the same sense as the sunwheel B for every five revolutions of the driving spindle carrying the sun wheel B. Determine suitable numbers of teeth for all the wheels	**10**	**CO2**

	 		
Q.8	Explain three types of constrained motions. Illustrate your answer using neat sketches and example.	**10**	**CO3**
	OR		
Q.9	Explain different kinds of kinematic pairs giving example for each one of them.	**10**	**CO3**
SECTION-C **(2Qx20M=40 Marks)**			
Q 10	A disc cam rotating in a clockwise direction is used to move a reciprocating roller with Uniform acceleration and retardation in a radial path, as given below : A. Outstroke with maximum displacement of 25 mm during 120° of cam rotation, B. Dwell for 60° of cam rotation, C. Return stroke with maximum displacement of 25 mm during 90° of cam rotation, and D. Dwell during remaining 90° of cam rotation. The line of reciprocation of follower passes through the camshaft axis. The maximum radius of cam is 20 mm. If the cam rotates at a uniform speed of 300 r.p.m. find the maximum velocity and acceleration during outstroke and return stroke. The roller diameter is 8 mm. Draw the profile of the cam when the line of reciprocation of the follower is offset by 20 mm. towards right from the cam shaft axis.	**20**	**CO4**
Q.11	Four masses A, B, C and D are attached to a shaft and revolve in the same plane. The masses are 12 kg, 10 kg, 18 kg and 15 kg respectively and their radii of rotations are 40 mm, 50 mm, 60 mm and 30 mm. The angular position of the masses B, C and D are 60°, 135° and 270° from the mass A. Find the magnitude and position of the balancing mass at a radius of 100 mm.	**20**	**CO4**
	OR		
Q.12	Four masses A, B, C and D revolve at equal radii and are equally spaced along a shaft. The mass B is 7 kg and the radii of C and D make angles of 90° and 240°	**20**	**CO4**

	respectively with the radius of B. Find the magnitude of the masses A, C and D and the angular position of A so that the system may be completely balanced.		