

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, May 2023

Course: Autonomous Vehicle System

Semester: II

Program: M.Tech Advanced Vehicle

Time : 03 hrs.

Course Code: MEAV 7009

Max. Marks: 100

Total no of pages:2

**SECTION A
(5Qx4M=20Marks)**

S. No.		Marks	CO
Q 1	List the locomotion mechanism used in autonomous vehicle systems.	4	CO1
Q 2	State the key issues for locomotion in the autonomous vehicle navigation problem.	4	CO1
Q 3	List the possible wheel configuration for rolling mobile vehicle locomotion.	4	CO2
Q 4	State the significance of wheel geometry & maneuverability in autonomous moving vehicle.	4	CO2
Q 5	Discuss the concept of synchro drive for the indoor mobile vehicle applications.	4	CO2

**SECTION B
(4Qx10M= 40 Marks)**

Q 6	Explain the control scheme for the autonomous moving vehicle for the palletising operation.	10	CO3
Q 7	Illustrate the concept of omnidirectional locomotion with four castor wheels and eight motors for autonomous off-road moving vehicle.	10	CO3
Q 8	Discuss the different types of sensors for mobile vehicle.	10	CO3

Q9	<p>Explain the characterising error in the autonomous vehicle navigation in indoor application.</p> <p style="text-align: center;">OR</p> <p>Explain the concept of pinhole camera model while detecting the obstacle in indoor environment.</p>	10	CO4
<p>SECTION-C</p> <p>(2Qx20M=40 Marks)</p>			
Q 10	Describe the wheel kinematic constraints of the steered standard wheel of the outdoor applications.	20	CO4
Q 11	<p>Suppose a differential drive vehicle has wheels of different diameters. The left wheel has diameter 2 inch and the right wheel has diameter 3 inch, $l=5$ inch for both wheels. The vehicle is positioned at $\theta = \pi/4$. The vehicle spins both wheels at a speed of 6 rpm. Compute the vehicle's instantaneous velocity in the global reference frame.</p> <p style="text-align: center;">OR</p> <p>Determine the degree of mobility ,steer ability , and maneuverability for each of the following :</p> <p>(a) bicycle (b)automobile</p>	20	CO4