

Hall Ticket Number :										
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R-19

Code: 19A351T

III B.Tech. I Semester Supplementary Examinations July 2022

Applied Thermodynamics – II
(Mechanical Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

	Marks	CO	Blooms Level
UNIT-I			
1. a) Explain the working of Rankine cycle with the help of P-V & T-S graph.	6M	CO1	L2
b) A simple Rankine cycle works between pressures 28 bar and 0.06 bar, the initial condition of steam being dry saturated. Calculate the cycle efficiency, work ratio and specific steam consumption.	8M	CO2	L4
OR			
2. a) What are the methods, which can lead to increase in thermal efficiency of Ranking cycle?	6M	CO2	L1
b) A steam power plant working on Ranking cycle has the range of operation from 40 bar dry saturated to 0.05 bar. Determine (i) the cycle efficiency (ii) work ratio (iii) specific fuel consumption	8M	CO2	L4
UNIT-II			
3. a) Explain the working of Benson boiler with the help of a neat sketch.	7M	CO2	L2
b) State the difference between the High pressure boilers and low pressure boilers	7M	CO2	L2
OR			
4. a) Discuss the advantages & disadvantages of Natural draught over Artificial draught.	7M	CO2	L2
b) Determine the condition for maximum discharge of hot gases through the chimney.	7M	CO2	L3
UNIT-III			
5. a) Explain the principle involved in calculation of the velocity with which fluid issues from a nozzle assuming frictionless adiabatic flow	6M	CO2	L2
b) Dry saturated steam at 10 bar is expanded isentropically in a nozzle to 0.1 bar using steam tables, find the dryness fraction of the steam at exit, also find the velocity of steam leaving the nozzle when (i) Initial velocity is negligible and (ii) Initial velocity of the steam is 135 m/s.	8M	CO2	L4
OR			
6. a) Derive an expression for velocity of flow through a nozzle	6M	CO2	L3
b) Steam is expanded in a set of nozzles from 10 bar and 200 ⁰ C to 5 bar. What type of nozzle is it? Neglecting the initial velocity find minimum area of the nozzle required to allow a flow 3 kg/s under the given conditions. Assume that expansion of steam to be isentropic	8M	CO2	L4
UNIT-IV			
7. a) What are various sources of air leakage into a steam condenser? How does it affect the performance of the condensing plant?	6M	CO2	L1
b) The air entering a steam condenser with steam is estimated at 6kg per hour. The temperature at inlet to air cooler section is 30 ⁰ C and at the outlet is 26 ⁰ C. The vacuum in the shell is essentially constant throughout and is 721 mm of Hg, while the barometer reads 758mm of Hg. Calculate			
i) The volume of air entering the cooling section per hour			
ii) The mass of moisture contained in the air			
iii) The mass of steam condensed per hour in the cooling section	8M	CO2	L4

OR

8. a) Discuss the merits and demerits of surface condenser and jet condenser, which type is recommended for large plants 6M CO2 L2
- b) A surface condenser is designed to handle 10,000kg of steam per hour. The steam enters at 0.08 bar abs. and 0.9 dryness and the condensate leaves at the corresponding saturation temperature. The pressure is constant throughout the condenser. Estimate the cooling water flow rate per hour, if the cooling water temperature rise is limited to 10°C. 8M CO2 L4

UNIT-V

9. a) What are the conditions for maximum efficiency of a reaction turbine? 6M CO2 L1
- b) In a Delaval turbine, the steam issues from nozzles with a velocity of 850 m/s. The nozzle angle is 20°. Mean blade velocity is 350m/s. The blades are equiangular. The mass flow rate is 1000 kg/min. Friction factor is 0.8. Determine (i) Blade angles (ii) Axial thrust on the end bearing and (iii) Power developed in kW 8M CO2 L4

OR

10. a) Draw the velocity diagram of impulse turbine and find the work done on the blade, blade efficiency 6M CO2 L2
- b) In a 50 percent reaction turbine stage running at 3000 rpm the exit angles are 30° and the inlet angles are 50°. The mean diameter is 1m. The steam flow rate is 10000 kg/min and the stage efficiency is 85%. Determine (i) Power output of the stage (ii) The specific enthalpy drop in the stage (iii) The percentage increase in the relative velocity of steam when it flows over the moving blades 8M CO2 L4

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Hall Ticket Number :

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R-19

Code: 19A353T

III B.Tech. I Semester Supplementary Examinations July 2022

Design of Machine Elements-I

(Mechanical Engineering)

Max. Marks: 70

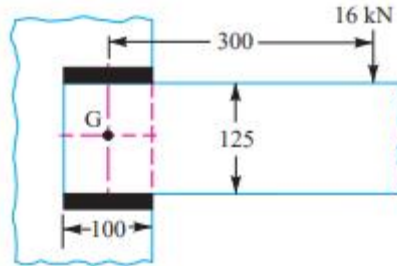
Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5 x 14 = 70Marks)

	Marks	CO	Blooms Level
UNIT-I			
1. a) What are the general considerations in the design of machine elements? Write in brief.	8M	CO1	L2
b) What do you understand by preferred numbers?	6M	CO1	L2
OR			
2. a) A shaft is required to transmit 1 MW power at 240 rpm. The shaft must not twist more than 1° on a length of 15 diameters. If the modulus of rigidity for material of the shaft is 80 GPa, find the diameter of the shaft and shear stress induced.	8M	CO1	L3
b) State various theories of failure and write in brief.	6M	CO1	L2
UNIT-II			
3. a) Define fatigue strength. Explain the factors that affect fatigue strength.	7M	CO2	L1,L2
b) Explain Goodman failure theory.	7M	CO2	L1
OR			
4. A machine member is made of plain carbon steel of ultimate strength 800 N/mm^2 and endurance limit of 400 N/mm^2 . The member is subjected to a fluctuating torsional moment which varies from -300 Nm to 500 Nm . Design the member using (i) modified Goodman's equation and (ii) Soderberg equation.	14M	CO2	L3
UNIT-III			
5. a) Write a short notes on failures of riveted joints with simple sketches	5M	CO3	L3
b) A double riveted lap joint is made between 15 mm thick plates. The rivet diameter and pitch are 25 mm and 75 mm respectively. If the ultimate stresses are 400 MPa in tension, 320 MPa in shear and 640 MPa in crushing, Find the minimum force per pitch which will rupture the joint.	9M	CO3	L3

OR

6. A 125 X 95 X 10 mm angle is welded to a frame by two 10 mm fillet welds as shown in Fig. A load of 16 kN is applied normal to the gravity axis at a distance of 300 mm from the centre of gravity of welds. Find the maximum shear stress in the welds, assuming each weld to be 100mm long and parallel to the axis of the angle.



All dimensions in mm.

14M CO3 L3

UNIT-IV

7. Design a cotter joint to connect two mild steel rods for a pull of 30 kN. The maximum permissible stresses are 55 Mpa in tension; 40 Mpa in shear and 70 Mpa in crushing. Draw a neat sketch of the joint designed.

14M CO4 L3

OR

8. a). Write a short note on types of keys with simple sketches.
b). Name any three types of joints used for coaxial rods. Write about any one with simple diagram.

7M CO4 L1

7M CO4 L1

UNIT-V

9. a). Explain the difference between shaft, axle and spindle.
b). A line shaft rotating at 200 RPM is to transmit 20 KW. The shaft may be made of mild steel with an allowable shear stress of 42 MPa. Determine the diameter of the shaft.

6M CO5 L2

8M CO5 L3

OR

10. Describe with the help of neat sketches, the types of various shaft couplings mentioning the uses of each type.

14M CO5 L3

END

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R-19

Code: 19A35CT

III B.Tech. I Semester Supplementary Examinations July 2022

Industrial Management
(Mechanical Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

Marks CO Blooms Level

UNIT-I

- | | | | | |
|-----------|---|-----|-----|----|
| 1. | Briefly explain the evolution of Management thought. | 14M | CO1 | L1 |
| OR | | | | |
| 2. | a) Distinguish between formal and informal organisation. | 7M | CO1 | L4 |
| | b) Describe the steps involved in the organising process. | 7M | CO1 | L3 |

UNIT-II

- | | | | | |
|----|---|-----|-----|----|
| 3. | a) What do you understand by 'Plant location' and explain the needs for a detailed investigation before selecting the location. | 10M | CO2 | L5 |
| | b) Discuss Weber's theory on industrial location. | 4M | CO2 | L3 |

OR

4. The following details relate to a small project. Construct project network and find critical path. The expected time of each activity is as follows

Sl.no.	1	2	3	4	5	6	7	8	9
Activity	1-2	1-3	2-4	3-4	4-5	5-6	3-5	5-7	6-7
Time (days)	6	8	7	12	3	5	7	11	10

14M CO2 L1

UNIT-III

- | | | | | |
|-----------|--|-----|-----|----|
| 5. | What are the objectives of 'Time study' and how is it organized? | 14M | CO3 | L1 |
| OR | | | | |
| 6. | Enumerate the steps involved in basic work study procedure. | 14M | CO3 | L1 |

UNIT-IV

- | | | | | |
|-----------|--|----|-----|----|
| 7. | a) What are the broad objectives of materials manager in a manufacturing organisation? | 7M | CO4 | L1 |
| | b) How do you apply system concept as a materials management in an organisation? | 7M | CO4 | L3 |
| OR | | | | |
| 8. | a) Distinguish between 'Marketing' and 'selling'. | 7M | CO4 | L4 |
| | b) What are the core concepts of marketing? | 7M | CO4 | L1 |

UNIT-V

- | | | | | |
|-----------|--|-----|-----|----|
| 9. | Critically evaluate different methods of merit rating. | 14M | CO5 | L5 |
| OR | | | | |
| 10. | a) What are functions of personnel Management? | 7M | CO5 | L1 |
| | b) Define Job Evaluation. Explain about any two methods. | 7M | CO5 | L1 |

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Hall Ticket Number :

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R-19

Code: 19A35JT

III B.Tech. I Semester Supplementary Examinations July 2022

Industrial Robotics

(Mechanical Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

Marks CO Blooms Level

UNIT-I

- | | | | | |
|-------|---|----|-----|----|
| 1. a) | Describe with neat sketches types of robot configuration | 7M | CO1 | L2 |
| b) | Discuss the application of gantry and arm type robots in the automobile industry? | 7M | CO1 | L3 |

OR

- | | | | | |
|-------|--|----|-----|----|
| 2. a) | Describe the specifications of an industrial robot and with its configuration. | 7M | CO1 | L2 |
| b) | Briefly explain the need for robots in industries | 7M | CO1 | L3 |

UNIT-II

- | | | | | |
|-------|--|-----|-----|----|
| 3. a) | Explain D-H notations | 4M | CO2 | L2 |
| b) | (i) Consider two frames {A} & {B}. The frame {B} is rotated with respect to frame {A} by 30 degree. around z-axis and the origin of {B} is shifted with respect to the origin of {A} by [5,10,5]. the Z a and Z b axes are parallel point 'p' is described in {B} by (1,2,3). describe the same point with respect to {A} using the transform matrix | 10M | CO2 | L3 |

OR

- | | | | | |
|-------|---|----|-----|----|
| 4. a) | Explain the inverse kinematic analysis of any spatial 3 dof by choosing a link parameter table. | 7M | CO2 | L2 |
| b) | Derive the 4x4 D-H transformation matrix. | 7M | CO2 | L3 |

UNIT-III

- | | | | | |
|-------|--|-----|-----|----|
| 5. a) | A jointed - arm robot of configuration RRR is to move all three axes so that the first joint is rotated through 500, the second joint is rotated through 900 and the third joint is rotated through 250. Maximum speed of any of these rotational joints is 100 mm/s. Ignore effects of acceleration and deceleration. (i) Determine the time required to move each joint if skew motion is used. (ii) Determine the time required to move the arm to the desired position and the rotational velocity of each joint, if joint - interpolation motion is used. | 14M | CO3 | L2 |
|-------|--|-----|-----|----|

OR

6. a) A rotary joint moves from -15° to $+45^\circ$ in 3seconds. Determine the polynomial for a smooth trajectory, if the initial and final velocity and accelerations are zero. 7M CO3 L2
- b) A single cubic trajectory is given by $(t) = 20 + 25 t^2 + 40 t^3$ and is used over a time interval from $t = 0$ to $t = 2$ seconds. What are the starting and final positions, velocities and accelerations? 7M CO3 L3

UNIT-IV

7. a) Discuss various types of sensors used in the robot 7M CO4 L2
- b) What is a stepper motor? Explain. 7M CO4 L3

OR

8. a) Explain the working of hydraulic and pneumatic type actuators. 7M CO4 L2
- b) Discuss about Piezo-electric and infrared sensors. 7M CO4 L3

UNIT-V

9. a) Describe all the types of robot programming used in robotics? 7M CO5 L2
- b) Explain the manual lead through programming in robot application. 7M CO5 L3

OR

10. a) Elaborate applications of robots in machine loading and unloading operations. 5M CO5 L2
- b) Program the robot to pick up two blocks from fixed positions on either side of a center position, and to stack the blocks in the center position. The larger block will always be one side of the centre position and the smaller block will always be other side of the centre position. The smaller block is to be placed on top of the larger block. 9M CO5 L3

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Hall Ticket Number :

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R-19

Code: 19A352T

III B.Tech. I Semester Supplementary Examinations July 2022

Machine Tools

(Mechanical Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

	Marks	CO	Blooms Level
UNIT-I			
1. a) Derive the expression for shear angle in orthogonal cutting in terms of rake angle and chip thickness ratio.	7M	1	L6
b) Determine the cutting speed and machining time per cut when the work piece having 45 mm diameter is rotating at 400 rpm. The feed given as 0.15 mm/rev and length of cut 6cm.	7M	1	L3
OR			
2. a) What are the desirable Characteristics of cutting material? Describe them in brief.	7M	1	L2
b) Define tool wear and explain types of tool wear on cutting tools	7M	1	L1, L2
UNIT-II			
3. a) Differentiate between single spindle and multi spindle automatic lathes.	7M	2	L2
b) Discuss the working of various tool holding devices of lathe.	7M	2	L2
OR			
4. a) Draw the tool layout of Hexagonal head bolt.	7M	2	L2
b) How lathe is specified? Explain briefly the operations that are performed on a lathe.	7M	2	L2
UNIT-III			
5. a) Define a planner? Illustrate and describe its working principle.	7M	3	L1, L4
b) Define indexing? Explain simple indexing?	7M	3	L1, L2
OR			
6. a) Sketch and describe a vertical milling machine.	7M	3	L2
b) With the help of neat sketch explain the radial drilling machine	7M	3	L2
UNIT-IV			
7. a) Sketch and explain the three methods of external cylindrical centre less grinding.	7M	4	L2
b) List the product applications of lapping process.	7M	4	L1
OR			
8. a) Explain different types of abrasives used in grinding wheel.	7M	4	L2
b) Differentiate between buffing and burnishing processes.	7M	4	L2
UNIT-V			
9. a) List the design principles of jigs and fixtures?	7M	5	L1
b) Explain channel jig with neat sketch?	7M	5	L2
OR			
10. a) Discuss about clamping devices?	7M	5	L2
b) Explain turning fixture with neat sketch?	7M	5	L2

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R-19

Code: 19AE41T

II B.Tech. II Semester Supplementary Examinations July/August 2022

Managerial Economics and Financial Accounting

(Common to CE & ME)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

UNIT-I

1. Define managerial economics. Illustrate how it helps in solving managerial problems and explain the nature.

Marks CO Blooms Level

14M CO1 L4

OR

2. What is Elasticity of Demand, Elucidate the types of Elasticity of Demand with graphical representation?

14M CO1 L3

UNIT-II

3. Outline Production function. Describe the factors affecting production function with suitable examples.

14M CO2 L2

OR

4. Determine the Break-even point. What are the assumptions and importance of Break-even analysis?

14M CO2 L3

UNIT-III

5. Explain the following

A) Features of Isoquants

B) Difference between Perfect competition and Monopoly.

7M CO3 L5
7M

OR

6. Differentiate features of Private Limited Company to that of Public Limited Company?

14M CO3 L2

UNIT-IV

7. Define capital Budgeting? Elucidate the various techniques of capital budgeting.

14M CO4 L3

OR

8. Kumar & Co Ltd is contemplating the purchase of machinery. Two machines A and B are available each at Rs. 2,50,000.

Net cash inflows (Amt, in Rs.)

Year	Machine A	Machine B
1	75,000	25,000
2	1,00,000	50,000
3	1,25,000	1,00,000
4	75,000	1,50,000
5	50,000	1,00,000

14M CO4 L3

Calculate NPV @10%

UNIT-V

9. Deliberate the different types of financial ratios in ratio analysis?

14M CO5 L2

OR

10. Classify the financial ratios. With assumed data, illustrate any two types of ratios under each category?

14M CO5 L4

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R-19

Code: 19A35IT

III B.Tech. I Semester Supplementary Examinations July 2022

Rapid Prototyping
(Mechanical Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5 x 14 = 70Marks)

	Marks	CO	Blooms Level
UNIT-I			
1. Give the classification of Rapid Prototyping processes. Differentiate Subtractive Prototyping process and Additive Prototyping process.	14M	CO1	BL1
OR			
2. Describe the importance of magics, mimics, solid view, view expert operations in rapid prototyping software.	14M	CO1	BL1
UNIT-II			
3. Briefly explain the stereo lithography process with neat sketch and what are the process parameters of SLA system that influence the part quality?	14M	CO2	BL2
OR			
4. With the help of simple line diagram explain the construction details of extrusion head in FDM process.	14M	CO2	BL2
UNIT-III			
5. Explain Beam Deposition (LENS) Rapid Prototyping process in detail with neat sketch.	14M	CO3	BL2
OR			
6. State the principle of operation of SLS system. What are different types of materials available for the SLS system? What are their respective applications?	14M	CO3	BL3
UNIT-IV			
7. Distinguish between direct and indirect rapid tooling with classic examples. Write down two automotive applications of Rapid tooling.	14M	CO4	BL3
OR			
8. State the reasons for reverse engineering in Industries. With the aid of suitable example explain the various steps in reverse engineering.	14M	CO4	BL3
UNIT-V			
9. Write short notes on the following. (i) Influence of building orientation (ii) File exchange errors (iii) Errors in SH files (iv) Part building errors.	14M	CO5	BL3
OR			
10. Identify the important RP applications in field of medical and bioengineering. What is the significant role of RP in design and production of medical devices?	14M	CO5	BL2

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R-19

Code: 19A35HT

III B.Tech. I Semester Supplementary Examinations July 2022

Automation and Robotics
(Mechanical Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

Marks	CO	Blooms Level
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UNIT-I

- | | | | | |
|----|---|----|-----|----|
| 1. | a) Define automation. List the need for automation. | 7M | CO1 | L1 |
| | b) Describe about various elements of automation | 7M | CO1 | L2 |

OR

- | | | | | |
|----|---|-----|-----|----|
| 2. | With neat diagrams, explain the different configurations of automated flow lines. | 14M | CO1 | L2 |
|----|---|-----|-----|----|

UNIT-II

- | | | | | |
|----|---|-----|-----|----|
| 3. | What is need for line balancing in assembly processes? Explain the factors which may improve the line performance beyond that what the line balancing algorithms provide. | 14M | CO2 | L2 |
|----|---|-----|-----|----|

OR

- | | | | | |
|----|---|----|-----|----|
| 4. | Outline the following with relevant schematic diagrams: | | | |
| | a) Flexible assembly line. | 7M | CO2 | L4 |
| | b) ANY ONE method for design for automated assembly | 7M | CO2 | L4 |

UNIT-III

- | | | | | |
|----|--|-----|-----|-------|
| 5. | Define robotics. Explain different types of robot configurations. Explain the features of each type with applications. | 14M | CO3 | L1&L2 |
|----|--|-----|-----|-------|

OR

- | | | | | |
|----|--|----|-----|----|
| 6. | a) Explain the different types of grippers. | 7M | CO3 | L2 |
| | b) Explain the components of the robotic system. | 7M | CO3 | L2 |

UNIT-IV

- | | | | | |
|----|--|-----|-----|----|
| 7. | Explain trajectory planning system with reference to robots. | 14M | CO4 | L2 |
|----|--|-----|-----|----|

OR

- | | | | | |
|----|---|-----|-----|----|
| 8. | Derive the forward and reverse transformation of 2-degree of freedom arm. | 14M | CO4 | L3 |
|----|---|-----|-----|----|

UNIT-V

- | | | | | |
|----|---|----|-----|----|
| 9. | a) State the importance of the sensors in robotics. Explain about the Tactile sensors | 7M | CO5 | L2 |
| | b) Explain the working principle of any one position sensor. | 7M | CO5 | L2 |

OR

- | | | | | |
|-----|---|----|-----|----|
| 10. | a) What are the various type of robot programming? Discuss in detail about lead through programming | 7M | CO5 | L2 |
| | b) Explain the working of a stepper motor. | 7M | CO5 | L2 |

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R-19

Code: 19A35ET

III B.Tech. I Semester Supplementary Examinations July 2021

Automobile Engineering
(Mechanical Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

	Marks	CO	Blooms Level
UNIT-I			
1. a) With the help of neat sketches, describe (i) Cylinder Head and (ii) Oil Pan	7M	CO1	L2
b) Describe briefly the various types of chassis construction with the help of suitable diagrams.	7M	CO1	L1
OR			
2. a) Describe the construction and working of a solenoid switch with a neat sketch.	7M	CO1	L2
b) Describe the construction and working of an oil pressure gauge with a neat sketch.	7M	CO1	L2
UNIT-II			
3. How does an automobile contribute towards pollution of the atmosphere? Discuss various methods to reduce the emission of pollutants in exhaust gases.	14M	CO2	L2
OR			
4. List alternative fuels. Explain their merits and demerits comparing with each other.	14M	CO2	L1
UNIT-III			
5. a) Write the function of following in an automobile transmission system: (i) clutch and (ii) gear box	4M	CO3	L1
b) What is an epi-cyclic gear box? Describe its principle with the help of a neat sketch.	10M	CO3	L2
OR			
6. a) Explain the necessity of a differential in an automobile.	4M	CO3	L1
b) Discuss in detail the construction and operation of a differential with a neat sketch.	10M	CO3	L2
UNIT-IV			
7. a) A car with a wheelbase 2.5 m has a pivot centres 1.25 m. The track distance between tyre centre lines is 1.4 m. If the angle of lock is 30° and tyre width is 110 mm, determine the minimum radius of the outer turning circle.	6M	CO4	L3

- b) Explain the following terms:
(i) Camber,
(ii) Castor,
(iii) Steering axis inclination and
(iv) Toe-in

8M CO4 L1

OR

8. a) Describe the method of bleeding of brakes.
b) How is the vacuum from the engine inlet manifold utilized to actuate the vehicle brakes? Explain fully with diagram.

4M CO4 L2

10M CO4 L2

UNIT-V

9. a) What are the safety precautions to follow when working around an airbag?
b) What are the components of an air bag? Explain the function of an air bag with a neat sketch?

6M CO5 L2

8M CO5 L2

OR

10. a) What is the importance of vehicle navigation system? Write the basic features of a navigation system?
b) How does the navigation system work in a car? Explain with a neat sketch.

7M CO5 L2

7M CO5 L2

****END****