**A.K.T MEMORIAL COLLEGE OF ENGINEERING ANDTECHNOLOGY**

 **KALLAKURCHI-606202.**

 **DEPARTMENT OF MECHANICAL ENGINEERING**

**UNIT I (VEHICLE STRUCTURE AND ENGINES)**

**PART-A**

1.Outline the properties of lubrication oil.**(May/June 2011)**

2. Why an engine cooling system is required? **(May/June 2011)**

3. State the basis on which automobile are classified. **(May/June 2012) (May/June 2014)**

4. What is the type of suspension used in heavy duty trucks? **(May/June 2012)**

5. List of the forces acting on a chassis frame. **(May/June 2013)**

6. Define ‘turbo lag’. **(May/June 2013)**

7. What is meant by ‘dump iron’ in frame work? **(Nov/Dec 2013)**

8. State the functions of lubrication. **(Nov/Dec 2013)**

9. What are the advantages of diesel engines in cars? **(May/June 2014)**

10. What is the need for gearbox in an automobile? **(Nov/Dec 2014) (Nov/Dec 2015)**

11. What is chassis? how its design is related to vehicle aerodynamics? **(Nov/Dec 2014)**

12. Name the resistances to vehicle motion. **(Apr/May 2015)**

13. Name the components of engine. **(Apr/May 2015) (Nov/Dec 2016)**

14. Give the typical specifications of an automobile. **(Nov/Dec 2015)**

15. What are the types of cross sectional frames used in automobile? **(May/June 2016)**

16. What are the forces acting in running vehicles? **(May/June 2016)**

17. List the classification of chassis name according to its control method. **(Nov/Dec 2016)**

18. What is frameless construction? **(April/May 2017)**

19. State the functions of push rod and rocker arm. **(April/May 2017)**

**PART – B**

1. Explain the lead acid battery with chemical reaction.(16) **(May/June 2011)**

2. Explain the different lubrication systems and discuss the main parts of the lubrication systems. (16) **(May/June 2011)**

3. Explain with neat sketches the various types of chassis & discuss their advantages and disadvantages.(16) **(May/June 2012)**

4. (i) Explain the main forces which oppose the motion of vehicle.(8) **(May/June 2012)**

 (ii)Explain the effect of power to weight ratio on the performance of an automobile. (8) **(May/June 2012)**

5. Discuss the methods of a vehicle construction in detail.(16) **(May/June 2013)**

6. Describe the cooling & lubrication systems in automotive engine. (16) **(May/June 2013)**

7. Explain briefly about the defects in chassis frame. (16) **(Nov/Dec 2013)**

8. Explain the various sensors used in an electronic engine management systems and their functions. (16) **(Nov/Dec 2013)**

9. Give reasons

 (i) For using single cylinder two stroke petrol engines on two wheelers. (8) **(May/June 2014)**

 (ii) For using multi cylinder diesel engines in commercial vehicles. (8) **(May/June 2014)**

10. List the engine parts ,materials ,method of manufacture and their functions.(16) **(May/June 2014) (Nov/Dec 2015) (April/May 2017)**

11. Explain the different components of the engine and their function.(16) **(Nov/Dec 2014) (Nov/Dec 2015) (May/June 2016)**

12. (i) Explain the resistance to vehicle motion.(8) **(Nov/Dec 2014) (Nov/Dec 2015)**

 (ii) Tabulate the typical metals used for engine parts. (8) **(Nov/Dec 2014)**

13. (i) Discuss the frame type chassis construction with neat sketch. (8)**(Apr/May 2015)**

 (ii) Explain about any two type of stub axles. (8) **(Apr/May 2015)**

15. (i) Discuss the different types of automobiles. (8) **(Nov/Dec 2015)**

16. (i) Draw the layouts of automobile chassis and explain its significance.(8) **(May/June 2016)**

17. (i) Write short notes on the following:

 (a) Crankshaft (b) Valve Mechanism. (8) **(May/June 2016)**

 (ii) What are the functions at Carburetor? (8) **(May/June 2016)**

18. Explain the construction of various chassis frames used in automobile with a neat sketch. (16) **(Nov/Dec 2016)**

19. Explain with suitable sketches and valve timing diagram, the working of a Variable Valve Timing (VVT) system used in automobiles. (16) **(Nov/Dec 2016)**

20. With neat diagram explain components and drive systems in an automobile chassis. (16) **(April/May 2017)**

**UNIT II (ENGINE AUXILIARY SYSTEM)**

**PART-A**

1. What is meant by charging & discharging of a battery? **(May/June 2011)**

2. List the types of injection system. **(May/June 2011)**

3. What are the advantages a common rail direct injection system? **(May/June 2012) (May/June 2013) (Nov/Dec 2015)**

4. What are the methods of turbo charging? **(May/June 2012)**

5. Name the drawbacks of carburetor in multi cylinder engine. **(May/June 2013)**

6. Enumerate the factors which affect battery life. **(Nov/Dec 2013)**

7. Draw a simplified wiring circuit for the lighting system of a car. **(Nov/Dec 2013)**

8. Enlist the limitations of turbo charging. **(May/June 2014)**

9. Write the main requirements of an injector nozzle. **(May/June 2014)**

10. What do you understand by the term DTS-I? **(Nov/Dec 2014)**

11. How does a turbo charger work? **(Nov/Dec 2014)**

12. What is gasoline injection system? **(Apr/May 2015)**

13. What are the functions of a turbo charger? **(Apr/May 2015)**

14. Mention the principle of operation of a distributor type pump. **(Nov/Dec 2015)**

15. Define continuous injection of petrol engine. **(May/June 2016)**

16. State the diesel vehicle emission norms of Euro BS IV in g/Km. **(May/June 2016)**

17. Define intermittent injection of petrol engine. **(Nov/Dec 2016)**

18. Write the Emission norms of Euro BS IV for petrol vehicle (in g/Km). **(Nov/Dec 2016)**

19. Which is most commonly used supercharger in automobile? Why petrol engines are rarely supercharged? **(Apr/May 2017)**

20. Give short note on Unit Injector system. **(Apr/May 2017)**

**PART – B**

1. What are the functions of carburetor, discuss the working of solex carburetor? (16) **(May/June 2011)**

2. Explain the working of lighting system & ignition system of an automotive with neat sketch. (16) **(May/June 2011) (Apr/May 2015) (Nov/Dec 2015)**

3. Explain the following of an injector of a common rail diesel injection system (CRDI). (16) **(May/June 2012) (May/June 2014) (Apr/May 2015)**

4. What are the types of electronic ignition system? Describe any one of them clearly stating its advantages over conventional ignition system.(16) **(May/June 2012)**

5. With a schematic layouts explain the multi point electronic fuel injection system (MPFI).(16) **(May/June 2013) (Nov/Dec 2013)**

6. Describe the working principle of electronic ignition system.(16) **(May/June 2013) (Apr/May 2015) (April/May 2017)**

7. Discuss the construction & working of starting motor for automobiles. (16) **(Nov/Dec 2013)**

8. Explain the following with suitable sketches: (I) rotary distributor type (II) CRDI (16) **(Nov/Dec 2014) (Apr/May 2015)**

9. Explain in detail about the engine emission control by three way catalytic converter system. (16) **(Nov/Dec 2014) (Apr/May 2015) (Nov/Dec 2015)**

10. (i) Brief the modifications to be done in an engine to make it suitable for supercharging. (8) **(May/June 2014)**

 (ii) Write a short note on electronic fuel injection system.(8) **(May/June 2014)**

11. Discuss the principle of operation of a turbocharger with a neat sketch. (8) **(Nov/Dec 2015)**

12. (i) What are the advantages of Transistorized Coil Ignition (TCI) system? (8) **(May/June 2016)**

 (ii) Sketch and explain the Capacitive Discharge Ignition System. (8) **(May/June 2016)**

13. (i) What are the main functions of ECU? (8)

 (ii) Describe the construction details of distributor type diesel fuel injection pump with a sketch. (8) **(Nov/Dec 2016)**

14. (i) What are the types of electronic ignition systems used in SI engine? (8)

 (ii) Draw and explain the circuit diagram of electronic ignition system using a magnetic pick-up method. (8) **(Nov/Dec 2016)**

15. With a neat sketch, explain the working of a turbocharger and state how it differs from superchargers. (16) **(Apr/May 2017)**

**UNIT III (TRANSMISSION SYSTEMS)**

**PART-A**

1. What is the function of a clutch? **(May/June 2011) (Nov/Dec 2015)**

2. Mention any two uses of propeller shaft. **(May/June 2011)**

3. What is a transfer case? **(May/June 2012)**

4. What is a Hotchkiss drive? **(May/June 2012)**

5. List out the disadvantages of floor mounted gear shift mechanism.**(May/June 2013)**

6. Define the term ‘double declutching’ used in sliding mesh gear box. **(May/June 2013)**

7. Differentiate between a live & dead axle. **(Nov/Dec 2013)**

8. How is drive from propeller shaft turned at right angles? **(Nov/Dec 2013)**

9. What is known as one way clutch? **(May/June 2014)**

10. Mention few important causes of axle failures. **(May/June 2014)**

11. What is the function of a flywheel? **(Nov/Dec 2014)**

12. What is 4WD & AWD? **(Nov/Dec 2014)**

13. Name the types of clutches? **(Apr/May 2015)**

14. Why slip joint is important? **(Apr/May 2015)**

15. Mention the purpose of synchromesh mechanism. **(Nov/Dec 2015)**

16. What are the functions of gear box? **(May/June 2016)**

17. What are the functions of differential assembly? **(May/June 2016)**

18. What is the function of the tension spring in the clutch plate? **(May/June 2016)**

19. What is the use of slip joint? **(Nov/Dec 2016)**

20. List the types of automobile clutches. **(Nov/Dec 2016)**

21. What is a free wheel? What is the importance of the free wheel in the transmission of an automobile? **(Apr/May 2017)**

22. Write short note on Panhard rod. **(Apr/May 2017)**

**PART – B**

1. Explain the types of clutch. And with neat diagram explain the working principle of centrifugal clutch. (16) **(May/June 2011)**

2. Describe the working principle of torque converter with a neat diagram.(16) **(May/June 2011) (May/June 2013) (Nov/Dec 2013) (Apr/May 2015)**

3. (i) Explain the construction of a torque tube propeller shaft. (8) **(May/June 2012) (May/June 2016)**

 (ii) Explain the construction & working of a differential with a neat sketch.(8) **(May/June 2012) (May/June 2014) (Apr/May 2015)**

4. (i)Explain the working principle of a fluid flywheel. (8) **(May/June 2012)**

 (ii)Explain the construction & working of a universal joint. (8) **(May/June 2012)**

5. With a neat sketch, explain the working of simple floor mounted gear shift mechanism. (16) **(May/June 2013)**

6. Explain the types of gear boxes in detail with neat sketches. (16) **(May/June 2014)**

7. Explain briefly the following differentials:

 (i) Non- slip differential

 (ii) Double reduction type differential (16) **(Nov/Dec 2013)**

8. (i) Explain the working of friction clutches. What are the assumptions made in pressure calculation? (8) **(Nov/Dec 2014)**

 (ii) Explain the differential of an automobile with a neat sketch. (8) **(Nov/Dec 2014)**

9. Explain in detail the automatic transmission system. (16) **(Nov/Dec 2014)**

10. (i) Discuss about working principle of single plate clutch.(8) **(Apr/May 2015) (Nov/Dec 2015)**

 (ii) Explain about gear shifting mechanism with neat diagram.(8) **(Apr/May 2015)**

11. (i) What are the types of rear axle casting? (8) **(May/June 2016)**

(ii) What are the types of rear axle drive? And explain with a neat sketch. (8)

12. (i) What are the requirements of the clutch? (8) **(May/June 2016)**

13. (i) What are the functions of the transmission system? (8)

 (ii) Sketch and explain the working method of fluid flywheel. (8) **(Nov/Dec 2016)**

14. Describe the line diagram of synchromesh unit and mention the component (spring with ball type system). (16) **(Nov/Dec 2016)**

15. Explain the construction and working principle of a constant mesh gear box with a neat sketch. (16) **(Apr/May 2017)**

16. With a neat sketch explain the Torque tube drive. (16) **(Apr/May 2017)**

**UNIT IV (STEERING, BRAKES & SUSPENSION SYSTEM)**

**PART-A**

1. List the use of suspension systems. **(May/June 2011)**

2. What are the wheel alignment parameters? **(May/June 2011)**

3. Define ‘camber’ & ‘castor’. **(May/June 2013)**

4. Write the functions of steering system in an automobile. **(May/June 2013) (Nov/Dec 2015)**

5. What are the functions of brake lining? **(May/June 2012)**

6. What is steering ratio? **(May/June 2012)**

7. Define the term ‘braking efficiency’. **(Nov/Dec 2013)**

8. State the functions of steering gears. **(Nov/Dec 2013)**

9. What are the disadvantages of having rigid axle suspension? **(May/June 2014)**

10. With regard to steering, what is toe –in & toe-out. **(May/June 2014)**

11. Compare disc & drum brakes. **(Nov/Dec 2014)**

12. List out the different types of steering gear system. **(Nov/Dec 2014)**

13. Name the types of front axles. **(Apr/May 2015)**

14. What is meant by traction control? **(Apr/May 2015) (Nov/Dec 2015)**

15. Name the classifications of brake system. **(May/June 2016)**

16. Name any four types of suspension spring. **(Nov/Dec 2016)**

17. Describe the advantages of steering geometry. **(Nov/Dec 2016)**

18. Give types of stub axle. **(Apr/May 2017)**

19. What is an include angle? **(Apr/May 2017)**

**PART – B**

1.Explain the working of suspension systems and also list the advantages and disadvantages of independent front and rear suspension. (16) **(May/June 2011)**

**2.** (i)Explain the functions of automobile brake system and its requirements. (8) **(May/June 2011)**

 (ii)Briefly explain the brake balance & brake torque. (8) **(May/June 2011) (May/June 2014) (May/June 2016)**

**3.** (i)What the purpose of a steering system? (4) **(May/June 2012) (May/June 2014) (Nov/Dec 2016)**

 (ii)Explain the working of the steering system with neat sketches. (12) **(May/June 2012) (May/June 2014)**

**4.** (i) What are the functions of a front axle? (3) **(May/June 2012) (Nov/Dec 2015)**

 (ii)What is difference between dead front axle & live front axle? (3) **(May/June 2012)**

 (iii)Explain the neat sketches, construction of a front axle. (10) **(May/June 2012)**

**5.** Discuss the working of a diagonal braking system with a layout. Also explain the working of master cylinder in a hydraulic brake. (16) **(May/June 2013)**

**6.** Explain the principle of air suspension system used in buses. (16) **(May/June 2013)**

**7.** Explain independent suspension system with neat sketches. (16) **(May/June 2014)**

**8.** Define and explain the following:

 (i) Camber angle

 (ii) Caster angle

 (iii) King-pin inclination, and

 (iv) Toe-in (16) **(Nov/Dec 2013)**

**9.** (i) What is ‘under steering’ & ‘over steering’? (8) **(Nov/Dec 2013)**

 (ii) Explain briefly with a neat sketch the steering linkage for a conventional rigid axle suspension. (8) **(Nov/Dec 2013) (Nov/Dec 2015)**

**10.** Explain the four parameters of wheel alignment with neat sketches. (16) **(Nov/Dec 2014)**

**11.** Explain the following:

 (i) Power steering

 (ii) ABS

 (iii) Hotchkiss suspension (16) **(Nov/Dec 2014) (Nov/Dec 2015)**

12. Explain the working principle of pneumatic suspension system. (8) **(Apr/May 2015)**

13. Explain the working principle of antilock braking system.(8) **(Apr/May 2015) (Nov/Dec 2015)**

14. Explain the operation of a telescopic type shock absorber. (8) **(Nov/Dec 2015)**

15. (i) List the types of suspension spring used in automobile. (8) **(May/June 2016)**

16. Draw the schematic diagram of pneumatic braking system and explain it. (16) **(May/June 2016)**

17. Describe in detail working method of steering linkage system with suitable sketches. (8) **(Nov/Dec 2016)**

18. (i) What are the requirements of a good braking system? (8)

 (ii) Explain the merits of independent suspension system. (8) **(Nov/Dec 2016)**

19. Explain with a neat diagram steering geometry parameters in an automobile. (16) **(Apr/May 2017)**

20. Explain any one of the front independent suspension system with a neat sketch. (16) **(Apr/May 2017)**

**UNIT V (ALTERNATIVE ENERGY SOURCES)**

**PART-A**

1. What are the alternative energy sources for automobile? **(Nov/Dec 2014)**

2. Why fuel cells are not preferred for automobiles now? **(Nov/Dec 2014)**

3. What are the fuel cells? **(May/June 2011) (Apr/May 2015)**

4. What are the control mechanisms of co emissions? **(May/June 2011)**

5. What are the advantages of compressed natural gas as a fuel in I.C engines? **(May/June 2012)**

6. What are the advantages of fuel cell vehicle? **(May/June 2012)**

7. Name the components used in Antilock Braking System. **(May/June 2013)**

8. Distinguish between parallel hybrid & series hybrid configurations. **(May/June 2013) (Nov/Dec 2015)**

9. Mention the various methods of storing hydrogen. **(Nov/Dec 2013)**

10. Write down the parts of a fuel cell. **(Nov/Dec 2013)**

11. Define energy intensity. **(May/June 2014)**

12. Why is hydrogen called as secondary energy source? **(May/June 2014)**

13. Write down the advantage and disadvantage of Bio-diesel. **(Apr/May 2015)**

14. List the major constituents of natural gas and LPG. **(Nov/Dec 2015) (May/June 2016)**

15. Why alcohol is an alternate fuel for S.I. engine? **(May/June 2016)**

16. What do you understand by the term Hybrid vehicle? **(Nov/Dec 2016)**

17. What is the working principle of Fuel cell? **(Nov/Dec 2016)**

18. What are the merits and demerits of supercritical methanol (SCM) transesterification process? **(Apr/May 2017)**

19. Mention any four types of fuel cells. **(Apr/May 2017)**

**PART – B**

1. Explain the various alternative fuels in automobile. (16) **(May/June 2011)**

2. Explain with neat sketch the working of fuel cell & also its advantages & disadvantages. (16) **(May/June 2011) (Nov/Dec 2013) (Apr/May 2015) (Nov/Dec 2015)**

3. Discuss the performance & emission characteristics of a C.I. engine fuelled with bio-diesel & diesel blends. (16) **(May/June 2012) (Nov/Dec 2015)**

4. Explain the advantages of a hybrid & fuel cell vehicles. (16) **(May/June 2012) (Apr/May 2015)**

5. Write short notes on the following:

 (i) Stabilizers (8)

 (ii) Electric vehicles (8) **(May/June 2013) (Apr/May 2015)**

6. Discuss the functions benefits of airbags used in cars. (16) **(May/June 2013)**

7. Enumerate the advantages & disadvantages of using alcohol as a fuel. (16) **(May/June 2014)**

8. Explain briefly about the history, current uses, process of utilization & advantages of biomass, as a fuel. (16) **(May/June 2014)**

9. Explain the production of natural gas with a neat sketch in detail. (16) **(Nov/Dec 2013)**

10. (i) Compare performance, emission & cost aspects alternate fuels with conventional fuels for automobiles. (8) **(Nov/Dec 2014)**

 (ii) Explain the engine modification required to use alternate fuels in automobiles. (8) **(Nov/Dec 2014)**

11. (i) Briefly explain electric & hybrid vehicles. (8) **(Nov/Dec 2014) (Nov/Dec 2015)**

(ii) Explain solid polymer fuel cell with a neat sketch. (8) **(Nov/Dec 2014)**

12. Explain the working principle of LPG fuelled engines.(8) **(Apr/May 2015) (Nov/Dec 2015)**

13. (i) What are the merits and demerits of LPG as a motor fuel? (8)

 (ii) List the advantages of LNG. (8) **(May/June 2016)**

14. (i) What are the merits and demerits of Hydrogen fuel? (8)

 (ii) Explain the merits of Ethanol fuel. (8)

15. What are the engine modifications to be undertaken in the SI engine for Alcohols or Ethanol as alternate fuel? (16) **(Nov/Dec 2016)**

16. (i) What are the advantages of hybrid electric vehicle? (8)

 (ii) Explain the construction and working of the PEM fuel cell with sketch. (8) **(Nov/Dec 2016)**

17. Explain LPG is an alternate fuel for petrol engine with a diagram. Also explain the performance and emission characteristics. (16) **(Apr/May 2017)**

18. Explain construction and working principle of hybrid vehicle with a neat sketch. (16) **(Apr/May 2017)**