

ME666

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**NEW SCHEME**

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**Sixth Semester B.E. Degree Examination, July/August 2005**  
**Mechanical Engineering**  
**Automotive Engineering**

Time: 3 hrs.]

[Max.Marks : 100

**Note:** 1. Answer any FIVE full questions.  
2. All questions carry equal marks.

1. (a) With neat sketches, explain the construction and working of dry and wet liner. (8 Marks)  
(b) What are the methods of swirl generation in C.I engines ? Explain. (6 Marks)  
(c) List the various methods of engine cooling. With a neat sketch explain the thermo-syphon cooling system. (6 Marks)
2. (a) What is the necessity of a carburettor ? Explain with a neat sketch, the working of a constant choke carburettor. (8 Marks)  
(b) What are the requirements of a fuel injection system ? Differentiate between multi point and single point fuel injection system. (6 Marks)  
(c) Write a note on any TWO :
  - i) alternate fuels
  - ii) fuel filters
  - iii) octane and cetane numbers. (6 Marks)
3. (a) Differentiate between battery ignition and magneto ignition system and with a neat sketch explain any one method of automatic ignition advance. (8 Marks)  
(b) With neat sketches explain the various types and causes of tyre wear. (6 Marks)  
(c) Explain with the help of a neat sketch, the working of a thermostatic fuel gauge. (6 Marks)
4. (a) In a gear box, the clutch has 14 teeth and low gear main shaft pinion has 32 teeth. The corresponding lay-shaft pinions have 36 and 18 teeth. The rear axle ratio is 3.7:1 and effective radius of rear tyre is 35.5cm. calculate the gear ratio, overall gear ratio and car speed in the above arrangement at an engine speed of 2500 rpm. (8 Marks)  
(b) With a neat sketch explain the working of a 3-speed synchromesh gear box. (6 Marks)  
(c) With a neat sketch, explain the working of a torque converter. (6 Marks)
5. (a) With a neat sketch, explain the working of Hotch kiss drive and state its advantages over torque tube drive. (8 Marks)  
(b) Define the following and explain their effect on steering :
  - i) camber
  - ii) king pin inclination (6 Marks)

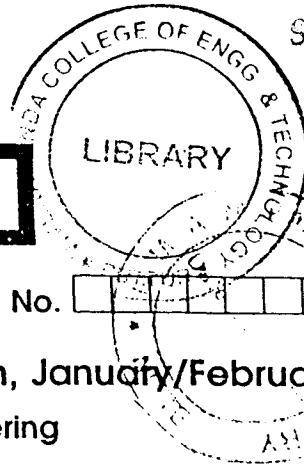
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- (c) A motor vehicle has a wheel base of 2.75m and pivot centres are at a distance of 1.05 m apart. The front and rear wheel track is 1.25m. Determine the correct angle of outside lock and turning circle radius of the outer front and inner rear wheels, when the angle of the inside lock is  $40^\circ$ . (6 Marks)
6. (a) With a neat sketch explain the working of a telescopic shock absorber. (8 Marks)
- (b) Draw a neat sketch and explain the functioning of a Mac Pherson strut assembly suspension system. (6 Marks)
- (c) Write short notes on any TWO :
- i) Confert curves
  - ii) Pitching and bouncing
  - iii) Leaf springs. (6 Marks)
7. (a) Explain the construction and working of a master cylinder and wheel cylinder, with a neat sketch. (8 Marks)
- (b) An automobile weighing 13445N makes an emergency stop at  $95\text{km/hr}$  at which the total resistance is 805 N. Assume coefficient of adhesion as 0.5, calculate :
- i) The retarding force, if the brakes are applied to locking point
  - ii) Heat flow per minute at each wheel at the beginning of braking. (6 Marks)
- (c) Distinguish between disc brakes and drum brakes. (6 Marks)
8. Write short notes on any FOUR.
- a) Electronic ignition
  - b) Dry sump lubrication
  - c) Engine emission control
  - d) Starting motors
  - e) Slip angle and cornering force
  - f) Distinguish between turbo charging and super charging. (5×4=20 Marks)

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NEW SCHEME



ME666

Reg. No.

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Sixth Semester B.E. Degree Examination, January/February 2006  
Mechanical Engineering  
Automotive Engineering

Time: 3 hrs.)

(Max.Marks : 100)

- Note:** 1. Answer any FIVE full questions.  
2. All questions carry equal marks.  
3. Missing data, if any, may be suitably assumed.

1. (a) Distinguish between S.I and C.I engines with respect to the following :
  - I) Thermal efficiency
  - II) Compression ratio
  - III) Specific output
  - IV) Air Fuel Ratio

Give reasons for your answers. (8 Marks)
- (b) With a neat sketch, explain the working of an overhead valve actuating mechanism. Clearly show the valve clearance and mention its purpose. (8 Marks)
- (c) Discuss the advantages and disadvantages of a wet liner over a dry liner. (4 Marks)
2. (a) Describe the working of S.V. electrical fuel transfer pump with a neat sketch. What are the advantages of this pump over mechanical fuel transfer pump? (10 Marks)
- (b) Show by means of necessary sketches, how a constant choke carburetor can provide necessary mixture strength for idling and acceleration. (10 Marks)
3. (a) With a circuit diagram, explain the working of a battery coil ignition system for a four stroke four cylinder S.I. engine. What are the advantages of magneto ignition system over this system? (10 Marks)
- (b) With sketches describe the constructional features of the tubed and tubeless type tyres for automotive use. (10 Marks)
4. (a) Explain with a neat sketch the working principle of a multiple clutch. (10 Marks)
- (b) A four speed gear box is to be designed for providing the ratios of 1.0, 1.45, 2.28 and 3.93 to 1 as nearly as possible. The diametral pitch of each gear is 3.25mm and the smallest pinion is to have atleast 15 teeth. Determine the suitable number of teeth of the different gears. Also find the centre distance between main shaft and lay shaft. (10 Marks)

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5. (a) With a neat sketch, explain the torque tube drive. What are its merits over the Hotchkiss drive? (8 Marks)

(b) With a sketch, explain a fully floating axle. (4 Marks)

(c) Define the following and explain their effect on steering

- i) Camber
- ii) King pin inclination
- iii) Castor
- iv) Toe in and toe out.

(8 Marks)

6. (a) What are the requirements of a suspension system? (4 Marks)

(b) With a neat sketch, explain the working principle of telescopic shock absorber. (10 Marks)

(c) Describe the working of a Wishbone type of independent suspension system with a neat sketch. (6 Marks)

7. (a) Explain with a neat sketch, how a master cylinder of a hydraulic braking system works. (10 Marks)

(b) An automobile has a wheel base of 2.65m and height of centre of gravity above the ground is 0.6m and it is 1.13m in front of the rear axle. If the automobile is moving with a speed of 45 km/hr, find the minimum stopping distance when

- i) Only rear wheels are braked
- ii) Only front wheels are braked
- iii) Brakes are applied to all wheels.

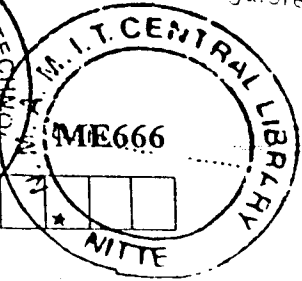
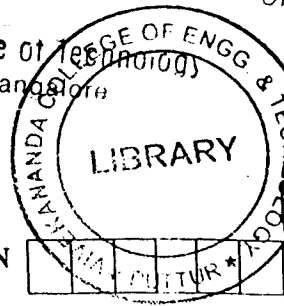
(10 Marks)

8. Write short notes on any FOUR of the following :

- a) Alternative fuels for I.C. Engines
- b) Supercharging of I.C. Engines
- c) Bendix drive
- d) Voltage regulator
- e) Exhaust emission from petrol engines.

(5 × 4 = 20 Marks)

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<b>NEW SCHEME</b>
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Sixth Semester B.E. Degree Examination, July 2006

Mechanical Engineering

**Automotive Engineering**

Time: 3 hrs.]

[Max. Marks:100

- Note:** 1. Answer any FIVE full questions.  
2. Draw neat and proportionate sketches.  
3. Justify your answer with figures wherever necessary.

1. a. Sketch and explain the constructional features of the engine cylinder block. Mention the typical composition of cast iron and aluminium cylinder blocks. (06 Marks)
- b. Sketch and explain the inlet and exhaust valve timing diagram of a 4-stroke engine. (04 Marks)
- c. Sketch and explain any four types of combustion chamber of S.I. engines, with their relative advantages and disadvantages. (08 Marks)
- d. What are the advantages and disadvantages of pre-combustion chamber? (02 Marks)
2. a. Sketch and explain the variable – jet carburetor. (07 Marks)
- b. Draw a sectional view of an atomizer. Explain the construction and working of it. (07 Marks)
- c. Name the different methods of fuel injection system. Describe with figures the two types of air-less injection system. (06 Marks)
3. a. Draw ignition circuit of a four cylinder S.I. Engine; explain the constructional details of ignition coil, distributor and condenser with contact breaker. (08 Marks)
- b. A passenger car weighs 14000 N and has a wheel base of 2.75 m. The C.G. of the vehicle is 1.25 m behind the front axle, and 0.75 m above the ground level. Maximum braking on all four wheels will bring the vehicle uniformly from 80.0 km/hr to 42.0 km/hr in a distance of 28.0 m while running down the gradient 1:20. Calculate the value of co-efficient of friction between the tyre and road, total braking force, work done in braking the vehicle, and heat equivalent to the work done.  
Under the same condition, the vehicle is braked on the rear wheels only. Determine the load distributed between the front and rear wheels, and the minimum stopping distance. (12 Marks)
4. a. Draw neat sketches of a 4 – speed sliding mesh gear box when gears are engaged in 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> and reverse gear. Explain gear engagement, power transmission, and gear ratio for different gear engagement. (10 Marks)
- b. Sketch and explain the two essential devices of an overdrive unit. Also explain the exact location, and function of an overdrive unit. (10 Marks)

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- 5 a. With the help of diagrams of master cylinder and wheel cylinders. Explain how brake pedal force, applied by the driver, is multiplied by leverage at master piston. (05 Marks)
- b. Sketch and explain the two types of dual braking systems. (05 Marks)
- c. Draw two sketches of piston – type servo – assisted vacuum brake unit for slight pressure and full pressure. Explain how brakes are applied. (10 Marks)
- 6 a. Sketch and explain all the main parameters of steering geometry. Also explain the relative effects of varying these parameters. (10 Marks)
- b. Explain different methods of reducing emission. (05 Marks)
- c. Sketch and explain cam and peg type of steering gear box. (05 Marks)
- 7 a. Sketch cross-ply and radial ply tyres. Explain various components of tyres. (06 Marks)
- b. Write a note on Torsion bar and air suspension systems. (08 Marks)
- c. Explain two methods of pressure charging. (06 Marks)
- 8 Write short notes on any four of the following: (Draw figures wherever necessary)
- a. Torque Converter
- b. Differential gear box
- c. Tandem master cylinder
- d. Hotchkiss drive
- e. Cutout (voltage regulator)
- f. Alternative fuels for automotive engines. (20 Marks)

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**NEW SCHEME**

**Sixth Semester B.E. Degree Examination, July 2007**  
**Mechanical Engineering**  
**Automotive Engineering**

Time: 3 hrs.]

[Max. Marks:100

**Note :1. Answer any FIVE full questions.**

**2. Sketches should be drawn neatly wherever required.**

- 1 a. Explain briefly with a neat sketch working of a dry sump engine lubrication system. (06 Marks)  
b. Explain with a neat sketch overhead valve mechanism. (06 Marks)  
c. What is the difference between dry and wet liners? (04 Marks)  
d. Write a short note on materials for engine components. (04 Marks)
- 2 a. Explain with a neat sketch working of a mechanical petrol pump. (06 Marks)  
b. Sketch and explain briefly a carter carburettor. (08 Marks)  
c. What is air-less injection system? Explain with a neat sketch. (06 Marks)
- 3 a. Describe with a neat sketch working of electronic ignition system. (06 Marks)  
b. Write a short note on ignition advance system. (05 Marks)  
c. What are types of tyre wear and how do they affect tyre life? (04 Marks)  
d. What is the difference between crossply and radialply? Explain. (05 Marks)
- 4 a. Describe with a neat sketch working of a multiplate clutch. (07 Marks)  
b. Explain with a neat sketch epicyclic gear box. (05 Marks)  
c. Sketch and explain working of a synchromesh gear box. (08 Marks)
- 5 a. What are the parameters of steering geometry? Explain with a neat sketch. (08 Marks)  
b. What is toe-in and toe-out? Explain with a neat sketch. (06 Marks)  
c. Write a short note on universal joint. (06 Marks)
- 6 a. Sketch and explain wishbone type independent suspension system. (08 Marks)  
b. Explain with a schematic diagram showing the layout of an air suspension system. (06 Marks)  
c. Write a short note on shock absorber. (06 Marks)
- 7 a. Sketch and explain working of a hydraulic brake system layout and tandem master cylinder. (08 Marks)  
b. Write a short note on
  - i) Vacuum servo brakes. (06 Marks)
  - ii) Air brakes. (06 Marks)
- 8 Write a short note on:
  - a. Alternative fuel for SI and CI engine. (05 Marks)
  - b. Effect of driving mode exhaust emission. (05 Marks)
  - c. Speedometer circuit fitted on a dash board. (05 Marks)
  - d. Odometer fitted on a dash board. (05 Marks)





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**Sixth Semester B.E. Degree Examination, June / July 08**  
**Automotive Engineering**

Max. Marks: 100

Time: 3 hrs.

- Note :** 1. Answer any FIVE full questions.  
2. Draw neat and proportionate sketches.  
3. Indicating the parts on the sketch is essential.

- 1 a. Draw neat sketches of the following engine components. Explain material used, material composition and constructional features of the same. i) Cylinder block ii) Connecting rod iii) Piston and piston rings. (09 Marks)
- b. Draw neat sketch of the following types of combustion chambers. (06 Marks)
- i) Shallow depth chamber iv) Bath – tub combustion chamber.  
ii) Pre – Combustion chamber v) Wedge shaped combustion chamber  
iii) M – Combustion chamber vi) Hemisphere type combustion chamber
- c. With the help of a neat sketch, explain how all engine parts are lubricated in a Dry sump lubricating system. (05 Marks)
- 2 a. With the help of a schematic diagram, explain the functions of the following important parts of Bosch Electronic Petrol Injection System. (09 Marks)
- i) ECU ii) Electric pump iii) Sensors iv) Fuel injector. (06 Marks)
- b. Draw a neat sketch of a fuel atomizer and explain how the fuel is injected. (05 Marks)
- c. Draw a neat sketch of a variable jet carburetor.
- 3 a. Draw transistor assisted ignition circuit of a four cylinder S.I. Engine. Explain the constructional details of ignition coil, distributor and condenser with contact breakers. (09 Marks)
- b. With simple diagrams, briefly explain the following. (06 Marks)
- i) Oil pressure gauge ii) Fuel gauge iii) Ammeter.
- c. With the help of a neat figure, explain how a voltage regulator works. (05 Marks)
- 4 a. Draw two neat sketches of synchromesh assembly, one before engagement and another after dogs over-riding the toothed ring. Explain working of the device. (09 Marks)
- b. The following data is for a old single plate clutch. Power – 110 kW ; Speed – 1250 rpm coefficient of friction – 0.4 .
- i) Assuming a uniform pressure of  $0.17 \text{ N/mm}^2$  , determine the inner diameter of the friction surfaces.  
ii) Assuming the same dimension and the same total axial thrust, determine the maximum torque that can be transmitted and the maximum intensity of pressure. Assume suitable theory conditions for old clutch. Take outer diameter of contact surface = 300mm. (08 Marks)
- c. Draw a neat sketch of a torque convertor. (03 Marks)
- 5 a. Draw neat sketches of the following : (09 Marks)
- i) Semi – floating type of rear axle arrangement ii) Fully – floating type of rear axle arrangement. Mention atleast four very important differences between the two systems.  
b. Draw a neat sketch of a recirculating ball type of steering box. Explain its working. (06 Marks)

- c. Define slip angle. What is under-steering and over-steering? What are the effects of over and under steer? (05 Marks)
- 6 a. Sketch double wishbone type of front suspension system. Explain how the wheels are steered as well as moved up and down. (09 Marks)  
b. Sketch and explain MacPherson strut type of suspension system. (06 Marks)  
c. Explain atleast five important functions of the suspension system. (05 Marks)
- 7 a. A car has a wheel base of 2.75m and the height of its C.G. above the ground is 0.65m and it is at a distance of 1.2m from the rear axle. If the car is traveling at a speed of 80km/hr down a long slope of one in twenty. Determine the minimum stopping distance when  
i) Rear wheels are braked  
ii) Front wheels are braked  
iii) All four wheels are braked.  
The coefficient of friction between tyre and the road may be taken as 0.6. Also calculate the heat generated for the case (iii). Assume vehicle weight = 1500 N. (09 Marks)  
b. Draw a neat sketch of a Tandem Master Cylinder. Explain its construction. (06 Marks)  
c. Sketch and explain a disc brake in action. (05 Marks)
- 8 a. With a neat sketch, explain the construction of radial ply tyre. How does it differ from a cross ply tyre? (06 Marks)  
b. Discuss few important causes of tyre wear. (04 Marks)  
c. Distinguish between Super charging and Turbo charging. (06 Marks)  
d. Write a short note on emission from S.I. Engine. (04 Marks)

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**Eighth Semester B.E. Degree Examination, May/June 2010**  
**Automotive Engineering**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, selecting  
at least TWO questions from each part.**

**PART – A**

- 1 a. List out the components of automotive engine. Give its functions, materials and method of manufacturing. (10 Marks)
- b. What are the various methods of engine cooling? Explain with sketch the thermosyphon system of cooling. (06 Marks)
- c. Explain the splash lubrication, with a sketch. (04 Marks)
- 2 a. What are the octane and cetane numbers? (04 Marks)
- b. Sketch and explain zenith carburetor. (08 Marks)
- c. Explain with a sketch, the A.C. mechanical pump. (08 Marks)
- 3 a. What are the effects of supercharging on the engine performance? (02 Marks)
- b. With a neat sketch, explain centrifugal type and Root's supercharger. (08 Marks)
- c. Explain any three methods of turbocharging. (06 Marks)
- d. What are the advantages and disadvantages of turbocharging? (04 Marks)
- 4 a. Describe a battery ignition system, for six cylinder, inline engine. (06 Marks)
- b. Compare battery ignition and magneto ignition systems. (04 Marks)
- c. Explain the principle of electronic ignition system. (05 Marks)
- d. Explain with a sketch vacuum advance mechanism. (05 Marks)

**PART – B**

- 5 a. With a neat sketch, explain the construction and working of single plate clutch. (10 Marks)
- b. With a neat sketch, explain the working of sliding mesh gear box. (06 Marks)
- c. Determine the maximum pressure in a plate clutch, when the axial force is 4 kN, the inside radius of the contact surface is 50 mm and outside radius is 100 mm. Assume uniform wear. (04 Marks)
- 6 a. With a neat sketch, explain the torque tube drive. What are its merits over Hotch-Kiss drive? (08 Marks)
- b. Define the following and explain their effects on steering:  
i) camber ii) king pin inclination iii) Castor iv) Toe in and Toe out. (08 Marks)
- c. Sketch the semi-floating axle arrangement. (04 Marks)
- 7 a. Explain the telescopic type shock absorber, with a neat sketch. (10 Marks)
- b. Explain the drum brake, with a sketch. (05 Marks)
- c. A car of mass 800 kg is traveling at 36 km/hr. Determine  
i) The kinetic energy it possesses and ii) Average braking force to bring it to rest in 20 m. (05 Marks)
- 8 a. Explain the sources of automotive exhaust gas emissions. (04 Marks)
- b. Explain the controlling of crank case emissions, with a sketch. (06 Marks)
- c. Explain controlling the air fuel mixture way to reduce pollutants in the exhaust gas. (05 Marks)
- d. Write a note on alternative fuels for automotive engines. (05 Marks)

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Important Note : 1. On completing your answer, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

1. The first part of the document is a list of names and addresses of the members of the committee.