Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.

Use of following supporting materials is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT - I

1. (a) What do you mean by inversion of mechanism ? Describe with the help of suitable sketches the inversion of a slider crank chain.

8

(b) The crank of an engine is 200 mm long and connecting rod length to crank radius ratio is 4. The crank has turned through 45° for inner dead centre position. The uniform speed of rotation of crank is 200 rpm clockwise. Determine velocity and acceleration of slider.

8

OR

1. (a) Draw and explain Klien's construction for determining the acceleration of the piston of a reciprocating engine.

8

(b) The link AB of a four bar mechanism resolves uniformly at 120 rpm in clockwise direction. Find the angular acceleration of link BC and CD. The dimensions of various links are as given : AB = 50 mm, BC = 100 mm, CD = 90 mm, AD = 120 mm and DAB = 60°.
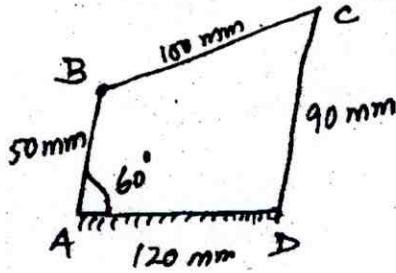
8

UNIT - II

2   (a) Sketch and describe the Ackermann steering mechanism. Discuss its advantages with respect to Davis mechanism.

8

(b) Explain the construction and working of overhead value mechanism.

8

OR

2   (a) Describe the working of hook's joint. Also show for a hook's joint that $\tan\theta = \tan\phi \cdot \cos\alpha$ where the θ, ϕ, α have their usual meaning.

8

(b) Two shafts are connected by means of hook's joint, the angle between the shafts is 20°. What will be the angle turned by driving shaft when :
(i) Velocity ratio is maximum, minimum and unity.
(ii) Acceleration of driven shaft is maximum and zero.

8

UNIT - III

3   (a) Derive the conditions for maximum power transmitted by belt drive.

8

(b) A shaft rotating at 200 rpm, another shaft at 300 rpm and transmits 6 kW through a belt. The belt is 100 mm wide and 10 mm thick. The distance between the shafts is 4m. The smaller pulley is 0.5 m in diameter. Calculate the stress in the belt : if it is -
(i) An open belt drive
(ii) An cross belt drive, take $\mu = 0.3$.

8

OR

3   (a)   Derive an expression for tension ratio of V-belt -

$$\frac{T_1}{T_2} = e^{\frac{\mu\theta}{\sin\alpha}}$$

8

     (b)   Find the effort required at the end of handle, fitted to the screw of a screw jack to lift a load of 2000 N. The length of handle is 50 cm. The mean diameter and pitch of screw are 6 cm and 1 cm respectively. The coefficient of friction is 0.09.

8

UNIT - IV

4   (a)   Derive an expression for the torque transmitted by a single plate clutch assuming uniform wear.

8

     (b)   A torque of 350 N-m is transmitted through a cone clutch having a mean diameter of 300 mm and a semicone angle of 15°. The maximum normal pressure at the mean radius is $150 \, kN/m^2$. The coefficient of friction is 0.3. Calculate the width of the contact surface. Also, find the axial force to engage the clutch.

8

OR

4   (a)   Derive the expression of retardation when brakes are applied to the front wheel of an automobile and -
       (i)   Vehicle moves up on inclined plane
       (ii)   Vehicle moves on level road.

8

     (b)   Describe the construction and operation of a prony brake absorption dynamometer.

8

UNIT - V

5   (a)   Draw the displacement, velocity and acceleraiton diagram for a follower when it moves with SHM. Derive the expression for velocity and acceleration during out stroke and return stroke of the follower.

8

(b) A cam with 30 mm minimum radius is rotating clockwise at 1200 rpm to give the follower motion to a roller follower of 20 mm diameter -

(a) Lift = 25 mm

(b) Follower offset = 10 mm

(c) Follower rise during 120° cam rotation with SHM.

(d) Follower to dwell for next 60° cam rotation.

(e) Follower to return during 120° cam rotation with uniform velocity.

(f) Follower to dwell for remaining period.

Draw the profile of cam for above conditions.

8

OR

5 (a) Define the following terms as applied to cam with a neat sketch :

(i) Base circle

(ii) Pitch circle

(iii) Pressure angle

(iv) Stroke of the follower

8

(b) A cam with minimum radius of 50 mm, rotating clockwise at a uniform speed, is required to give a knife edge follower the motion as described below :

(i) To move outwards through 40 mm during 100° rotation of the cam.

(ii) To dwell for next 80°.

(iii) To reutrn to its starting position during next 90°.

(iv) To dwell for the rest period of a revolution i.e. 90°.

Draw the profile of the cam.

When the line of stroke of follower is offset by 15 mm.

The displacement of the follower is to take place with uniform acceleration and uniform retardation. Determine the maximum velocity and acceleration of the follower when the cam shaft rotates at 900 rpm.

8

Roll No. _____   Total No. of Pages : 4

4E4148

4E4148

B. Tech. IV-Sem. (Main & Back) Exam; April-May 2017

Automobile Engineering

4AE2A Fluid Mechanics & Machines

Time : 3 Hours   Maximum Marks : 80
                                        Min. Passing Marks : 26

Instructions to Candidates :-

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.
Units of quantities used / calculated must be stated clearly.
Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT - I

1 (a) Define the viscosity and derive the expression of units of viscosity.

8

   (b) Explain surface tension. Prove that the relationship between surface tension and pressure inside a droplet of liquid in excess of outside pressure is given by $p = \dfrac{4\sigma}{d}$.

8

OR

4E4148]   1   [P.T.O.

1   (a) If the velocity profile of a fluid over a plate is parabolic with the vertex 20 cm from the plate, where the velocity is 120 cm/sec. Calculate the velocity gradiant and shear stress at a distance of 0.10 and 20 cm from the plate, if the viscosity of fluid is 8.5 poise.

12

   (b) Determine the viscosity of a liquid having kinematics viscosity 6 stokes and specific gravity 1.9.

4

UNIT - II

2   (a) Determine the total pressure and centre of pressure on an isosceles triangular plate of base 11 m and altitude 4 m when it is immersed vertically in an oil of specific gravity 0.9. The base of the plate coincides with the free surface of oil.

10

   (b) Explain the term meta-centre and metacentric height.

6

OR

2   A fluidflow field is given by

$$V = x^2 yi + y^2 zj - \left(2xyz + yz^2\right) K$$

Prove that it is a case of possible steady incompressible fluid flow. Calculate the velocity and acceleration at the point [2, 1, 3].

16

4E4148]   2   [P.T.O.

UNIT - III

3 (a) An oil of viscosity 0.1 Ns/m² and relative density 0.9 is flowing through a circular pipe of diameter 50 mm and length 300 m. The rate of flow of fluid through the pipe is 3.5 litre/sec. Find the pressure drop in a length of 300 m and also the shear stress at the pipe wall.

10

(b) Explain Prandtl mixing. Length Theory.

6

OR

3 (a) Show that velocity distribution for turbulent flow through rough pipe is given by $\dfrac{u}{u_*} = 5.75 \log_{10}(y/k) + 8.5$.

8

(b) Derive Hagen Poiseulle's equation.

8

UNIT - IV

4 In given dig. when a sudden contraction is introduced in a horizontal pipe line from 50 cm to 25 cm the pressure changes from 10500 kg/m² to 6900 kg/m². Calculate the rate of flow. Assume coefficient of contraction of let to be 0.65.Following this if there is a sudden enlargment from 25 cm to 50 cm and if the pressure at the 25 cm section is 6900 kg/m² what is the pressure at 50 cm enlarged section ?
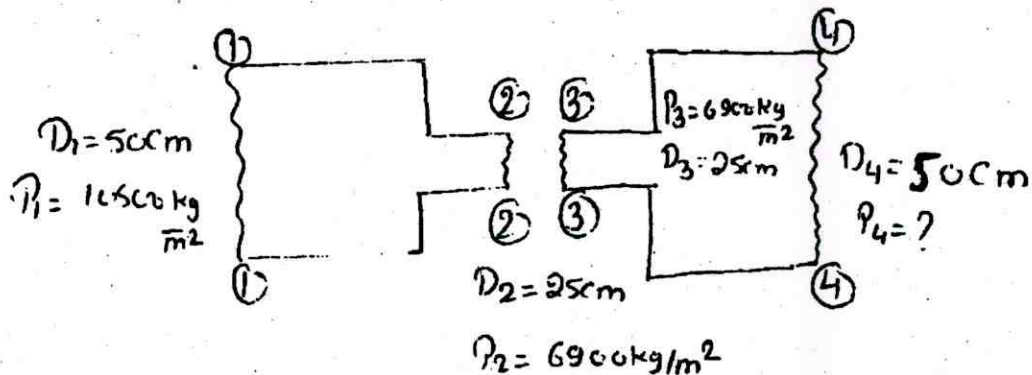
16

OR

4 (a) What do you mean by equivalent pipe ? Obtain expression for equivalent pipe.

8

(b) Define and explain the terms :

(i) Hydraulic gradient line

(ii) Total energy line.

4+4=8

UNIT - V

5 (a) Explain the working principle of Hydraulic Accumulator with a neat sketch.

8

(b) Explain the working principle of Hydraulic Ram with a neat sketch.

8

OR

5 (a) Explain characteristic curve of hydraulic turbine.

8

(b) Explain specific speed and derive expression for specific speed.

8

Roll No. _____

Total No. of Pages : 4

4E4141

4E4141

B. Tech. IV-Sem. (Back) Exam; April-May 2017
Mechanical Engg.
4ME2A(O) Fluid Mechanics

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates :-

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.
Units of quantities used / calculated must be stated clearly.
Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. <u>NIL</u>   2. <u>NIL</u>

UNIT - I

1   A - U-tube Manometer is used to measure the pressure of water in a pipeline, which is in excess of atmospheric pressure. The right limb of the manometer contain mercury and is open to atmosphere. The contact between water and mercury is in the left limb. Determine the pressure of water in the main line, if the difference in level of mercury in the limbs of U-tube is 10 cm and free surface of mercury is in level with the centre of the pipe. If the pressure of water in pipeline is reduced to 9810 N/m^2, calculate the new difference in the level of mercury. Sketch the arrangements in both cases.

16

OR

1   (a)   Determine the viscosity of a liquid having kinematic viscosity 6 stokes and specific gravity 1.9.

                                                                                    6

    (b)   A caisson for closing the entrance to a dry clock is of trapezoidal form 16 m wide at top and 10 m wide at bottom and 6 m deep. Find total pressure and centre of pressure on the caisson if the water on outside is just level with the top and clock is empty.

                                                                                    10

UNIT - II

2   A fluid flow field is given by

$$V = x^2 yi + y^2 zj - \left(2xyz + yz^2\right) K$$

Prove that it is a case of possible steady incompressible fluidflow. Calculate velocity and acceleration at point [2, 1, 3].

                                                                                    16

OR

2   (a)   Derive the Bernoull's Equation.

                                                                                    8

    (b)   A nozzle of diameter 20 mm is fitted to a pipe of diameter 40 mm. Find the force exerted by nozzle on the water which is flowing through the pipe at the rate of 1.2 m³/min.

                                                                                    8

UNIT - III

3 **(a)** Derive the Hagen Poiseuille formula.

8

(b) An oil of viscosity 10 poise flows between two parallel fixed plates which are kept at a distance of 50 mm apart. Find the rate of flow of oil between the plates if the drop of pressure in a length of 1.2 m be 0.3 N/cm³. The width of plate is 200 mm.

8

OR

3 **(a)** A rough pipe is of diameter 8.0 cm. The velocity at a point 3.0 cm from wall is 30% more than velocity at a point 1.0 cm from pipe wall. Determine the average height of roughness.

8

(b) Explain hydrodynamically smooth and rough boundaries.

8

UNIT - IV

4 **(a)** Derive the discharge formula for venturimeter.

8

(b) Derive the experssion for discharge over a triangular notch.

8

OR

4   (a)   Derive the Darcy-Weisbach equation.

8

(b)   A horizontal pipe line 40 m long is connected to a water tank at one end and discharge freely into the atmosphere at the other end. For the first 25 m of its length from the tank, the pipe is 150 mm diameter and its diameter is suddenly enlarged to 300 mm. The height of water level in the tank is 8 m above the centre of pipe. Consider all losses of head which occur, determine the rate of flow.

Take $f = .01$ for both secitons of the pipel

8

UNIT - V

5   (a)   A Pelton wheel has a mean bucket speed of 10 meter per second with a jet of water flowing at the rate of 700 litres/sec. Under a head of 30 meter. The buckets deflect the jet through an angle of 160°. Calculate the power given by water to the runner and hydraulic efficiency of turbine take $C_v = .98$.

8

(b)   Explain the draft-tube.

8

OR

5   Explain any four in following :

(i)   Hydraulic press

(ii)   Hydraulic ram

(iii) Hydraulic lift

(iv)   Hydraulic accumulator

(v)   Hydraulic coupling

(vi)   Hydraulic torque converter gear pump.

4×4

547

4E4142

4E4142

B. Tech. IV-Sem. (Main / Back) Exam; April-May 2017

Mechanical Engg.

4ME3A Machining & Machine Tools

Common with Automobile

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 24

Instructions to Candidates :-

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.

Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT - I

1   (a)   Explain the mechanism of chip formation and the types of chip with suitable diagrams.

ı   4+4=8

(b)   In an orthogonal cutting test with a tool of rake angle 10°, the following observations were made :

Chip thickness ratio = 0.3

Horizontal component of the cutting force = 1290 N

Vertical component of cutting force = 1650 N

Calculate the various components of the cutting forces and the coefficient of friction at the chip tool interface by using Merchants theory.

8

OR

1   (a) What is the thermal aspects of machining ? Discuss briefly a technique for measuring average chip tool interface temperature.

3+5=8

(b) What is tool nomenclature ? With suitable sketch explain geometry of single point cutting tool.

2+6=8

UNIT - II

2   (a) Differentiate between Flank wear and crater wear. Also discuss difference between Adhesion and Abrassion tool wear mechanism.

4+4=8

(b) Explain the important characteristics of a cutting tool material and list the different types of tool material.

5+3=8

OR

2   (a) What is machinability and machinability index ? Explain briefly.

2+3=5

(b) Discuss various cutting fluids properties.

3

(c) In a normal turning operation, the tool life varies with cutting speed as follow :

Cutting Speed $\left(\dfrac{m}{min}\right)$	Tool Life (min)
25	30
70	2

Estimate the tool life for this operation at a speed of 60 m/min.

8

4E4142]   2   [P.T.O.

UNIT - III

3 (a) Differentiate between Grinding and Broaching operation.

4

   (b) Explain up and down milling.

4

   (c) A shaper is operated at 120 cutting strokes per min. and is used to machine a work piece with a 250 mm length and 120 mm width. Use a feed of 0.6 mm per stroke and a depth of cut 6 mm. Calculate the total machining time to machine the component. Take approach distance = 25 mm.

8

OR

3 (a) List the basic specifications to fully describe the lathe machine.

4

   (b) Explain about drilling time estimation.

4

   (c) What is Automatic lathe ? How automatic lathes are classified and list the operations carried out on automatic lathe.

2+4+2=8

UNIT - IV

4 Briefly explain about any four :

   (i)   Honning

   (ii)   Lapping

   (iii) Super finishing

   (iv)   Thread milling

   (v)   Thread Grinding

4×4=16

OR

4   (a) Explain the function of bond materials and about commonly used bond materials.

2+6=8

(b) The designation of the grinding wheel is given as

51 A 36 L 5 V 23

Explain the significance of the various elements of the codes.

8

UNIT - V

5   (a) How gears are manufactured by powder metallurgy process ? Explain.

6

(b) Why gear finishing processes are required ? Write down the advantages and limitations of gear shaving and gear lapping process.

2+4+4=10

OR

5   (a) Discuss the difference between gear hobbing and gear shaping.

8

(b) Briefly explain Electro-hydraulic forming methods.

8

_____

| Roll No. _____ | Total No. of Pages : 4 |

4E4143

4E4143

B. Tech. IV-Sem. (Main) Exam; April-May 2017
Production & Industrial Engg.
4PI4A Design of Machines Elements - I

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates :-

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.
Units of quantities used / calculated must be stated clearly.
Use of following supporting materials is permitted during examination.
(Mentioned in form No. 205)

1. NIL _____ 2. NIL _____

UNIT - I

1 (a) What is a machine element ? Give two examples.

4

(b) What do you understand by mechanical properties of materials ? How these are helpful in machine design ?

12

OR

1 (a) What is 'machine design' ? Explain the basic procedure of machine design.

8

(b) Explain standardization, limits, fits and surface roughness for manufacturing consideration in design with neat sketch and suitable examples.

8

4E4143] 1 [P.T.O.

UNIT - II

2 (a) What is 'Stress concentration' ? How it can be reduced in a component ?

8

(b) Determine the diameter of a circular rod made of ductile material with a fatigue strength (complete stress reversal) σ_c = 265 MPa and a tensile yield strength of 350 MPa. The member is subjected to a variable axial load from W_{min} = $-$ 300$\times$10^3 N to W_{max} = 700$\times$10^3 N and has a stress concentration factor = 1.8. Use factor of safety as 2.0.

8

OR

2 It is required to design a cotter joint to connect two steel rods of equal diameters. Each rod is subjected to an axial tensile force of 50 kN. Design the joint and specify its main dimensions.

16

UNIT - III

3 (a) What is a 'beam' ? Which type of stresses can be induced in it ? Discuss the role of section modulus in beams design with two examples of different shapes.

8

(b) A truck spring has 12 number of leaves, two of which are full length leaves. The spring supports are 1.05 m and the central band is 85 mm wide. The central load is to be 5.4 kN with a permissible stress of 280 MPa. Determine the thickness and width of the steel spring leaves. The ratio of the total depth to the width of the spring is 3. Also determine the deflection of the spring.

8

OR

3 (a) What is a 'lever' ? Explain the principle of it and leverage. Classify the levers.

8

4E4143]

2

[P.T.O.

(b) A right angled bell-crank lever is to designed to raise a load of 5 kN at the short arm end. The lengths of short and long arms are 100 and 450 mm respectively. The lever and the pins are made of steel 30C8 (S_{yt} = 400 N/mm^2) and the factor of safety is 5. The permissible bearing pressure on the pin is 10 N/mm^2. The lever has rectangular cross-section and the ratio of width to thickness is 3 : 1. The length to diameter ratio of fulcrum pin is 1.25 : 1

Calculate :

(i) The diameter and the length of fulcrum pin

(ii) The shear stress in the pin

(iii) The dimensions of the boss of the lever of the fulcrum and

(iv) The dimensions of the cross-section of the lever.

Assume that the arm of bending moment on the lever expands upto the axis of the fulcrum.

8

UNIT - IV

4 (a) A line shaft transmits 25 kW power at 200 rpm by means of a vertical belt drive. The diameter of the belt pulley is 1 m and the pulley overhangs 150 mm beyond the centre line of the end bearing. The belt tension acts vertically downward. The tension on the tight side of the belt is 2.5 times that on slack side. The shaft is made of plain carbon steel 40C8 (S_{yt} = 380 N/mm^2) and the factor of safety is 2.5. The mass of the pulley is 25 kg. Determine the diameter of the shaft.

(b) What is a 'key' ? Explain the failure of key.   12

OR

4 (a) What is coupling ? Classify it.   4

(b) Design a muff coupling which is used to connect two steel shafts transmitting 25 kW power at 360 rpm. The shafts and key are made of plain carbon steel 30C8 ($S_{yt} = S_{yc}$ = 400 N/mm^2). The sleeve is made of grey cast iron FG 200 (S_{ut} = 200 N/mm^2). The factor of safety for the shaft and key is 4. For the sleeve, the factor of safety is 6 based on ultimate strength.   4

12

UNIT - V

5   (a)   Explain the concept of thread for single start and double start, relative to lead of them. Explain the terminologies used to define the threads with neat sketches.

8

(b)   What are the 'locking devices' ? Classify them and explain their working concept with neat sketches.   •

8

OR

5   (a)   Why uniform strength is required in bolts ? How it can be achieved ? Determine the diameter of the hole that must be drilled in a M48 belt such that the bolt becomes of uniform strength.

8

(b)   A bracket, as shown in Fig. supports a load of 30 kN. Determine the size of bolts, if the maximum allowable tensile stress is in the bolt material is 60 MPa. the distances are $L_1 = 80$ mm, $L_2 = 250$ mm and $L = 500$ mm.
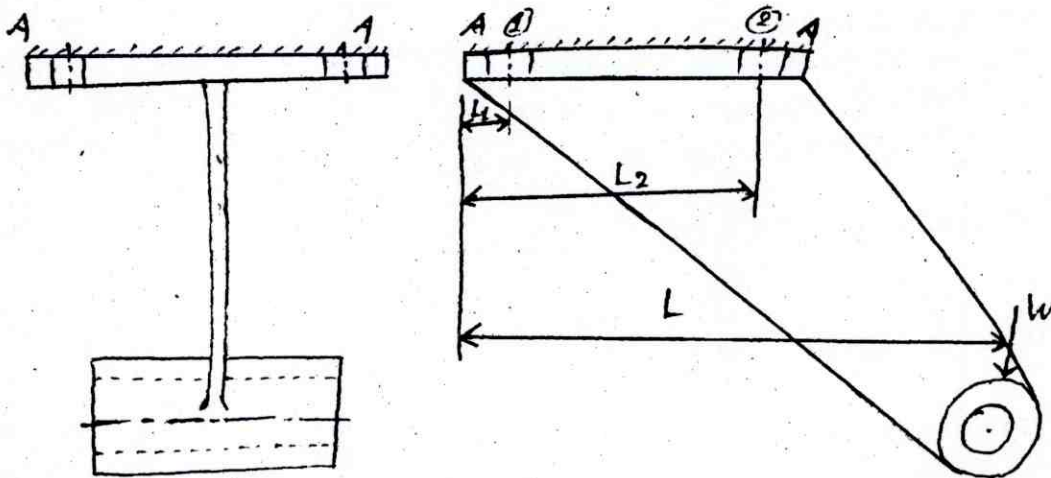
8

Fig. : Bracket with eccentric loading.

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Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.
Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT - I

1   (a)   Discuss the role of an Industrial Engineer in a manufacturing company.

                                                                          8

    (b)   Discuss the principles of motion economy and its application in plant layout and design of work stations.

                                                                      2+3+3

OR

1   (a)   What is Productivity? Differentiate between Capital Productivity, Labour Productivity and Material Productivity with a suitable example.

                                                                    2+2+2+2

    (b)   State four benefits of Method study. Draw the symbols for four Therbligs and state their function. Make a left and right hand operation chart for changing a refill in a ball pen.

                                                                      2+2+4

UNIT - II

2 (a) A work study was conducted in a factory. In a total of 5000 observations in 60 hours, no activity was found in 500 observations. The ratio between manual to machine elements is 3:1. Average performance rating is estimated at 85%. The total number of pieces produced during the observed duration is 120. Rest and personal allowances may be taken as 15% of the normal time. Calculate, the standard time in minutes.

8

(b) What is decision making? Discuss the stages of decision making.

4+4

OR

2 (a) What is scientific management? Discuss the principles of scientific management.

3+5

(b) Describe the basic procedure for conducting a time study. What are the various allowances to be added to the observed time to determine standard time?

4+4

UNIT - III

3 (a) Discuss the procedure for the formation of a joint stock company.

8

(b) Explain what is 'cost of capital'? Discuss the relative advantages and disadvantages of equity capital versus borrowed capital.

4+4

OR

3 (a) Distinguish between the single proprietorship and partnership firms. Explain the concept of limited liability.

6+2

(b) Discuss the types of organizations with suitable organization charts. Which type of organization would you suggest for a startup company and why?

6+2

UNIT - V

5 (a) What is depreciation? Discuss the various methods of calculating depreciation.

10

   (b) The data for a small manufacturing concern is given below :

   Cost of Fixed Assets   =   Rs. 24,000
   Units sold   =   8,000
   Variable cost   =   Rs. 64,000
   Sale price per unit   =   Rs. 10
   Contribution for 8000 Units = 16,000

   Find out :
   (i) the Sales Volume required to Break Even
   (ii) the sales price for a Break Even sales of 10000 units.

6

OR

5 (a) Define Break-Even analysis. Explain the following terms :
   (i) Profit Volume ratio
   (ii) Contribution
   (iii) Margin of Safety
   (iv) Variable Cost

8

   (b) A machine is purchased at a cost of Rs 30 Lakhs. It has a useful life of 6 years, with an estimated salvage value of Rs 3 Lakhs. The rate of interest is 10%. Calculate the depreciation of the machine using the (a) straight line method, (b) sinking fund method and (c) sum of years digits method.

2+3+3

Roll No. _____   Total No. of Pages : 3

4E4145

B. Tech. IV-Sem. (Main & Back) Exam; April-May 2017
Mechanical Engineering
4ME6A I. C. Engines

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates :-

Attempt any *five questions*, selecting *one question* from *each unit*. All Questions carry *equal* marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.
Units of quantities used / calculated must be stated clearly.
Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT - I

1   (a)   What are the fundamental differences between SI and CI engines ?

8

    (b)   Discuss the differences between ideal and actual valve timing diagrams of a petrol.

8

OR

1   A two stroke C.I. Engine delivers 5000 kW while using 1000 kW to overcome frictional losses. It consumes 2300 kg of fuel per hour at an air-fuel ratio of 20 to 1. The heating value of fuel is 42000 kJ/kg. Find the
    (a)   indicated power
    (b)   mechanical efficiency

4E4145]   1   [P.T.O.

(c) indicated thermal efficiency,

(d) brake thermal efficiency.

<div align="right">4×4=16</div>

UNIT - II

2 (a) Explain briefly the process of combustion in S.I. engine and also explain the stages of combustion with the help of P-Q diagram.

<div align="right">8</div>

(b) Describe the phenomenon of detonation in C.I. Engine.

<div align="right">8</div>

OR

2 (a) Write a short note on alternative fuel for I.C. engines.

<div align="right">8</div>

(b) What are the desirable properties of good I.C. engine fuels,

<div align="right">8</div>

UNIT - III

3 Describe with suitable diagram the following systems of a carburettor :
(a) Main metering system.
(b) Idling system.
(c) Power enrichment or economizer system.
(d) Acceleration pump system.

<div align="right">4×4=16</div>

OR

3 (a) State the advantages of electronic ignition system over convectional ignition system.

<div align="right">8</div>

(b) Describe with the help of suitable diagram common rail direct injection system.

<div align="right">8</div>

UNIT - IV

4 (a) Discuss the functions of lubricant in an engine:

   8

   (b) Describe the mist lubrication system used for a two stroke engine,

   8

OR

4 (a) Explain water cooling system with suitable diagram. What is the function of fins ?

   8

   (b) Explain the methods of supercharging in four stroke engines.

   8

UNIT - V

5 (a) What is a dual fuel engine ? How mixing of fuel takes place.

   8

   (b) What is the effect of variable compression ratio on thermal efficiency of the engine ?

   8

OR

5 (a) Explain the working of stratified engine.

   8

   (b) What are the requirements of a dual fuel engine ?

   8

Roll No. _____

Total No. of Pages : 3

4E2050

4E2050

4E2050

B. Tech. IV-Sem. (Back) Exam; April-May 2017
Mechanical Engineering
4ME2(O) Automobile Engineering

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.
Use of following supporting materials is permitted during examination.
(Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT - I

1   What is the function of a frame ? Explain conventional, semi-integral and integral frame with neat sketches.

16

OR

1   How are clutches classified ? Explain the working of a centrifugal clutch with suitable sketch.

16

4E2050]   1   [P.T.O.

UNIT - II

2 Explain any two of the following gear forces :
(i) Sliding mesh gear box
(ii) Constant mesh gear box
(iii) Synchromesh gear box.

$8 \times 2 = 16$

OR

2 Explain briefly with the help of neat sketches :
(i) Half floating rear axle
(ii) Fully floating rear axle.

$8 \times 2 = 16$

UNIT - III

3 (a) What is a suspension system ? Discuss the elements of a suspension system.

8

(b) Give the layout of a steering system and label the various parts. Also explain the working of a steering system.

8

OR

3 (a) Describe the construction of a type. What are the causes of a tyre wear ?

8

(b) How are brakes classified ? Explain the working of hydraulic brakes.

8

UNIT - IV

4 Explain briefly :
(i) Specific gravity test
(ii) Open volt test
(iii) Trickle charging
(iv) Battery rating.

$4 \times 4 = 16$

OR

4 Draw and explain the simplified wiring circuit for the lighting system of a car.

16

UNIT - V

5 What do you understand by automotive air conditioning ? Explain the major components automotive air conditioning with the help of neat sketches.

16

OR

5 Write short notes on :
   (i)   Air bags
   (ii) NVS (Night Vision System)
   (iii) GPS (Global positioning system)
   (iv) Safety belts.

4×4=16

Roll No. _____   Total No. of Pages : 4

4E2054

4E2054

B. Tech. IV-Sem. (Back) Exam; April-May 2017
Mechanical Engineering
4ME6(O) Measurement and Control

Time : 3 Hours   Maximum Marks : 80
                                                Min. Passing Marks : 26

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions*
*carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any*
data you feel missing suitably be assumed and stated clearly.
Units of quantities used / calculated must be stated clearly.
Use of following supporting materials is permitted during examination.
(Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT - I

1 (a) What is calibration and why is it necessary for an instrument ?

6

   (b) Explain the construction of wire wound strain gauge and derive the
        expression for the gauge factor.

10

OR

1 (a) What is the need of a Mechanical Engineer to study measurement
        and control ? Differentiate Accuracy and Precision with an example.

8

   (b) Explain mechanical and optical strain gauges with neat sketch.

8

4E2054]   1   [P.T.O.

UNIT - II

2 **(a)** Explain construction and working principle of LVDT.

8

(b) Explain with the help of diagram how stroboscope works. Also discuss how the measured speed can be verified to be true?

8

OR

2 Describe the working principle and construction of thermocouple. Describe the different types of compensations used and also methods of measurement of their output voltage.

16

UNIT - III

3 **(a)** Write down the advantage of closed loop control system over open loop control system ?

4

(b) Describe different types of input signals commonly used.

4

(c) Find the Transfer function of the following block diagram using block diagram reduction method.
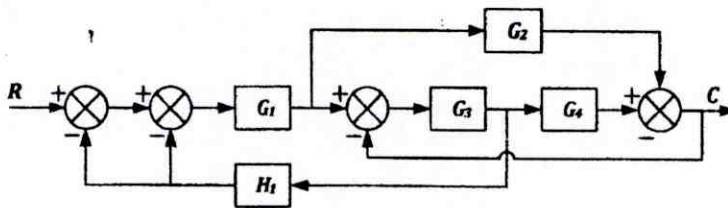

Fig. 1

8

OR

3   (a) Obtain the Transfer function for a negative feedback system with G(s) connected in its forward path and H(s) connected in its feedback path.

6

(b) Simplify the block diagram shown and obtain the closed loop transfer function C(s) / R(s). Verify the result by signal flow graph.
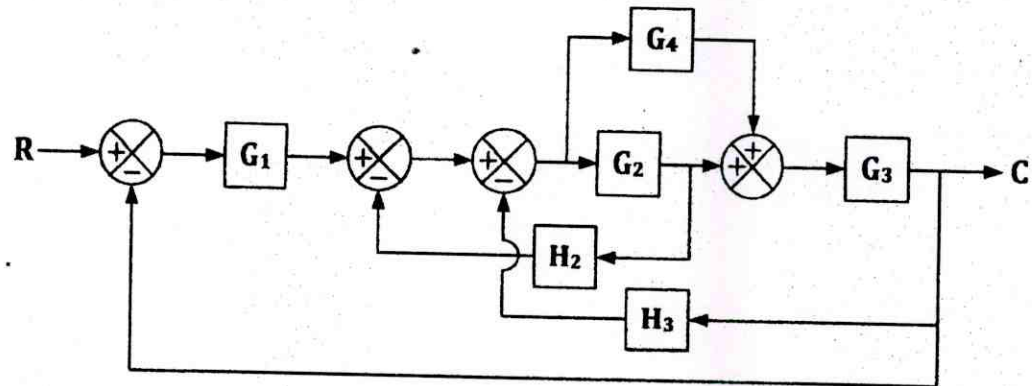

Fig. 2

10

UNIT - IV

4   Write short notes on the following :
   (a) Speed control system
   (b) Reeling system
   (c) Thermal system
   (d) Pneumatic system.

4×4

OR

4   (a) Derive the transient response of a unit input first order system.

8

(b) Define the feedback characteristics of control systems.

8

UNIT - V

5 (a) Define stability. Applying Routh criterion find the value of k if the system is stable.

$$G(s)\,H(s) = \frac{k(s+2)}{s(s+3)(s^2+2s+3)}$$

10

(b) Write down the rules of construction of loot locus.

6

OR

5 (a) Draw the polar plot of the following :

$$G(s)H(s) = \frac{1}{s(1+T_1s)(1+T_2s)}$$

8

(b) Explain Nyquist stability criterion with the help of example.

8