

3E1102

Roll No. _____

Total No of Pages: **3**

3E1102
B. Tech. IV - Sem. (Main) Exam., May - 2019
HSMC
Technical Communication
All branches

Time: 2 Hours**Maximum Marks: 80***Instructions to Candidates:*

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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. NIL2. NIL

PART – A

(Answer should be given up to 25 words only)

[5×2=10]

All questions are compulsory

Q.1 Define Technical Communication.

Q.2 What do you understand by print media?

Q.3 Name various forms of technical discourse.

Q.4 Distinguish between technical proposal and technical report.

Q.5 Mention various kinds of technical documents.

PART – B

(Analytical/Problem solving questions)

[4×10=40]

Attempt any four questions

Q.1 Discuss the importance and characteristics of technical communication. **[5+5=10]**

Q.2 Discuss the barriers to effective speaking.

Q.3 Describe the techniques to interpret and summarize technical texts.

Q.4 Spot the error and correct the following sentences: **[10×1=10]**

(a) We have received no information.

(b) i and he are brothers.

(c) I have no any friends.

(d) We should not make noise.

(e) He has finished his letter last night.

(f) If I were rich I will help you.

(g) She came yesterday, doesn't she?

(h) The last bus had gone until we had to walk home.

(i) Will you male this letter immediately?

(j) A person who can neither read or write is illiterate.

Q.5 Draft an official email informing about the forthcoming meeting of your company regarding improving work atmosphere in the company. **[10]**

Q.6 Explain the importance and types of technical articles. **[4+6=10]**

PART – C

(Descriptive/Analytical/Problem Solving/Design Question) [2×15=30]

Attempt any two questions

Q.1 Describe four basic technical communication skills and how to develop these four essential skills of technical communication? [8+7=15]

Q.2 Imagine yourself as Mehul Kumar of Kanpur, write a job application with resume in response to the advertisement for the post of Technical Executive in Tata Motors Ltd. Andheri East, Mumbai. [7+8=15]

Q.3 Discuss the kinds of Technical Proposals. Draft the format of technical proposal. [8+7=15]

4E1231

Roll No. _____

Total No of Pages: 3

4E1231

B. Tech. IV - Sem. (Main) Exam., May - 2019

BSC Automobile Engineering

4AE2 – 01 Data Analytics

AE, ME

Time: 2 Hours

Maximum Marks: 80

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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

PART – A

(Answer should be given up to 25 words only)

[5×2=10]

All questions are compulsory

- Q.1 Define Homoscedasticity and Heteroscedasticity. [2]
- Q.2 What is residual in multivariate analysis? [2]
- Q.3 What is ANOVA? [2]
- Q.4 Write a short note on cluster analysis. [2]
- Q.5 “The analysis of time series is done to understand the dynamic conditions for achieving the short term and long term goals of business firms.” Discuss. [2]

PART – B

(Analytical/Problem solving questions)

[4×10=40]

Attempt any four questions

- Q.1 Discuss the objectives and scope of data analytics in the industry. [10]
- Q.2 How would you differentiate among multiple discriminant analysis, regression analysis and logistic regression analysis? [10]
- Q.3 Find the multiple linear regression equation of X_1 , X_2 and X_3 from data relating of three variables given below - [10]

X_1	4	6	7	9	13	15
X_2	15	12	8	6	4	3
X_3	30	24	20	14	10	4

- Q.4 Write a brief essay on "Factor analysis". [10]
- Q.5 What do you understand by ARIMA model in time series data analysis? [10]
- Q.6 Explain briefly MANOVA and MANCOVA. [10]

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions)

[2×15=30]

Attempt any two questions

- Q.1 Write a short note on (any three) –
- (a) Missing data [5]
 - (b) Rotation [5]
 - (c) Conjoint Analysis [5]
 - (d) Outliers [5]

Q.2 Differentiate between CHAID and CART. How CHAID is better than CART? [10+5=15]

Q.3 The following table gives the average monthly sale of 4 salesman in three different types of territories: [15]

Territory	Salesman				Total
	A	B	C	D	
X	5	4	4	7	20
Y	7	8	5	4	24
Z	9	6	6	7	28
Total	21	18	15	18	72

Carry out a two way analysis of variance table from the above facts and interpret the result.

The 5% value of F for (3, 6) and (2, 6) degree of freedom are 4.76 and 5.14 respectively.

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Total No of Pages: 3

4E1232

B. Tech. IV - Sem. (Main) Exam., May - 2019

ESC Automobile Engineering

4AE3 – 04 Digital Electronics

AE, ME

Time: 2 Hours

Maximum Marks: 80

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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

PART – A

(Answer should be given up to 25 words only)

[5×2=10]

All questions are compulsory

Q.1 Draw V-I characteristics of P-N junction diode.

Q.2 Write down difference between Half wave & Full wave rectifier.

Q.3 What do you mean by operational amplifier?

Q.4 Differentiate positive & negative feedback systems.

Q.5 Write down the difference between Half & Full adder in brief.

PART – B

(Analytical/Problem solving questions)

[4×10=40]

Attempt any four questions

- Q.1 What do you mean by multiplexer & De-multiplexer. Describe 4 -1 multiplexer & 1- 4 De- multiplexer with application.
- Q.2 Describe shift left & shift right register with truth table & operation.
- Q.3 Explain 4 bit Asynchronous Down counter & 4 bit Asynchronous up counter with diagram.
- Q.4 Explain the need of modulation. A 400W, 1MHz carrier is amplitude-modulated with a sinusoidal signal of 2500 Hz. The depth of modulation is 75%. Calculate the sideband frequencies, bandwidth and power in sidebands and the total power in modulated wave.
- Q.5 Describe BJT as a single stage CE amplifier. Write down all the necessary expressions with the circuit diagram.
- Q.6 Differential gain A_d , of an op-amp measures 100. In the measurement of common mode gain experiment when 1.0V is applied common to both the inputs, output voltage measured is 0.01V. How much is common mode rejection ratio (CMRR)?

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions)

[2×15=30]

Attempt any two questions

- Q.1 Explain operational amplifier as -
- (i) Inverting & Non-inverting amplifier
 - (ii) Summing & differences amplifier

With diagrams & necessary expressions.

Q.2 Draw a Block diagram of GSM system. Describe the cellular concepts. Also describe various blocks used in the block diagram.

Q.3 What do you mean by Zener diode? Draw V-I characteristics of Zener diode. Describe Zener diode as a regulator.

For a Zener diode A 5.0 V stabilised power supply is required to be produced from a 12V DC power supply input source. The maximum power rating P_Z of the Zener diode is 2W. Using the Zener diode regulator circuit calculate:

- (a) Maximum current flowing through Zener diode.
 - (b) The minimum value of the series resistor R_S .
-

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Total No of Pages: **8**

4E1233

B. Tech. IV - Sem. (Main) Exam., May - 2019
PCC Automobile Engineering
4AE4 – 05 Fluid Mechanics and Fluid Machines
AE, ME

Time: 3 Hours

Maximum Marks: 160

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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

PART – A

(Answer should be given up to 25 words only)

[10×3=30]

All questions are compulsory

Q.1 What do we mean by Newtonian Fluid? Explain Newton's Law of Viscosity.

Q.2 What will be the effect of Temperature and pressure on the viscosity of the liquid and gas?

Also give reason for the effect.

Q.3 What is the cause of Surface Tension? If P is the pressure within a spherical droplet, what will be the gauge pressure within a bubble of the same size and same fluid?

- Q.4 On which different basic laws of science continuity equation, Euler's equation and Bernoulli's equation are based.
- Q.5 A garden hose of 30mm diameter then determine limiting average velocity or laminar flow.
- Q.6 What do you understand by the terms major energy losses and minor energy losses in a pipe?
- Q.7 Explain the use of foot valve in a centrifugal pump.
- Q.8 Explain different heads of a centrifugal pump.
- Q.9 State physical significance of Reynolds number.
- Q.10 What are the advantages and disadvantages of Francis turbine over a pelton wheel?

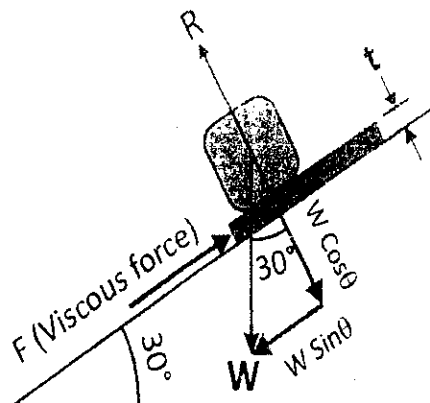
PART – B

(Analytical/Problem solving questions)

[5×10=50]

Attempt any five questions

- Q.1 A square block weighing 1kN and 100mm on an edge slides down an incline on a film of oil 5.0μm thick. Assuming a linear velocity profile in the oil, what is the terminal speed of the block? The viscosity of the oil is 5×10^{-3} (N – s/m²). [10]



Q.2 (a) What will be the necessary and sufficient condition of floating body to be stable? [5]

(b) Explain center of pressure and center of gravity, for a body immersed in liquid. [5]

Q.3 In case of pressure force acting on vertical submerged surface, the centre of pressure, point C, always lies below the centroid of the area, G. Explain analytically. [10]

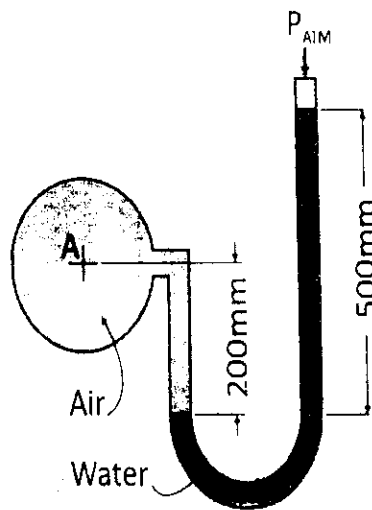
Q.4 (a) Derive expression for hydrostatic law for variation of pressure with depth. [5]

(b) In the figure shown below, air is contained in the pipe and water is the manometer liquid. Find pressure at 'A' in [5]

(1) m of water

(2) Pascal

(3) Absolute



Q.5 (a) What is Dimensional Homogeneity? Check Dimensional Homogeneity of Bernoulli

relation $p_0 = p + \frac{1}{2}\rho V^2 + \rho g z$ where [5]

p_0 = stagnation pressure

p = pressure in moving fluid

V = velocity

ρ = density

Z = altitude

g = gravitational acceleration

- (b) What will be the expression for the power P , developed by a pump when P depends upon the head H , the discharge Q and specific weight w of the fluid? [5]

Q.6 A jet of water 10cm in dia, velocity 20m/s strike a stationary flat plate which is 30° incline to the axis of the stream. [10]

- (1) Find force by jet on plate.
- (2) Flow rate of water
- (3) Ratio of discharge

Q.7 (a) What is meant by the term unit quantities for a turbine? Define and derive the relation for [5]

- (1) Unit speed
- (2) Unit discharge
- (3) Unit power

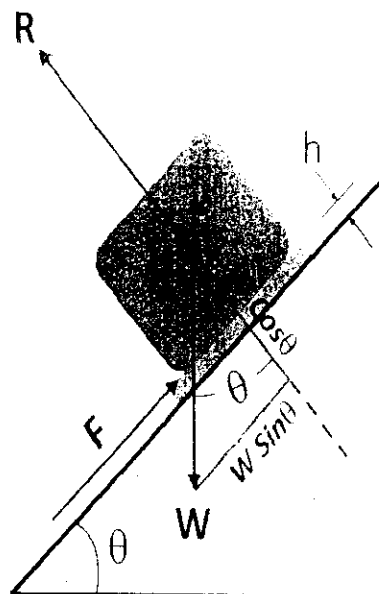
- (b) A turbine develops 10,000kW power when running at 10rpm under the head of 30m. if the head of turbine is reduced to 15 meter, what will be the speed and power developed by the turbine. [5]

PART – C

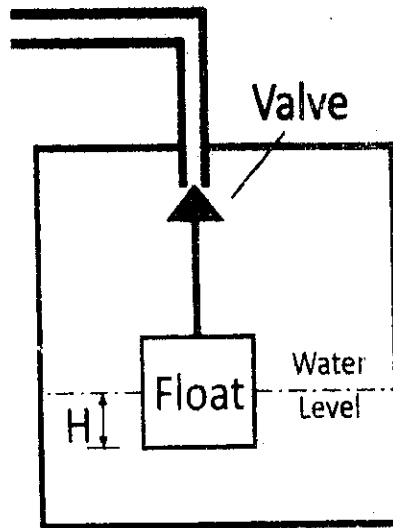
(Descriptive/Analytical/Problem Solving/Design Questions) [4×20=80]

Attempt any four questions

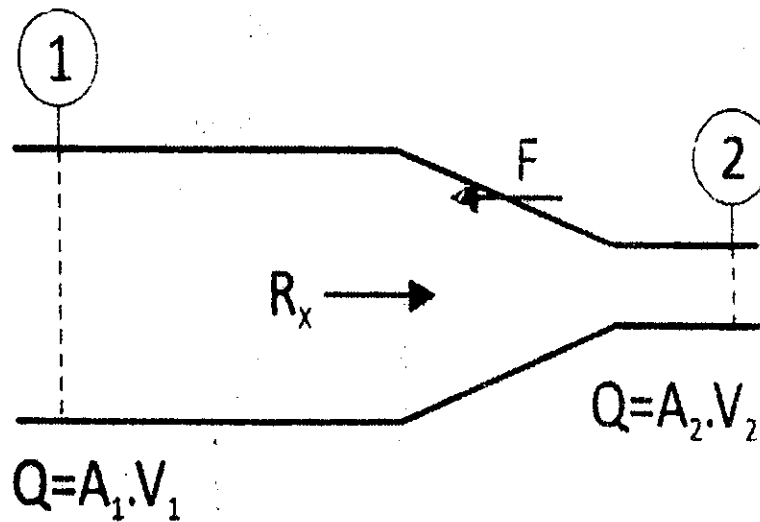
- Q.1 (a) A block of weight W slides down an inclined plane (θ) while lubricated by a thin film of oil (viscosity = μ), as in Fig. below. The film contact area with box is A and its thickness is h . Assuming a linear distribution in the film, derive an expression for the “terminal” (zero – acceleration) velocity V of the block. [10]



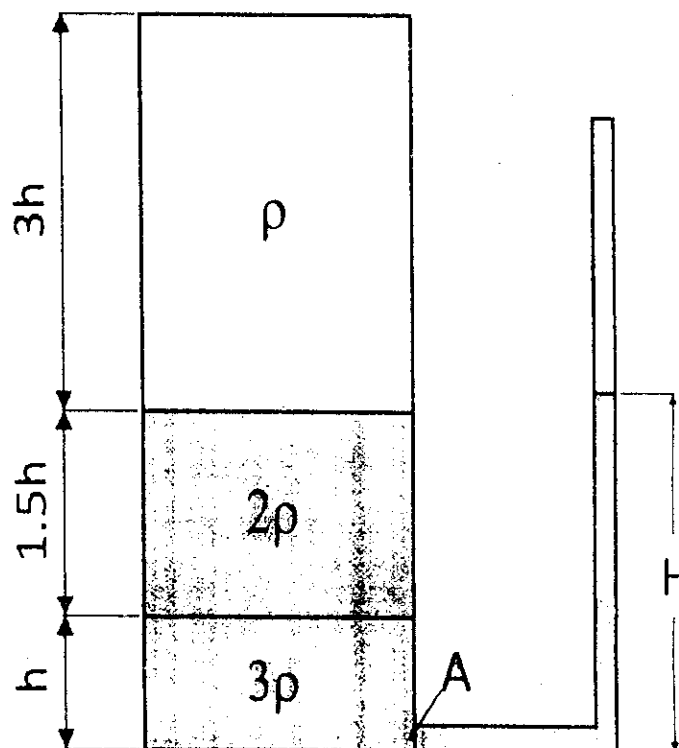
- (b) A float of cubical shape has sides of 10cm. The float valve just touches the valve seat to have a flow area of 0.5cm^2 as shown in the given figure. If the pressure of water in the pipeline is 1 bar, the rise of water level h in the tank to just stop the water flow will be : [10]



- Q.2 (a) What is buoyant force and differentiate center of buoyancy from center of gravity? [5]
- (b) Explain vapor pressure and cavitation, and how they both are related, also tell that how cavitation can be harmful to hydraulic machines. [5]
- (c) A tapered section in a horizontal pipeline reduces the diameter from 600mm to 450mm in the direction of flow. If the flow rate is 750 L/s and the upstream pressure is 300kN/m^2 , calculate : [10]
- (i) The downstream pressure
- (ii) The magnitude and direction of the force on the taper



- Q.3 (a) Explain the Euler's equation of motion, and how we can derive Bernoulli's equation from it. [10]
- (b) Three immiscible liquids of specific densities ρ , 2ρ and 3ρ are kept in a jar. The height of the liquids in the jar and at the piezometer fitted to the bottom of the jar is as shown in the given figure. The ratio H/h is? [10]



Q.4 (a) For the flow through pipes, derive the expression for Darcy Weisbach formula to calculate Major Losses. [10]

(b) Find the head lost due friction in a pipe of diameter 300mm and length 50m, water velocity in the pipe is 3m/s., kinematic viscosity $\nu = 0.01$ stoke, using Darcy Weisbach formula. [10]

Q.5 (a) What is the difference between model and prototype, and how similarity is established between them? [8]

(b) State Froude's Model Law. [6]

(c) In the model test of a spillway the discharge and velocity of flow over the model were $2\text{m}^3/\text{s}$ and 1.5m/s respectively. Calculate the velocity and discharge over the prototype which is 36 times the model size. [6]

4E1234

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Total No of Pages: 3

4E1234

B. Tech. IV - Sem. (Main) Exam., May - 2019

PCC Mechanical Engineering

4ME4 – 06 Manufacturing Processes

AE, ME

Time: 3 Hours

Maximum Marks: 120

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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

PART – A

(Answer should be given up to 25 words only)

[10×2=20]

All questions are compulsory

Q.1 Why is it necessary for all engineers to be familiar with manufacturing processes?

Q.2 Explain the function of pattern.

Q.3 Define Draft allowance.

Q.4 Differentiate pressurized and unpressurized gating systems.

Q.5 List the various additives used in molding sand.

- Q.6 What are the specific merits of cold working over hot working?
- Q.7 Why is glass a good lubricant in hot extrusion?
- Q.8 Write two differences between Soldering and Brazing.
- Q.9 Why is the neutral flame extensively used in oxy-acetylene welding?
- Q.10 What is the need of pre-sintering over sintering operations?

PART – B

(Analytical/Problem solving questions)

[5×8=40]

Attempt any five questions

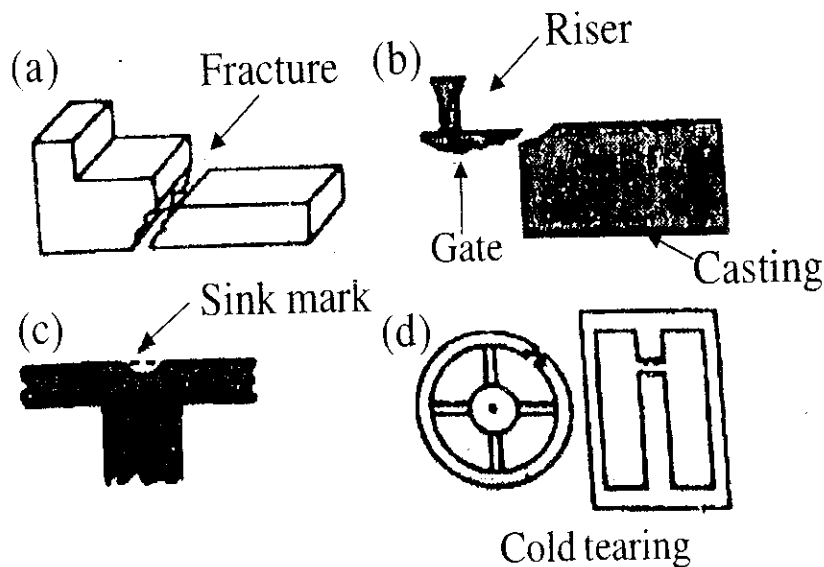
- Q.1 What are the advantages and disadvantage of casting processes over other manufacturing processes?
- Q.2 With neat sketch, describe the shell molding casting process. List the advantages of this process.
- Q.3 Differentiate hot working and cold working of metals. Mention their advantages, disadvantages and applications.
- Q.4 How extrusion operations are classified? Explain each extrusion operation with neat sketch.
- Q.5 Assume that you are reducing the diameter of two rods, one by simple tension and the other by frictionless indirect extrusion. Which will require more force? Why?
- Q.6 Explain the working principle and equipments of ultrasonic welding with neat sketch.
- Q.7 Explain any one of the atomization process used for preparing the metallic powder.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) [4×15=60]

Attempt any four questions

Q.1 The figures below indicate various defects and discontinuities in cast products. Review each one and offer solution to avoid them.



- Q.2 Review the technical literature, and make a detailed list of manufacturing steps involved in the manufacturing of long, metallic hypodermic needles.
- Q.3 Discuss the various defects observed in deep drawing process. What are the main causes of these defects and how can these be eliminated?
- Q.4 Find the best welding speed to be used for the welding of 6 mm steel plates with an ambient temperature of 30° with the welding transformer set at 25V and current passing is 300A. The arc efficiency is 0.9 and the possible travel speeds are 6 to 9 mm/sec. The limiting cooling rate for satisfactory performance is 6°C/sec at a temperature of 550°C.
- Q.5 How will you compare powder metallurgy with other manufacturing processes? Discuss various stages of this process.

4E1235

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Total No of Pages: **8****4E1235****B. Tech. IV - Sem. (Main) Exam., May - 2019****PCC Automobile Engineering****4AE4 – 07 Theory of Machines****Time: 3 Hours****Maximum Marks: 160***Instructions to Candidates:*

Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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. NIL2. NIL**PART – A****(Answer should be given up to 25 words only)****[10×3=30]****All questions are compulsory**

Q.1 For the kinematic linkages shown in Fig.1, calculate the following:

- (a) the number of total links (N) [1]
- (b) the number of joints or pairs (P) [1]
- (c) the number of degrees of freedom (F) [1]

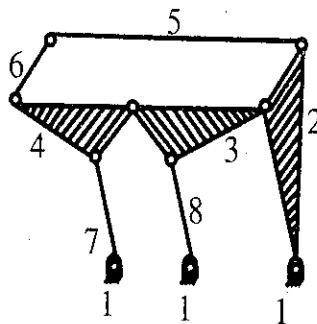


figure.1

Q.2 Find all the inversion of the four bar chain mechanism according to the Grashof's law shown in Fig.2 [3]

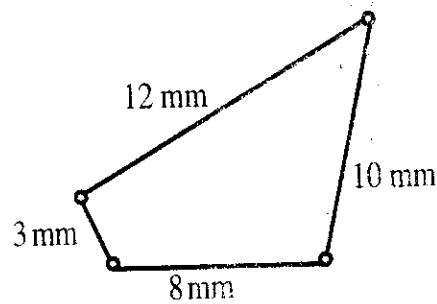


figure .2

- Q.3 (a) What is instantaneous center of rotation? [1]
 (b) How do you know the number of instantaneous centers in a mechanism? [2]
- Q.4 (a) What is a clutch? [1]
 (b) Make a sketch of a single-plate clutch. [1]
 (c) Make a sketch of a multi-plate clutch. [1]
- Q.5 Define the terms as following with neat sketch- [1]
 (a) coefficient of friction [1]
 (b) limiting angle of friction [1]
- Q.6 (a) State the law of gearing with suitable sketch. [1.5]
 (b) What types of gears are used for parallel, intersecting and skew shafts? Give the name only. [1.5]
- Q.7 What is the difference between the following gear train- [1.5]
 (a) simple gear train [1.5]
 (b) compound gear train [1.5]
 Explain with the help of sketches.
- Q.8 Why is balancing necessary for rotors of high speed engines? [3]
- Q.9 (a) What is a displacement diagram? [1.5]
 (b) Why is it necessary to draw it before drawing a cam profile? [1.5]
- Q.10 Define the following terms in gyroscopic couple- [1]
 (a) plane of spin [1]
 (b) plane of precession [1]
 (c) plane of gyroscopic couple [1]

PART - B

(Analytical/Problem solving questions)

[5×10=50]

Attempt any five questions

- Q.1 Figure.3 shows configuration of an engine mechanism. The dimensions are the following: Crank OA = 200 mm; connecting rod AB = 600 mm, distance of center of mass from crank end, AD = 200 mm. At the instant, the crank has an angular velocity of 50 rad/s clockwise and an angular acceleration of 800 rad/s². Calculate the:
- (i) velocity of D and angular velocity of AB [5]
 - (ii) acceleration of D and angular acceleration of AB [5]

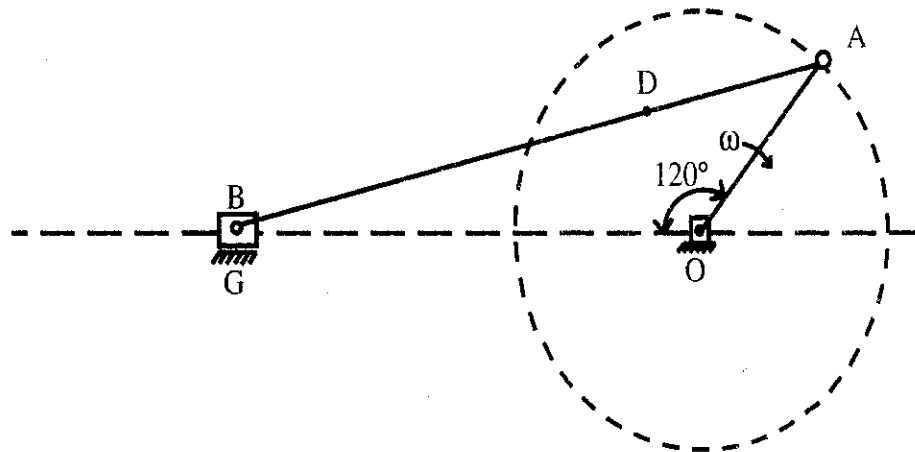


figure.3

- Q.2 A simple band brake is applied to a drum of 580 mm diameter which rotates at 240 rpm. The angle of contact of the band is 260°. One end of the band is fastened to a fixed pin and the other end to the brake lever, 150 mm from the fixed pin. The brake lever is 750mm long and is placed perpendicular to the diameter that bisects the angle of contact. Assuming the coefficient of friction as 0.25.
- (a) Determine the necessary pull at the end of the lever to stop the drum if 40 kW of power is being absorbed. [5]
 - (b) Find the width of the band if its thickness is 3mm and the maximum tensile stress is limited to 45N/mm². [5]

Q.3 Two involute gears of 20° pressure angle are in mesh. The number of teeth on pinion is 20 and the gear ratio is 2. If the pitch expressed in module is 5 mm and the pitch line speed is 120 cm/sec, assuming addendum as, standard and equal to one module find:

- (i) The angle turned through by pinion when one pair of teeth is in mesh. [6]
- (ii) The maximum velocity of sliding. [4]

Q.4 The speed ratio of the reverted gear trains, as shown in figure 4, is to be 14. The module pitch of gears A and B is 3.125 mm and of gears C and D is 3.5 mm. Calculate the suitable numbers of teeth for the following gears –

- (i) Gear A [2.5]
- (ii) Gear B [2.5]
- (iii) Gear C [2.5]
- (iv) Gear D [2.5]

No gear is to have less than 24 teeth.

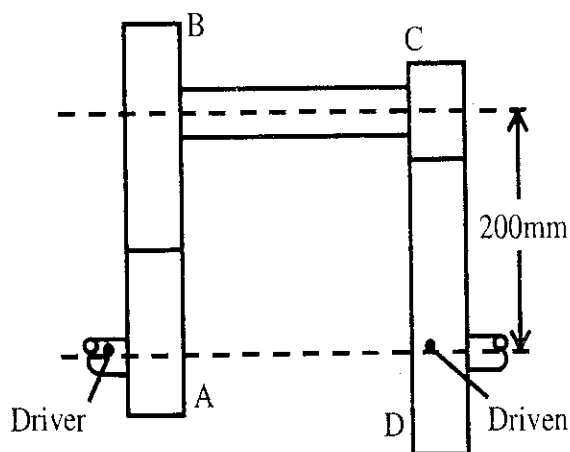


figure.4

Q.5 A cam is to give the following motion to a knife-edged follower:

- (i) To raise the follower through 30 mm with uniform acceleration and deceleration during 120° rotation of the cam.
- (ii) Dwell for next 30° of the cam rotation.
- (iii) To lower the follower with simple harmonic motion during the next 90° rotation of the cam.
- (iv) Dwell for the rest of the cam rotation. The cam has a minimum radius of 30 mm and rotates counter-clockwise at a uniform speed of 800 rpm. Draw the-
 - (a) Displacement Diagram [3]
 - (b) Velocity Diagram [3]
 - (c) Acceleration Diagram, for the motion of the follower for one complete revolution of the cam indicating main values. [4]

Q.6 The turbine rotor of a ship has a mass of 2 tonnes and rotates at 1600 rpm clockwise when viewed from the aft. The radius of gyration of the rotor is 300 mm. Determine the gyroscopic couple and its effect when the-

- (i) ship turns right at a radius of 230 m with a speed of 24 km/h. [4]
- (ii) ship pitches with the bow rising at an angular velocity of 0.6 rad/sec. [3]
- (iii) ship rolls at an angular velocity of 0.1 rad/s. [3]

Q.7 Four masses A, B, C and D carried by a rotating shaft at radius 60 mm, 80 mm, 140 mm and 120 mm respectively are completely balanced. Masses B, C and D are 6 kg, 2kg and 1 kg respectively. Determine the :

- (i) Mass A [4]
- (ii) The relative angular positions of the four masses if the planes are spaced 400 mm apart. [6]

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) [4×20=80]

Attempt any four questions

- Q.1 (a) What are double – slider – crank chain mechanism? [5]
- (b) Describe in detail the following inversions with given application-
- (i) First inversion for Elliptical Trammel. [5]
 - (ii) Second inversion for Scotch yoke. [5]
 - (iii) Third inversion for Oldham's coupling. [5]
- Q.2 (a) In what way are the expressions for the friction torque of a conical collar changed from that for a flat collar? [2.5]
- (b) In what way flat collar and conical collar are modified for pivots. [2.5]

(c) A friction clutch is used to rotate a machine from a shaft rotating at a uniform speed of 240 rpm. The disc-type clutch has both of its sides effective, the coefficient of friction being 0.25. The outer and the inner diameters of the friction plate are 200 mm and 120 mm respectively. Assuming uniform wear of the clutch, the intensity of pressure is not to be more than 80 kN/m^2 . If the moment of inertia of the rotating parts of the machine is 6 kg.m^2 , determine-

- (a) The time to attain the full speed by the machine. [5]
- (b) The energy lost in slipping of the clutch. [5]
- (c) What will be the intensity of pressure if the condition of uniform pressure of the clutch is considered? [2.5]
- (d) Determine the ratio of power transmitted with uniform wear to that with uniform pressure. [2.5]

Q.3 (a) What is meant by interference in involute gears? Explain. [3]

(b) Derive a relation for minimum number of teeth on the gear wheel and the pinion to avoid interference. [7]

(c) The center distance between two spur gears in a mesh is to be approximately 275 mm. The gear ratio is 10 to 1. The pinion transmits 360 kW at 1800 rpm. The pressure angle of the involute teeth is 20° and the addendum is equal to one module. The limiting value of normal tooth pressure is 1 kN/mm of width. Determine the-

- (a) nearest standard module so that interference does not occur. [5]
- (b) number of teeth on each gear wheel. [5]

Q.4 Explain the gyroscopic effect on four – wheeled vehicles by considering following effects -

(a) The effect of the gyroscopic couple on the stability of a four wheeler while negotiating a curve? [10]

(b) The effect of the centrifugal couple limit the speed of the vehicle. [10]

Q.5 Deduce expressions for variation in tractive force, swaying couple and hammer blow for an uncoupled two cylinder locomotive engine. [7.5+7.5+5=20]

4E4140

Roll No. _____

Total No of Pages: **4****4E4140****B. Tech. IV Sem. (Back) Exam., May - 2019****Mechanical Engineering****4ME1A Kinematics of Machines****AE, ME****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.

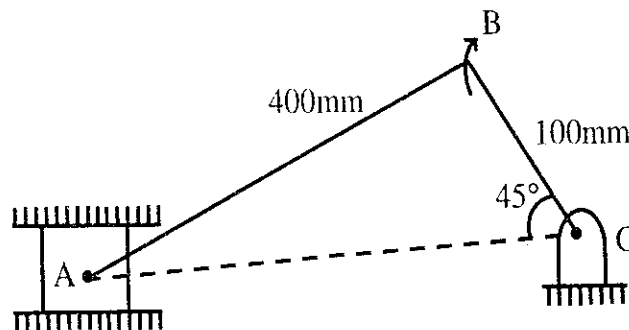
Units of quantities used/calculated must be stated clearly.

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

1. NIL2. NIL

UNIT-I

- Q.1 (a) What is kinematic chain and Pair? Classify. [6]
- (b) What is Instantaneous Centre? Locate all the Instantaneous Centre of the slider crank mechanism as shown in the fig. [10]



If the crank rotates clockwise with an angular velocity of 10 rad/sec. Then find

- (i) Velocity of the slider
(ii) Angular velocity of AB

OR

Q.1 Explain the following –

[4×4=16]

- (a) Quardric Cyclic Chain
- (b) Single Slider Crank Chain
- (c) Double Slider Crank Chain
- (d) Whitworth Quick Return Mechanism

UNIT- II

Q.2 (a) Differentiate between Davis & Ackerman steering mechanism.

[10]

(b) Explain Roberts & Grasshopper mechanism in detail.

[6]

OR

Q.2 (a) The angle between the axes of two shafts connected by Hooke's Joint is 18° . Determine the angle turned through by the driving shaft when the velocity ratio is maximum and unity.

[6]

(b) Write sort notes on –

(i) Pantograph

[2]

(ii) Tchebicheff Straight Line Mechanism

[4]

(iii) Scott-Russel Mechanism

[4]

UNIT- III

Q.3 Determine the length of open & cross belt drive.

[16]

OR

Q.3 A shaft rotating at 200 rpm drives another shaft at 300 rpm and transmits 6kw through a belt. The belt is 100 mm wide & 10 mm thick. The distance between the shafts is 4 m. The smaller pulley is 0.5m in dia. Calculate the stress in the belt if it is –

(a) an open belt drive

(b) a cross belt drive

take $\mu = 0.3$

[16]

UNIT- IV

- Q.4 (a) What characteristics should a brake lining material have? [4]
- (b) A band & block brake, having 14 blocks each of which subtends an angle of 15° at the centre, is applied to a drum of 1 m effective diameter. The drum & flywheel mounted on the same shaft has a mass of 2000 kg and a combined radius of gyration of 500mm. The two ends of the bands are attached to pins on opposite side of the brake lever at distances of 30 mm & 120 mm from the fulcrum. If a force of 200N is applied at a distance of 750 mm from the fulcrum. Find
- (a) Maximum braking Torque
- (b) Angular Retardation of the drum
- The coefficient of friction between blocks & drum may be taken as 0.25. [12]

OR

- Q.4 (a) What is a dynamometer? How many type of dynamometers are there? Explain. [4]
- (b) Write Short Notes on – [4×3=12]
- (i) Rope Brake Dynamometer
- (ii) Epicyclic Train Dynamometer
- (iii) Torsion Dynamometer

UNIT- V

Q.5 A cam is to give the following motion to a knife-edge follower –

- (a) Outstroke during 60° of cam rotation
- (b) Dwell for the next 30° of cam rotation
- (c) Return stroke during next 60° of cam rotation
- (d) Dwell for the remaining 210° of cam rotation

The stroke of the follower is 40 mm and the minimum radius of the cam is 50 mm. The follower moves with uniform velocity during both the outstroke and return strokes.

Draw the profile of the cam when

- (i) The axis of the follower passes through the axis of the cam shaft
- (ii) The axis of the follower is offset by 20 mm from the axis of the cam shaft [16]

OR

Q.5 Draw a cam profile to drive an oscillating roller follower to the specs given below –

- (a) Follower to move outwards through an angular displacement of 20° during first 120° rotation of cam.
- (b) Follower to return to its initial position during next 120° rotation of cam.
- (c) Follower to dwell during the next 120° of cam rotation.

The distance between pivot center and roller center = 120 mm; distance between pivot center & cam axis = 130 mm; minimum radius of cam = 40 mm; radius of roller = 10 mm; inward & outward strokes takes place with SHM.

4E4148

Roll No. _____

Total No of Pages: 4

4E4148

B. Tech. IV Sem. (Back) Exam., May - 2019

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

Q.1 (a) Define Surface tension. Prove that the relationship between surface tension and pressure inside a droplet of liquid in excess of outside pressure is given by

$$P = 4\sigma/d. \quad [8]$$

(b) Calculate the pressure at a height of 8000 m above sea-level if the atmospheric pressure is 101.3 KN/m² and temperature is 15°C at the sea-level assuming (i) air is incompressible (ii) pressure variation follows adiabatic law, and (iii) pressure variation follows isothermal law. Take the density of air at the sea-level as equal to 1.285 kg/m³. Neglect variation of g with altitude. [8]

OR

Q.1 Differentiate between:

- (a) Dynamic viscosity and kinematics viscosity [4]
- (b) Absolute and gauge pressure [4]
- (c) Simple and differential manometers [4]
- (d) Centre of gravity and centre of buoyancy [4]

UNIT- II

- Q.2 (a) Define the equation of continuity. Obtain an expression for continuity equation for a three-dimensional flow. [8]
- (b) Gasoline flows through a constriction in a horizontal pipe where the diameter is reduced from 20 cm to 10 cm. The pressure in the 20 cm pipe just upstream of constriction is 60 kPa. Considering no loss of energy in the flow passage, make calculations for the maximum discharge that can be passed through the constriction without the occurrence of cavitation. The barometer reads 76 cm of mercury and for gasoline vapour pressure is 56 kPa (abs) density is 650 kg/m^3 for the pressure and temperature conditions involved. [8]

OR

- Q.2 (a) State Euler's equation of motion and obtain the Bernoulli's equation from it. [8]
- (b) Pipeline carrying oil of specific gravity 0.87, change in diameters from 200mm diameter at a position A to 500mm diameter at a position B which is 4m at a higher level. If the pressure at A to B are 9.81 N/cm^2 and 5.9 N/cm^2 respectively and discharge is 200 litres/sec. Determine loss of head and direction of flow. [8]

UNIT- III

- Q.3 Show that the ratio of average velocity to maximum velocity for viscous flow between two stationary parallel plates is $2/3$. [16]

OR

- Q.3 A smooth pipe of diameter 80 mm and 800 m long carries water at the rate 0.480 m³/minute. Calculate the loss of head, wall shearing stress, centre line velocity, velocity and shear stress at 30 mm from pipe wall. Also calculate the thickness of laminar sub-layer. Take kinematic viscosity of water as 0.015 stokes. Take the value of co-efficient of friction 'f' from the relation given as: [16]

$$f = \frac{0.0791}{(Re)^{1/4}}, \text{ where } Re = \text{Reynolds number.}$$

UNIT- IV

- Q.4 (a) What are the uses of notches and weirs? Derive an expression for the discharge over a cipolletti weir? [8]
- (b) A hemispherical tank of diameter 4.m contains water upto a height of 1.5 m. An orifice of diameter 50mm is provided at the bottom. Find the time required by water (i) to fall from 1.5 m to 1.0 m (ii) for completely emptying the tank. Take $C_d = 0.6$. [8]

OR

- Q.4 (a) Derive an expression for the loss of head due to sudden enlargement. [8]

- (b) Determine the difference in the elevations between the water surfaces in the two tanks which are connected by a horizontal pipe of diameter 200 mm and length 400m. The rate of flow of water through the pipe is 250 litres/s. Consider all losses and take the value of $f=0.008$. [8]

UNIT- V

- Q.5 (a) Write short note on Hydraulic Intensifier. [4]
- (b) Explain the theory and function of a draft tube. Derive an expression for draft tube. [12]

OR

- Q.5 (a) Explain briefly about Hydraulic Ram. [4]
- (b) Prove that the maximum efficiency of Pelton wheel is given by :

$$\eta_{\max.} = \frac{1+k\cos\phi}{2} \quad [12]$$

4E4142

Roll No. _____

Total No of Pages: 3

4E4142

B. Tech. IV Sem. (Back) Exam., May - 2019

Automobile Engineering

4AE3A Machining & Machine Tools

AE, ME

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

Q.1 (a) Explain geometry of single point cutting tool with neat sketches. [8]

(b) Differentiate between orthogonal and oblique cutting. [8]

OR

Q.1 (a) What is the effect of high cutting temperature on tool and work piece? Explain how chip – tool interface temperature can be measured. [8]

(b) Discuss factors responsible for production of various types of chips. [8]

UNIT- II

- Q.2 (a) Discuss various factors affecting machinability in details. [8]
- (b) Explain various mechanism of tool wear. [8]

OR

- Q.2 (a) Explain the different types of tool material and their application. [8]
- (b) Mention the requirement of cutting fluids. [8]

UNIT- III

- Q.3 (a) Compare the merits and demerits of Broaching with other machining operations. [8]
- (b) Explain the construction and working of milling machine. [8]

OR

- Q.3 (a) Explain various parts of capstan & turret lathe machines. [8]
- (b) What is a 'twist drill'? Make a neat sketch of a twist drill and show its different parts on it. [8]

UNIT- IV

- Q.4 (a) Explain honing operation and its application. [8]
- (b) Discuss various gear finishing processes. [8]

OR

- Q.4 (a) Explain thread milling and thread grinding operations. [8]
- (b) Discuss various types of abrasives used for grinding. [8]

UNIT- V

Q.5 (a) Explain the following methods –

(i) Magnetic pulse forming. [8]

(ii) Hydraulic forming. [8]

OR

Q.5 (a) How gears are manufactured by powder metallurgy process? [8]

(b) What is the difference between gear hobbing and gear shaping? [8]

4E2051

Roll No. _____

Total No of Pages: 4

4E2051

B. Tech. IV Sem. (Old Back) Exam., May - 2019

Aeronautical Engineering

4AN3 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. NIL

2. NIL

UNIT- I

Q.1 (a) Define following:- [4×1.5=6]

- (i) Mass density
- (ii) Specific weight
- (iii) Specific volume
- (iv) Specific gravity

(b) State and prove Pascal's law. [4]

(c) Express the viscosity and kinematic viscosity in S.I. units. [6]

OR

Q.1 (a) The capillary rise in the glass tube is not to exceed 0.2 mm of water. Determine its minimum size, given that surface tension for water in contact with air = 0.0725 N/m. [8]

(b) Determine the viscosity of a liquid having kinematic viscosity 6 stokes and specific gravity is 1.9. [8]

UNIT- II

Q.2 (a) Derive Bernoulli's equation for steady flow by integrating Euler's equation of motion. [8]

(b) In a 2D incompressible flow, the fluid velocity components are given by

$$u = x - 4y \qquad v = -y - 4x$$

Show that velocity potential exists and determine its form. Find also the stream function. [8]

OR

Q.2 (a) A discharge of $2000 \text{ m}^3/\text{s}$ is to pass over a rectangular weir. The weir is divided into a number of openings each of span 10m . If the velocity of approach is 4 m/s . Find the no. of openings needed in order the head of water over the crest is not to exceed 2m . [8]

(b) A pitot tube is inserted in a pipe of 300mm diameter. The static pressure in pipe is 100mm of mercury (vacuum). The stagnation pressure at the centre of the pipe, recorded by the pitot tube is 0.981 N/cm^2 . Calculate the rate of flow of water through pipe, If the mean velocity of flow is 0.85 times the central velocity. Take $C_v = 0.98$. [8]

UNIT- III

Q.3 (a) Water at 15°C flows between two large parallel plates at a distance of 1.8m apart. Determine. [8]

(i) The maximum velocity

(ii) The pressure drop per unit length

(iii) The shear stress at the walls of the plates, If average velocity is 0.2 m/s .

The viscosity of water at 15°C is given as 0.01 poise.

(b) A $1:64$ model is constructed of an open channel in concrete which has Manning's $N = 0.074$. Find the value of N for the model. [8]

OR

Q.3 Derive on the basis of dimensional analysis suitable parameters to present the thrust developed by a propeller. Assume that the thrust P depends upon the angular velocity ω , speed of advance v , diameter D , dynamic viscosity μ , mass density ρ , elasticity of the fluid medium which can be denoted by the speed of sound in the medium C . [16]

UNIT- IV

Q.4 An old water supply distribution pipe of 250mm diameter of a city is to be replaced by two parallel pipes of smaller equal diameter having equal lengths and identical friction factor values. Find out the new diameter required. [16]

OR

Q.4 A smooth pipeline of 100mm diameter carries 2.27 m^3 per minute of water at 20°C with kinematic viscosity of 0.0098 stokes. Calculate. [16]

- (i) Friction Factor
- (ii) Maximum Velocity
- (iii) Shear stress at the boundary

UNIT- V

Q.5 Water is flowing over a thin smooth plate of length 4m and width 2m at a velocity of 1.0 m/s. If the boundary layer flow changes from laminar to turbulent at a Reynold no 5×10^5 . Find. [16]

- (i) The distance from leading edge upto which boundary layer is laminar?
- (ii) The thickness of the boundary layer at the transition point. And
- (iii) The drag force on one side of the plate. Take viscosity of water, $\mu = 9.81 \times 10^{-4} \text{ N-S/m}^2$.

OR

Q.5 A cylinder whose axis is perpendicular to the stream of air having a velocity of 20 m/s, rotates at 300 rpm. The cylinder is 2m in diameter and 10m long.

Find: (Take density of air = 1.24 kg/m^3 . For actual drag and lift, take $C_L = 3.4$, $C_D = 0.65$,

$$\frac{u\theta}{v} = 1.57)$$

- (i) The circulation.
 - (ii) Theoretical lift force per unit length.
 - (iii) Position of stagnation points.
 - (iv) The actual lift, drag & direction of resultant force.
 - (v) Find speed of rotation of the cylinder which will give only a single stagnation point.
-

4E4143

Roll No. _____

Total No of Pages: **4**

4E4143

B. Tech. IV Sem. (Back) Exam., May - 2019

Automobile Engineering

4AE4A Design of Machine Elements - I

AE, ME, PI

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. Design Data Book

2. NIL

UNIT- I

Q.1 (a) What are the factors to be considered for the selection of materials for the design of Machine Element? Discuss. [8]

(b) Define Mechanical property of an Engineering Material. State any six Mechanical properties, give their definitions and one example of the material possessing the properties. [8]

OR

Q.1 (a) What is meant by "hole basis system" and "shaft basis system". Which one is preferred and why? [8]

(b) Define tolerance, Allowance, fits and interchangeability. [8]

UNIT- II

- Q.2 (a) Design and draw a Cotter joint to support a load varying from 30 kN in compression to 30 kN in tension. The Material used is carbon steel for which the following allowable stresses may be used. The load is applied statically.
Tensile stress = Compressive stress = 50 MPa; shear stress = 35 MPa and crushing stress = 90 MPa. [16]

OR

- Q.2 (a) What are the Modes of failure? What is Allowable stress, factor of safety and stress concentration? [8]
- (b) Discuss the design procedure of spigot and socket Cotter Joint. [8]

UNIT- III

- Q.3 Design a right angled bell crank lever. The horizontal arm is 500mm long and a load of 4.5 kN acts vertically downward through a pin in the forked end of this arm. At the end of the 150mm long arm which is perpendicular to the 500mm long arm, a force P acts at right angles to the axis of 150mm arm through a pin into a forked end. The lever consists of forged steel material and a pin at the fulcrum. Take the following data for both the pins and lever Material. [16]

Safe stress in tension = 75 MPa

Safe stress in shear = 60 MPa

Safe bearing pressure on pins = 10N/mm^2 .

OR

- Q.3 (a) Define the terms- [8]
- (i) Solid length
 - (ii) Free length
 - (iii) Spring Index
 - (iv) Spring Rate
 - (v) Pitch

- (b) A truck spring has 12 number of levers; two of which are full length levers. The spring supports are 1.05m apart and the central band is 85mm 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 levers. The ratio of the total depth to the width of the spring is 3. Also determine the deflection of the spring. [8]

UNIT- IV

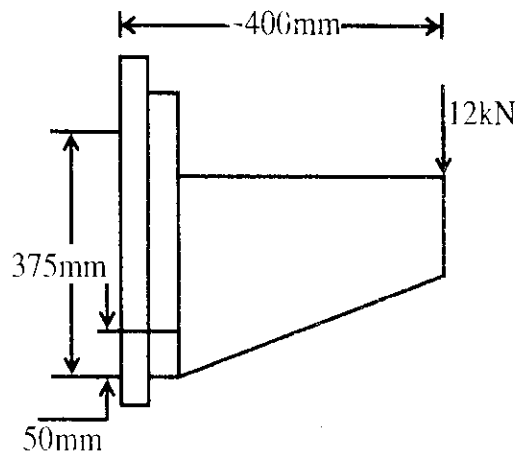
- Q.4 (a) A shaft made of mild steel is required to transmit 100 kw at 300 r.p.m.. The supported length of the shaft is 3m. It carries two pulleys each weighing 1500N supported at a distance of 1m from the ends respectively. Assuming the safe value of stress, determine the diameter of the shaft. [6]
- (b) A shaft is supported by two bearings placed 1m apart. A 600mm diameter pulley is mounted at a distance of 300mm to the right of left hand bearing and this drives a pulley directly below it with the help of belt having maximum tension of 2.25 kN, Another pulley 400mm diameter is placed 200mm to the left of right hand bearing and is driven with the help of electric motor and belt, which is placed horizontally to the right. The angle of contact for both the pulleys is 180° and $\mu=0.24$. Determine the suitable diameter for a solid shaft, allowing working stress of 63 MPa in tension and 42 MPa in shear for the Material of shaft. Assume that the torque on one pulley is equal to that on the other pulley. [10]

OR

- Q.4 (a) Write down the Design procedure of flange coupling with Diagram. [8]
- (b) A 45mm diameter shaft is made of steel with a yield strength of 400 MPa. A parallel key of size 14mm wide and 9mm thick made of steel with yield strength of 340 MPa is to be used. Find the Required length of key, if the shaft is loaded to transmit the maximum permissible torque. Use max. Shear stress theory and assume a factor of safety of 2. [8]

UNIT- V

- Q.5 (a) For supporting the travelling crane in a workshop, the brackets are fixed on steel columns as shown in fig. The Maximum load that comes on the bracket is 12 kN acting vertically at a distance of 400mm from the face of the column. The vertical face of the bracket is secured to a column by four bolts, In two rows (two in each row) at a distance of 50mm from the lower edge of the bracket. Determine size of the bolts, If the permissible value of the tensile stress for the bolt material is 84 MPa. Also find the cross section of the arm of the bracket which is rectangular. [10]



- (b) Describe the term bolt of Uniform strength. [6]

OR

- Q.5 (a) Explain different types of locking device with suitable diagram. [8]
- (b) Two shafts are connected by means of a flange coupling to transmit torque of 25 Nm. The flanges of the coupling are fastened by four bolts of the same material at a radius of 30mm. Find the size stress for the bolts if the allowable shear stress for the bolt material is 30 MPa. [8]

4E4144

Roll No. _____

Total No of Pages: **3**

4E4144

B. Tech. IV Sem. (Back) Exam., May - 2019

**Mechanical Engineering
4ME5 Industrial Engineering
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

Q.1 (a) Define Industrial Engineering. Write the role of industrial Engineer and applications of industrial Engineering. [2+4+4=10]

(b) Differentiate between work study and productivity. [6]

OR

Q.1 (a) Write down the principles of motion economy. [8]

(b) Define Method Study and briefly discuss about any one method study chart. [2+6=8]

UNIT- II

Q.2 (a) What is scientific management? Write down the difference between management and Administration. [3+5=8]

(b) Explain Fayal's 14 principles of management. [8]

OR

- Q.2 (a) Briefly discuss Taylor's principles of scientific management. [8]
- (b) An industrial operation consists of five elements with following observed times and the performance ratings [8]

Element	Observed time (min.)	Performance rating (%)
1	0.15	80
2	0.20	85
3	0.10	90
4	0.12	75
5	0.25	80

Assume rest and personal allowances as 12% and contingency allowance as 4% of the basic time. Calculate standard time per piece.

UNIT- III

- Q.3 (a) Explain about any four [4×4=16]
- (i) Public limited Company
 - (ii) Private limited Company
 - (iii) Single Proprietorship
 - (iv) Co-operative Society
 - (v) Line, staff and committee organization

OR

- Q.3 (a) Briefly explain the procedure of formation of Joint Stock Company and its merits and demerits. [8]
- (b) Differentiate between equity shares and preference shares. [8]

UNIT- IV

- Q.4 (a) Discuss about liquidity ratio, profit investment ratio, equity ratio and inventory ratio. [2+2+2+2=8]
- (b) What is compound interest? Explain about compound interest factors. [3+5=8]

OR

- Q.4 (a) Write about balance sheet and draw its format. [4+4=8]
- (b) Discuss the difference between Rate of return and Internal rate of return. [8]

UNIT- V

- Q.5 (a) Discuss the assumptions that are made while plotting a break – even chart. [7]
- (b) A factory producing only one item, which it sells for ₹ 12.50 per unit has a fixed cost equal to ₹ 60,000 and variable cost ₹ 7.5 per unit. Calculate- [3×3=9]
- (i) The number of units to be produced to break even.
- (ii) No of units to be produced to earn a profit of ₹ 12,000.
- (iii) The profit, if 25,000 units are produced and sold.

OR

- Q.5 (a) Define the concept of depreciation and explain the classification of depreciation. [4+4=8]
- (b) An engine lathe was purchased for ₹ 20,000. Its useful life was estimated as ten years and the salvage value as ₹ 5,000. Using the diminishing balance method, calculate the depreciation ratio. Also estimate the depreciation fund at the end of two years. [2+3+3=8]
-

4E4145

Roll No. _____

Total No of Pages: **3**

4E4145

B. Tech. IV Sem. (Back) Exam., May - 2019

Mechanical Engineering

4ME6A I. C. Engine

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

Q.1 Explain the working of a four stroke C.I. engine giving neat sketch. Also show in what respect the C.I. engine are superior to S. I. engine. [16]

OR

- Q.1 (a) Define the volumetric efficiency as applied to petrol engine. How does the volumetric efficiency of an engine limit the power output? [8]
- (b) Describe how the I.P. of a multi cylinder engine is measured? Mention the assumption made. [8]

UNIT- II

- Q.2 (a) What do you understand by ignition lag? Discuss the effect of different factors which affect the ignition lag. Why ignition lag should be minimum? [8]
- (b) What are the effects of sulphur content in the fuel on the performance of S.I and C.I engines? [8]

OR

- Q.2 (a) Explain the combustion stages of C.I. engines. [8]
- (b) What is meant by following terms in the refining of petroleum – [8]
- (i) Cracking
 - (ii) Polymerization
 - (iii) Blending
 - (iv) Isomerization

UNIT- III

- Q.3 (a) Explain the working of a battery ignition system with the help of neat sketch. [8]
- (b) What do you understand by angle of advance? Why it is necessary with the ignition system? [8]

OR

- Q.3 What are the basic requirement of a good injection system? Also explain the working of a fuel injector with the help of neat sketch. [16]

UNIT- IV

- Q.4 (a) What modification are required if the existing engine is to be supercharged? [8]
- (b) What is the function of an additive? Discuss different types of additives and effects on the properties of lubricating oil? [8]

OR

- Q.4 (a) Why does turbo charging of C.I. engine lead to an improvement in fuel economy, while turbo charging a S.I. engine usually leads to decreased fuel economy? [8]
- (b) Explain the lubrication of the following parts with the help of a neat sketch – [8]
- (i) Crank Pin and Gudgeon pin,
 - (ii) Main bearing
 - (iii) Cylinder and piston

350

UNIT- V

Q.5 Define the dual fuel and multifuel engine. Also describe the working of dual fuel engine with neat sketch and discuss its performance characteristic. [16]

OR

- Q.5 (a) Explain the thermodynamics of free piston engine with the help of T – s diagram. [8]
- (b) Discuss the performance characteristic of variable compression ratio engine with conventional I. C. engine. [8]
-