4E1308

Total No. of Questions : 22 Total No. of Pages : 04

Roll No. : .....

4E1308

B.Tech. IV-Sem. (Main/Back) Exam. - 2024

PLASTIC TECHNOLOGY

4PT2-01 / Data Anlytics

(AE, ME, PT)

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates :

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

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. ..... 2. .....

PART-A **[10x2=20]**

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. What is the role of data analytics in industries? Explain.

Q.2. Explain point and interval estimation with suitable examples.

Q.3. Define the terms collinearity and multicollinearity.

Q.4. What is a perceptual map?

Q.5. What is demand forecasting?

Q.6. Define homoscedasticity and heteroscedasticity.

Q.7. Write the importance of logistic regression.

Q.8. Explain level of significance.

Q.9. Explain dependent and independent variables.

Q.10. What is conjoint analysis?

PART-B **[5x4=20]**

(Analytical/Problem solving questions)

Attempt any five questions

Q.1. Explain central limit theorem (CLT).

Q.2. Define the following terms :

(a) Factor loadings

(b) Communality

(c) Eigen Value

(d) Rotation

(e) Factor Scores

Q.3. Write a short note on principal component analysis.

Q.4. Explain errors in hypothesis testing with suitable examples.

Q.5. Explain hierarchical and non-hierarchical clustering with suitable examples.

Q.6. Explain structural equation modeling (SEM).

Q.7. "A decision tree is a decision support tool that uses a tree-like model of decisions and their possible consequences." Explain the purpose of decision tree in detail.

PART-C [3x10=30]

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions

Q.1. Many organizations have started initiatives around the use of big data. However, most organizations do not necessarily have a grip on it. Across all industries, the business case for big data is strongly focused on addressing customer-centric objectives". What do you understand by management of big data? Explain. Give some emerging insights for making better use of big data.

Q.2. The time X in years that an employee spent at a company and the employee's hourly pay, Y, for 5 employees are listed in the table below. Find the equation of the Regression line for the given data.

X (Years)	Y (Hourly Pay)
5	25
3	20
4	21
10	35
15	38

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

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 is 4.76 and 5.14 respectively.

Q.4. What do you understand by factor analysis? Explain with suitable example. Explain the need of rotation phenomenon in factor analysis.

Q.5. Differentiate between CHAID and CART. How CHAID is better than CART?

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113

4E1309

Total No. of Questions : 22 Total No. of Pages : 04

Roll No. : .....

4E1309

B.Tech. IV-Sem. (Main/Back) Exam. - 2024

AUTOMOBILE / MECH. ENGG.

4AE3-04 Digital Electronics

AE, ME

Time : 3 Hours Maximum Marks : 70

Instruction to Candidates :

Attempt all Ten questions from Part A. Attempt any Five questions out of seven questions from Part B and three questions out of five questions from Part C. Schematic diagrams must be shown wherever necessary. Any data 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(As mentioned in form No.205)

1. .....

2. .....

PART-A

[10x2=20]

Answer should be given upto 25 words only

All questions are compulsory.

1. Calculate the DC output voltage of a Half wave rectifier whose input is $v_1 = 8\sin 100t$.

2. Write the name of any two electronic circuit which use positive feedback.

3. Draw the circuit diagram of an op-amp which is working as unity gain buffer.

4. Draw the logic circuit for $y = A + \overline{B}$ using NOR gate only.

5. Draw Block diagram of a wireless receiver.

6. Find the oscillation frequency of a Wein bridge oscillator in which resistor $R = 10\,k\Omega$ and capacitor $c = 1\,\mu F$.

7. Draw the frequency response of a RC coupled common emitter (CE) amplifier of single stage.

8. Write two applications of IC-555.

9. Write the full form of **GSM** used in Mobile communication.

10. Find the no. of select line in a 8x1 multiplexer.

PART-B **[5x4=20]**

Analytical / Problem solving questions

Attempt any five questions

1. Draw the logic diagram of a full adder. Also draw its truth table.

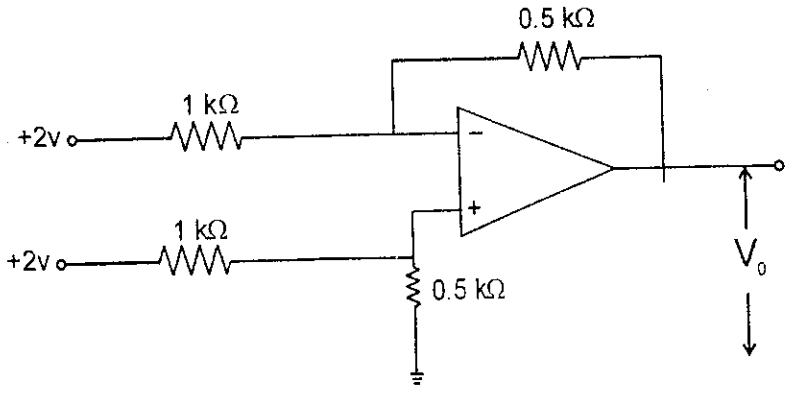
2. Draw the circuit diagram of a full wave rectifier. Also draw the output voltage wave form before and after a capacitive filter.

3. Draw the circuit diagram of a Monostable Multivibrator and explain its working.

4. Draw the Block diagram of a Microprocessor (8085).

5. Why Modulation is done in communication ? Compare the AM and FM.

6. Calculate the output voltage of following op-amp circuit.



Assume the open loop gain of op-amp is infinite.

7. Design a NAND gate logic circuit for implement the logic $y = \bar{A}B + CD$.

PART-C **[3x10=30]**

Descriptive / Analytical / Problem solving / Design questions

Attempt any three questions

1. Design a voltage regulator circuit using Zener diode that give the constant DC output of 6 volt. Assume the unregulated input voltage vary between 12 to 14 volt; $I_{1\max} = 20\ mA, V_2 = 6$ volt.

2. Draw the logic circuit of 4 bit ripple counter. Also draw its output waveform. Assume the input clock to be count is 9 square waveform of 10 KHz frequency with 50% duty cycle.

3. Draw the circuit diagram of astable or bistable multivibrator using IC-555. Also explain its working with waveforms.

4. Draw any two circuit from following using op-amp. Also explain its working :

   (i) Integrator

   (ii) Differentiator

(iii) Comparator

(iv) Summing amplifier

5. Simplify the following logic using K-map :

$$y = \sum m\left(1,2,5,7,8,9(0) + d(13,15)\right)$$

XXX

117

4E1310

Total No. of Questions : 22 Total No. of Pages : 04

Roll No. : .....

4E1310

B.Tech. IV-Sem. (Main/Back) Exam. - 2024

AUTOMOBILE ENGINEERING

4AE4-05 / Fluid Mechanics and Fluid Machines

AE, ME

Time : 3 Hours Maximum Marks : 70

Instructions to Candidates :

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

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. ..... 2. .....

PART-A **[10x2=20]**

Answer should be given upto 25 words only

All questions are compulsory.

Q.1. Define the term 'buoyancy'and explain how it affects floating and sinking bodies.

Q.2. Define the centre of buoyancy and centre of pressure.

Q.3. State Pascal's law and its applications in fluid mechanics.

Q.4. Write the names of hydraulic turbines.

Q.5. Define surface tension and capillarity. Explain their effects on fluid behaviour.

Q.6. Convert 1 stoke into SI Unit (m^2/s).

Q.7. Define the term 'reynolds number' and discuss its significance in fluid flow.

Q.8. Define :

(i) Turbulent flow, and

(ii) Steady flow

Q.9. Define the following fluid properties :

(i) Viscosity, and

(ii) Specific volume

Q.10. Write the names of flow measuring devices.

PART-B [5x4=20]

Analytical / Problem solving questions

Attempt any five questions

Q.1. Discuss the principle of operation of a manometer and its applications in measuring fluid pressure.

Q.2. A fluid with a density of 1000 kg/m^3 and a viscosity of 0.1 Pa.s flows through a circular pipe with a diameter of 0.1 m at a velocity of 2 m/s. Calculate the Reynolds number and determine the flow regime.

Q.3. Determine the viscosity of a liquid having kinematic viscosity 10 stokes and specific gravity 1.2.

Q.4. Determine the depth of immersion of cube of side 2 m and density 800 kg/m^3 floats in water.

Q.5. The velocity distribution for flow over a plate is given by $u=5y-y^2$, where u is the velocity in m/s at a distance y metre above the plate. Determine the shear stress at y=5cm. Assume dynamic viscosity as 6 poise.

Q.6. A reciprocating pump operates with a piston diameter of 0.2 m and a stroke length of 0.3 m. If the pump delivers 0.1 m^3 of water per second, calculate its discharge velocity.

Q.7. Explain the working principle of a Francis turbine with the help of a diagram.

PART-C **[3x10=30]**

Descriptive / Analytical / Problem solving / Design questions

Attempt any three questions

Q.1. Determine the meta-centric height of wooden block of size $2m \times 2m \times 2\ m$ and specific gravity 0.8 floats in water.

Q.2. Derive an expression for the depth of center of pressure from free surface of liquid for inclined immersed plane.

Q.3. Derive an expression for the discharge through a venturimeter.

Q.4. Explain the working principle of a Pelton wheel turbine and derive the expression for the work done by water on the runner.

Q.5. A fluid flows through a pipe of diameter 0.3 m with a velocity of 3 m/s. If the pressure at a certain point in the pipe is 200 kPa, determine the pressure at another point 10 m downstream from the first point. Consider the fluid to be incompressible and neglect losses.

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4E1233

Total No. of Questions: Total No. of Pages:

Roll No. _____

B. Tech. IV-Sem. (Back) Exam. 2024
PCC Automobile Engg.
4AE4-05 Fluid Mechanics and Fluid Machines
4E1233
AE,ME

Time: 3 Hours **Maximum Marks: 160**
Min. Passing Marks: 65

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 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._____ 2. _____

Part A(Answer should be given up to 25 words only)
All questions are compulsory

Q.1 State the Newton's law of viscosity and give example of its application.

Q2. Define Newtonian and Non-Newtonian fluids.

Q3. Why does the viscosity of a gas increases with the increase in temperature while that of a liquid decreases with increase in temperature?

Q4. Differentiate between absolute and gauge pressure?

Q5. What do you understand by 'Centre of pressure'?

Q6. Define 'Met centric height'

Q7. Differentiate between laminar and turbulent flow.

Q8. What is Euler's equation of motion?

Q9. State Buckingham's π theorem.

Q10. Differentiate between pumps and turbines. **10 x 3 = 30**

Part B Analytical/Problem solving questions
Attempt any five questions

Q1. A simple U- tube manometer containing mereury is connected to a pipe in which a fluid of sp. Gr. 0.8 and having a vacuum pressure is flowing. The other end of the manometer is open to atmosphere. Find the vacuum pressure in pipe, if the difference of mercury level in the tv is 40 cm and the height of fluid in the left from the center of pipe is 15 cm below.

Q2. Explain the different type of of hydraulic similarities that must exist between a proto its model.

Q3. What are the conditions of equilibrium of a floating body and a submerged body?

Q4. Derive an expression for continuity equation for a three dimensional flow.

Q5. Explain the principle of venturimeter with a neat sketch.

Q6. Derive an expression for the loss of head due to sudden enlargement of a pipe.

Q7. Prove that area of indicator diagram is proportional to the work done by the recip pump? **5 x 10**

Part C(Descriptive/Analytical/Problem Solving/Design Questian)
Attempt any four questions

Q1. State the Bernoulli's theorem for steady flow of an incompressible fluid. D expression for Bernoulli's equation from first principle and state the assumptions made a derivation.

Q2. A pipe line, 300 mm in diameter and 3200 m long is used to pump up 50 kg per sec oil whose density is 950 kg/m^3 and whose kinematic viscosity is 2.1stokes. The center o line at the upper end is 40 m above than at the lower end. The discharge at the upp atmospheric. Find the pressure at the lower end and draw the hydraulic gradient and tot line.

Q3. The internal and external diameter of the impeller of a centrifugal pump is 200 mm mm respectively. The pump is running at 1200 RPM. The vane angles of the impeller at outlet are 20^0 and 30^0 respectively. The water enters the impeller radially and velocity constant. Determine the work done by the impeller per unit weight of water.

Q4. Explain the principle and working of reciprocating pump with a neat sketch.

Q5. Classify the hydraulic turbines. Also explain different components and working wheel turbine with a schematic diagram. **4 x 20**

122

4E1311

Total No. of Questions : 22 Total No. of Pages : 04

Roll No. : .....

4E1311

B.Tech. IV Sem. (Main/ Back) Exam. 2024

AUTOMOBILE / MECH. ENGG.

4ME4-06 / Manufacturing Processes

AE, ME

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates :

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

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. ..... 2. .....

PART-A **[10x2=20]**

(Answer should be given up to 25 words only)

All questions are compulsory

1. Define the core and core print. [2]

2. Discuss the different parts of gating system. [2]

3. Compare between hot working and cold working forming process. [2]

4. What is the Press Forgin? [2]

5. Write the types of welding techniques and electrodes. [2]

6. Discuss the friction welding. [2]

7. Identify the various sheet metal operations . [2]

8. Write the name of pattern and mould making materials. [2]

9. State the principle of rolling process. [2]

10. Define the mechanical Pulverization. [2]

PART-B [5x4=20]

(Analytical/Problem solving questions)

(Attempt any five question)

1. Classify the casting processes. Enlist the casting defects with their remedy. [4]

2. What are the moulding sand properties and briefly explain the permeability test of moulding sand. [4]

3. Describe the types of forging operations. What are the defects in forged parts? [4]

4. Illustrate the principle of extrusion process. Explain the impact and hydrostatic extrusion process with their advantages and applications. [4]

5. Classify the different drawing processes. Explain briefly wire and deep drawing processes with diagrams. [4]

6. Sketch and explain the explosive and thermit welding with their applications. [4]

7. Define the powder metallurgy process. What are the different post processing operations used in powder metallurgy process. [4]

PART-C [3x10=30]

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions

1. What is Pattern? Describe the different types of patterns and pattern allowances with neat sketch. [10]

2. Distinguish the rolling process based on roll arrangement, temperature and products. Derive the expression for the angle of bite in rolling process. Also, explain the phenomenon of slip in rolling process. [10]

3. Explain the following casting methods: [10]

   (a) Investment casting

   (b) Centrifugal casting

   (c) Slush casting

   (d) Shell mould casting

4. Describe the different metal joining processes. Explain the principle and equipment details of arc welding. Also, write the functions of electrodes in welding. [10]

5. Discuss the characteristics possessed by powder processed materials. What important steps are involved during manufacturing of parts by powder metallurgy method, also explain in brief each steps. [10]

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126

4E1312

Total No. of Questions : 22 Total No. of Pages : 03

Roll No. : .....

4E1312

B.Tech. IV-Sem. (Main/Back) Exam. - 2024

AUTOMOBILE ENGG.

4AE4-07 Theory of Machines

AE, ME

Time : 3 Hours Maximum Marks : 70

Instructions to Candidates :

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

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. ..... 2. .....

PART-A [10x2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. Define instantaneous centre of rotation.

Q.2 Name the different types of links.

Q.3. Sketch the reverted gear train.

Q.4. What is the difference between a kinematic chain and a mechanism?

Q.5. Define kinematic links, kinematic pairs and kinematic chain.

Q.6. Define gyroscopic couple.

Q.7. Define dynamic balancing.

Q.8. Distinguish between Mechanism and Machines.

Q.9. Write the name of different types of brakes.

Q.10. Write the formula of primary and secondary unbalanced forces.

PART-B

[5x4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1. Explain with neat sketch the Quick Return Mechanism.

Q.2 Explain with neat sketch the Epicyclic gear train.

Q.3. What do you mean by primary and secondary unbalanced force in reciproating engine.

Q.4. What is a **Cam**? What type of motion can be transmitted with a Cam and follower combination? What are its elements?

Q.5. Explain with neat sketch the various inversions of double slider crank chain.

Q.6. What is the difference between brake and clutch.

Q.7. Calculate gyroscopic couple acting on a disc with has radius of 120 mm Angular and processional velocity are 16 rad / s and 8 rad / s respectively. Assume density = 7810 kg / m^3 and thickness of disc = 30 mm.

PART-C

[3x10=30]

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any three questions

Q.1. Derive an expression for friction torque considering the uniform wear theory for flat collar.

Q.2 Derive the equation of displacement, velocity and acceleration of slider for slider crank mechanism by analytical method.

Q.3. Explain the working of a band brake and derive an expression for braking torque.

Q.4. Explain the principles of gyroscopic couple and its effects on a vehicle taking a turn. Include a diagram to support your explanation.

Q.5. Draw the displacement diagram for a follower when it moves with simple harmonic motion [SHM]. Given lift = 40 mm and angle of ascent = 60^{o}.

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129

4E1235

Total No. of Questions : 22 Total No. of Pages : 04

Roll No. : .....

4E1235

B.Tech. IV-Sem. (Back) Exam. - 2024

4AE4-07, THEORY OF MACHINE

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 questions from Part-C.

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. ..... 2. .....

PART-A **[10x3=30]**

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. List the types of Mechanisms. [3]

Q.2. State law of Gearing. [3]

Q.3. Write the types of Friction. [3]

30

Q.4. Define effort of a Governor. [3]

Q.5. What is the significance of dynamic balancing? [3]

Q.6. Explain reverted gear train. [3]

Q.7. Explain hunting in governors. [3]

Q.8. What is interference in gearing? [3]

Q.9. What is Swaying Couple? [3]

Q.10. What is quick return mechanism? [3]

PART-B [5×10=50]

(Analytical/Problem solving questions)

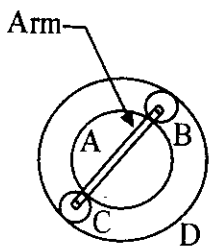
Attempt any five questions

Q.1. Sketch and explain the various inversions of slider chain mechanisms. [10]

Q.2. Describe with the neat sketch multiplate friction clutch. [10]

Q.3. Derive an expression for minimum number of teeth required on a pinion to avoid interference in involutes gear teeth when meshes with wheel. [10]

Q.4. A uniform disc of diameter 300 mm and a mass of 5 kg is mounted on one end of an arm of length 600 mm. The other end of the arm is free to rotate in a universal bearing. If the disc rotates about the arm with the speed of 300 r.p.m. clockwise, looking from the front, with what speed will it precess about the vertical axis? [10]



Q.5. Explain the term height of the governor. Derive an expression for the height in the case of a Watt governor. What are the limitations of a Watt governor? [10]

Q.6. What is Cam and followers? Explain with sketches various types of cam and followers. [10]

Q.7. Four masses A, B, C, D revolve at equal radii and are equally spaced along a shaft. The mas B is 7 kg and the radii of C and D make angles of 90° and 240° respectively with the radius of B. Find the magnitude of the masses A, C, and D and the angular position of A so that the system may be completely balanced. [10]

PART-C [4x20=80]

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any four questions

Q.1. Explain following with neat sketches : [20]

(i) Classification of Kinematic pairs

(ii) Oldham's Couplings

(iii) Elliptical Trammel

Q.2. An epicyclical gear train of gear is arranged as shown in figure. How many revolutions does the arm, to which the pinion B and C are attached. Make if : [20]

(a) When A makes one revolution clockwise and D makes half a revolution anticlockwise.

(b) When A makes one revolution clockwise and D is stationery.

The number of teeth on the gear A and D are 40 and 90 respectively.

Q.3. Two involutes 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 on module is 5 mm and the pitch line speed is 1.2 m/s. Assume the addendum as standard are equal to one module. Find : [20]

(i) The angle turned through by pinion when pair of teeth is in mesh : and

(ii) The maximum velocity of sliding

Q.4. The arms of porter governor are each 250mm long and pivoted on the governor axis. The mass of each ball is 5 kg and the mass of central sleeve is 30kg. The radius of rotation of the balls is 150mm when the sleeve begins to rise and reaches to value of 200 mm for maximum speed. Determine the speed range of the governor. If the friction at the sleeve is equivalent to 20N load at the sleeve, determine how the speed range is modified. [20]

Q.5. Write short notes on the following : [20]

(i) Partial balancing of the locomotives

(ii) Hammer blow and tractive effort

(iii) Effect of gyroscopic couple on stabilization of ship.

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