

Code No: 134AK

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, May - 2019

COMPUTER ORGANIZATION

(Common to CSE, IT)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

- 1.a) What is the purpose of BUN instruction? [2]
- b) Define computer organization, computer architecture. [3]
- c) Contrast 8086 minimum mode with maximum mode. [2]
- d) How an address is latched in 8086? [3]
- e) What is the need of a linker? [2]
- f) What is the difference between a macro and a procedure? [3]
- g) What is the disadvantage of strobe method? [2]
- h) Provide the hardware for signed-2's complement addition and subtraction. [3]
- i) Define miss penalty for cache memory. [2]
- j) Draw the system bus structure for multiprocessors. [3]

PART – B

(50 Marks)

2. List the registers for the basic computer and give their functionality in program execution. [10]

OR

3. Describe the micro programmed control organization and compare its advantages over hardwired control. [10]

4. Evaluate the following arithmetic statement using zero, one, two and three address instructions. Use the conventional symbols and instructions.
 $X = (A+B) * (C+D)$. [10]

OR

5. Does 8086 support instruction pipelining? Justify your answer with relevant example instructions. [10]

6. Develop an assembly language program to find out numbers odd and even numbers in a given series of 16-bit hexa decimal numbers. [10]

OR

7. Elaborate on the techniques used to pass parameters to procedures in assembly language program. [10]

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8. Show the step-by-step multiplication process using Booth algorithm when the following binary numbers are multiplied. $(+33) \times (-12)$. [10]

OR

9. Design a circuit for a 4×4 First In First Out Buffer and explain its functionality. [10]

- 26 26 26 26 26 26 26
10. A digital computer has a memory unit of $64K \times 16$ and a cache memory of 1K words. The cache uses direct mapping with a block size of 4 words.

(a) How many bits are there in the tag, index, block and word fields of the address format?

(b) How many bits are there in each word of cache and how are they divided into function? Include a valid bit. [10]

OR

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11. Does pipelining get affected by data dependencies among the instruction? Justify your answer with lucid examples. [10]

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Code No: 134BC

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, May - 2019

FLUID MECHANICS AND HYDRAULIC MACHINES

(Common to ME, MSNT)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit.

Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

- 1.a) Name the phenomenon of capillarity. [2]
- b) How the pressure can be measured by a manometer. [3]
- c) Name the different forces present in a fluid flow. For the Euler's equation of motion, which forces are taken into consideration? [2]
- d) Explain the working principle of Orifice meter. [3]
- e) Define boundary layer and boundary layer thickness. [2]
- f) Define Hydraulic gradient line and Total energy line. [3]
- g) Mention the causes of cavitation in Francis turbine. [2]
- h) How governing of speed is done on Pelton wheel? [3]
- i) How the centrifugal pumps are classified? [2]
- j) Define Slip, percentage slip and negative slip in of a reciprocating pump. [3]

PART – B

(50 Marks)

2. Differentiate between:
 - a) Absolute pressure and gauge pressure
 - b) Piezometer and simple manometer
 - c) U-tube differential manometer and inverted U-tube differential manometer. [10]

OR

3. Define viscosity. A plate having an area of 0.7 m^2 is sliding down the inclined plane at 45° to the horizontal with a velocity of 0.45 m/s . there is a cushion of fluid 2 mm thick between the plane and the plate. Find the viscosity of the fluid if the weight of the plate is 300 N . [10]

- 4.a) State the momentum equation. How will you apply momentum equation for determining the force exerted by a floating liquid on a pipe bend?
- b) Derive Bernoulli's equation through Euler's equation of motion. [5+5]

OR

5. Water flows through a pipe AB 1.2 m diameter at 3 m/s and then passes through a pipe BC 14.5 m diameter. At C, the pipe branches. Branch CD is 0.8 m in diameter and carries one-third of the flow in AB. The flow velocity in branch CE is 2.5 m/s . find the volume rate of flow in AB, the velocity in BC, the velocity in CD and the diameter of CE. [10]

6. Explain in detail laminar boundary layer, turbulent boundary layer, laminar sub-layer.

[10]

OR

- 7.a) At a sudden enlargement of a water main from 240 mm to 480 mm diameter, the hydraulic gradient rises by 10 mm. estimate rate of flow.

- b) Derive an expression for minor losses due to sudden contraction.

[5+5]

- 8.a) Show the governing mechanism of a Pelton wheel turbine with a neat sketch and explain how it works.

- b) A Pelton wheel has a mean bucket speed of 10 meters per second with a jet of water flowing at the rate of 700 litres/s under a head of 30 meters. The buckets deflect the jet through an angle of 160° . Calculate the power given by water to the runner and hydraulic efficiency of the turbine. Assume co-efficient of velocity as 0.98.

[5+5]

OR

- 9.a) Define the terms 'unit power', 'unit speed' and 'unit discharge' with reference to a hydraulic turbine. Also derive expressions for these terms.

- b) A Kaplan turbine runner is to be designed to develop 9100 kW. The net available head is 5.6 m. If the speed ratio = 2.09, flow ratio = 0.68, overall efficiency = 86% and the diameter of the boss is $1/3$ the diameter of the runner. Find the diameter of the runner, its speed and the specific speed of the turbine.

[5+5]

- 10.a) Obtain an expression for the work done by impeller of a centrifugal pump on water per second per unit weight of water.

- b) The internal and external diameters of the impeller of a centrifugal pump are 200 mm and 400 mm respectively. The pump is running at 1200 r.p.m. The vane angles of the impeller at inlet and outlet are 20° and 30° respectively. The water enters the impeller radially and velocity of flow is constant. Determine the work done by the impeller per unit weight of water.

[5+5]

OR

- 11.a) Define and derive an expression for Manometric Efficiency, Mechanical Efficiency and Overall Efficiency.

- b) A centrifugal pump is to discharge $0.118 \text{ m}^3/\text{s}$ at a speed of 1450 r.p.m. against a head of 25 m. The impeller diameter is 250 mm, its width at outlet is 50 mm and manometric efficiency is 75%. Determine the vane angle at the outer periphery of the impeller. [5+5]

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Code No: 124DH

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, May - 2019

PRINCIPLES OF ELECTRICAL ENGINEERING

(Electronics and Communication Engineering)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A

(25 Marks)

- 1.a) Give the solution for instantaneous current $i(t)$ in a simple RL circuit without source. Take initial conditions $i(0)=I_0$. Draw the response graph indicating the factors effecting the rate of decay. [2]
- b) Find the Laplace transform of $\{e^{-2t}\sin(5t + 0.2\pi)\}$. [3]
- c) Define input impedance of a one-port network. Give the formula to determine it. [2]
- d) Define short circuit admittance parameters of a two-port network. [3]
- e) Give the classification of filters. [2]
- f) Draw the circuit diagram of π type attenuator. [3]
- g) Give the EMF equation of a DC generator and explain the factors effecting it. [2]
- h) List out various losses in DC machine and give the factors effecting them. [3]
- i) Define Regulation of a transformer. Give the general expression for it. [2]
- j) Give the applications of Stepper motors. [3]

PART-B

(50 Marks)

2. For the network shown in figure 1, the switch is closed at $t=0$. Determine the current $i(t)$ using solution to differential equations. [10]

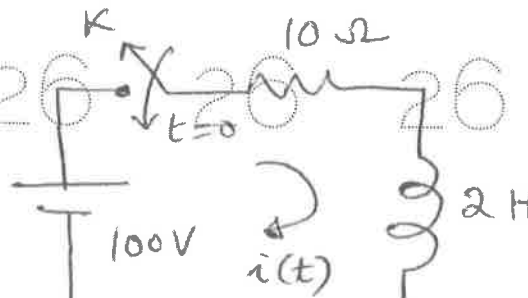


Figure: 1
OR

3. Find $i(t)$ if switch K is closed at $t=0$ as shown in figure 2. [10]

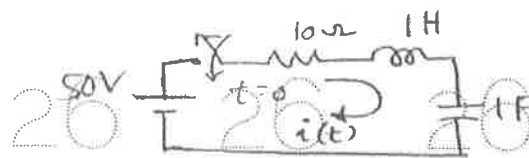


Figure: 2

4. Determine the z-parameters of given network as shown in Figure 3. [10]

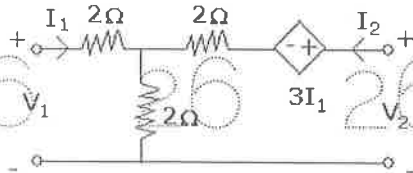


Figure: 3

OR

- 5.a) Write the standard Y-parameter equations. Obtain the Y-parameters in terms of Z-parameters.
b) Obtain Z-parameters for the circuit shown in figure 4 and thereby obtain ABCD parameters. [4+6]

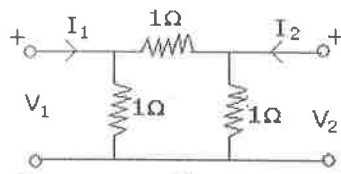


Figure: 4

- 6.a) What is the difference between constant-k and m-derived filters?
b) Design a constant-k type band-pass filter π section to be terminated in 600Ω resistance having cut-off frequencies of 2 kHz and 5 kHz. [3+7]

OR

- 7.a) Distinguish between Band Pass filter and Band Elimination filter with a suitable example.
b) Explain the design procedure of constant K low pass filter. [5+5]

- 8.a) Explain the basic principle of operation of DC generator with the help of neat sketches.
b) Explain the armature resistance and field control methods of speed control of DC shunt motor. [5+5]

OR

- 9.a) Explain the different types of DC generators with the help of circuit diagrams.
b) Give the procedure to determine the efficiency of DC machine using Swinburne's Test. Draw the experimental circuit diagram. [5+5]

- 10.a) Give the constructional details of single-phase transformer with help of neat sketches.
b) Develop an equivalent circuit of a single phase transformer from fundamentals. [5+5]

OR

- 11.a) Explain the principle of operation of single phase transformer and draw the phasor diagram for no-load and on-load operating conditions.
b) A 300kVA, 11kV/440V, single phase, 50Hz, transformer gave the following test results. Open circuit test on LV side with a normal voltage and frequency, input 1.3 kW, 4A; short circuit test HV side with voltage 600V, input 2.80kW, 15A. Calculate the efficiency and regulation for full load at 0.8 p.f. [4+6]

Code No: 124DU

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, May - 2019

THERMAL ENGINEERING – I

(Common to ME, AME)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit.

Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

- 1.a) What is the purpose of lubrication to an engine?
- b) What happens if the fuel is injected too early?
- c) List out four antiknock additives.
- d) Why excess air is to be supplied to a CI engine?
- e) Define volumetric efficiency.
- f) Distinguish between blower and compressor.
- g) Define isentropic efficiency.
- h) What is the purpose of a roots blower?
- i) Define ton of refrigeration.
- j) List out are the applications of air refrigeration?

[2]
[3]
[2]
[3]
[2]
[3]
[2]
[3]
[2]
[3]

PART-B

(50 Marks)

- 2.a) Draw the valve timing diagram of a 4 stroke CI engine and explain.
- b) What are the merits and demerits of air cooled engines over water cooled engines?

[5+5]

OR

- 3.a) With a neat sketch explain the fuel injection system in a CI engine.
- b) What are the different types of lubrication systems?

[5+5]

- 4.a) What are the effects of bad design combustion chambers?
- b) What is an aircell combustion chamber?

[5+5]

OR

5. What are the different stages of combustion in SI engines?

[10]

- 6.a) List and explain various methods for finding frictional power of an engine.
- b) How do you measure mean effective pressure?

[5+5]

OR

7. Derive an expression for the optimums inter cooler pressure for two stage reciprocating air compressors with perfect inter cooling.

[10]

- 26 26 26 26 26 26 26 2
- 8.a) What is the function of impeller and diffuser in a centrifugal compressor?
b) Explain why nowadays axial flow compressors are largely used for aviation gas turbines. [5+5]

OR

- 26 26 26 26 26 26 26 2
- 9.a) What is the benefit of using an after cooler with an air-compressor when air under pressure has to be stored over long period?
b) Mention the important applications of compressed air. [5+5]
- 10.a) Explain the simple vapour compression system with the help of a P-V diagram.
b) The inlet conditions to a Brayton cycle are 1 bar and 300 K. The cycle pressure ratio is 6.5. The temperature at the inlet to the turbine is 500 K. Calculate the performance parameters of the cycle. [5+5]

OR

- 26 26 26 26 26 26 26 2
- 11.a) Explain with a neat sketch the working of an air refrigeration cycle.
b) What is the effect of superheating and subcooling on COP? [5+5]

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, May - 2019

DESIGN AND ANALYSIS OF ALGORITHMS

(Computer Science and Engineering)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

- 1.a) Explain the Big oh notation. [2]
- b) Explain Binary search in brief. [3]
- c) What are disjoint sets? [2]
- d) What is spanning tree? [3]
- e) State the travelling salesman problem. [2]
- f) Write the applications of Dynamic programming. [3]
- g) What is Hamiltonian cycle? [2]
- h) Explain 8-queen problem. [3]
- i) What is NP-Complete? [2]
- j) Explain non-deterministic algorithm. [3]

PART-B

(50 Marks)

- 2.a) Describe the performance analysis of an algorithm in detail.
 - b) Briefly explain merge sort algorithm with suitable example and derive its time complexity. [5+5]
- OR**
- 3.a) Define time complexity. Describe different notations used to represent time complexities.
 - b) Explain divide and conquer in detail. [5+5]
- 4.a) Write a nonrecursive algorithm for inorder traversal of a binary tree T.
 - b) Explain AND/OR Graphs. [5+5]
- OR**
5. Explain in detail about:
 - a) Depth First Search
 - b) Breadth First Search. [5+5]
- 6.a) Explain Optimal binary search tree.
 - b) Explain the Prim's algorithm with an example. [5+5]
- OR**
- 7.a) Solve the following 0/1 Knapsack problem where $P=(10, 5, 15, 7, 6, 18, 3)$, $W=(2, 3, 5, 7, 1, 4, 1)$, $C=15$, $n=7$.
 - b) Write an algorithm of all pairs shortest path problem. [5+5]

- 8.a) Explain in detail about backtracking.
b) Explain the graph coloring with example.

[5+5]

OR

- 9.a) Briefly explain the Hamiltonian cycle using backtracking.
b) Explain the FIFO Branch and Bound solution.

[5+5]

- 10.a) Compare and contrast between NP-Hard and NP Complete.
b) Briefly explain Cooks theorem.

[5+5]

OR

- 11.a) Explain the classes of P and NP.
b) Write a non-deterministic Knapsack algorithm.

[5+5]

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R13

Code No: 114DU

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, May - 2019

THERMAL ENGINEERING – I

(Mechanical Engineering)

Time: 3 Hours

Max. Marks: 75

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PART- A

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PART-B

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- 2.a) Draw the valve timing diagram of a 4 stroke CI engine and explain.
- b) What are the merits and demerits of air cooled engines over water cooled engines?

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- 3.a) With a neat sketch explain the fuel injection system in a CI engine.
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5. What are the different stages of combustion in SI engines?

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OR

- 11.a) Explain with a neat sketch the working of an air refrigeration cycle.
b) What is the effect of superheating and subcooling on COP? [5+5]

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Code No: 114DH

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, May - 2019

PRINCIPLES OF ELECTRICAL ENGINEERING

(Electronics and Communication Engineering)

Time: 3 Hours

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- c) Define input impedance of a one-port network. Give the formula to determine it. [2]
- d) Define short circuit admittance parameters of a two-port network. [3]
- e) Give the classification of filters. [2]
- f) Draw the circuit diagram of π type attenuator. [3]
- g) Give the EMF equation of a DC generator and explain the factors effecting it. [2]
- h) List out various losses in DC machine and give the factors effecting them. [3]
- i) Define Regulation of a transformer. Give the general expression for it. [2]
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PART-B

(50 Marks)

2. For the network shown in figure 1, the switch is closed at $t=0$. Determine the current $i(t)$ using solution to differential equations. [10]

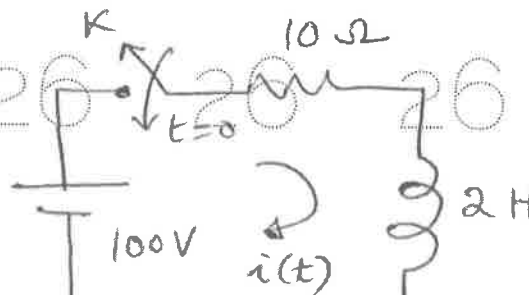


Figure: 1
OR

3. Find $i(t)$ if switch K is closed at $t=0$ as shown in figure 2.

[10]

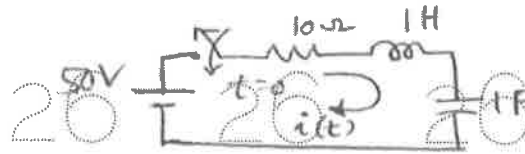


Figure: 2

4. Determine the z-parameters of given network as shown in Figure 3.

[10]

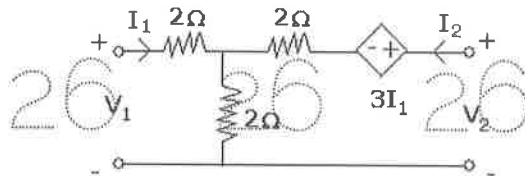


Figure: 3
OR

- 5.a) Write the standard Y-parameter equations. Obtain the Y-parameters in terms of Z-parameters.
b) Obtain Z-parameters for the circuit shown in figure 4 and thereby obtain ABCD parameters. [4+6]

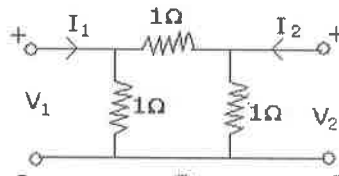


Figure: 4

- 6.a) What is the difference between constant-k and m-derived filters?
b) Design a constant-k type band-pass filter π section to be terminated in 600Ω resistance having cut-off frequencies of 2 kHz and 5 kHz. [3+7]

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- 7.a) Distinguish between Band Pass filter and Band Elimination filter with a suitable example.
b) Explain the design procedure of constant K low pass filter. [5+5]

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b) Explain the armature resistance and field control methods of speed control of DC shunt motor. [5+5]

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- 9.a) Explain the different types of DC generators with the help of circuit diagrams.
b) Give the procedure to determine the efficiency of DC machine using Swinburne's Test. Draw the experimental circuit diagram. [5+5]

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b) Develop an equivalent circuit of a single phase transformer from fundamentals. [5+5]

OR

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- 11.a) Explain the principle of operation of single phase transformer and draw the phasor diagram for no-load and on-load operating conditions.
b) A 300kVA, 11kV/440V, single phase, 50Hz, transformer gave the following test results. Open circuit test on LV side with a normal voltage and frequency, input 1.3 kW, 4A; short circuit test HV side with voltage 600V, input 2.80kW, 15A. Calculate the efficiency and regulation for full load at 0.8 p flagging. [4+6]

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Code No: 54014

R09

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, May - 2019

KINEMATICS OF MACHINERY

(Common to ME, AME)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

ILLUSTRATE YOUR ANSWERS WITH NEAT SKETCHES WHEREVER NECESSARY

PART - A

(25 Marks)

- 1.a) Define Link, and give two examples for flexible links. [2]
- b) What is *Gruebler's criterion* to find the degrees of freedom of a mechanism? Why is it sufficient to use the *Gruebler's criterion* instead of the *Kutzback's criterion* for plane mechanisms? [3]
- c) Define and explain the 'Instantaneous Center of Rotation' of a kinematic link. What is its significance? [2]
- d) If two links OA and OB are pin-jointed together at O as shown in the figure 1, define the terms: *Relative angular velocity* of OA with respect to OB, and the *Rubbing velocity* at the joint 'O'. [3]

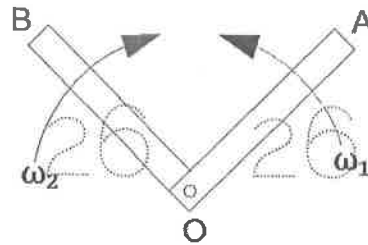


Figure: 1

- e) What are the advantage and disadvantage of Davis steering gear? [2]
- f) What is a Double Universal joint? What is its main advantage? [3]
- g) Give the classification of cams according to the:
i) direction of displacement of the follower with respect to the axis of the cam
ii) shape of that part of the follower which is in contact with the cam. [2]
- h) Define pressure angle with respect to cams. [3]
- i) State the law of gearing. [2]
- j) What are the three externally applied torques used to keep a gear train in equilibrium? [3]

PART - B

(50 Marks)

2. Describe, with neat sketches, the mechanisms obtained by the inversions of four bar chain. [10]

OR

3. In a crank and slotted lever quick return mechanism, the distance between the fixed centers is 240 mm, and the length of driving crank is 120 mm. Find the inclination of the slotted bar with the vertical in the extreme position, and the time ratio of cutting stroke to return stroke. If the length of slotted bar is 450 mm, find the length of stroke, if the line of stroke passes through the extreme positions of the free end of the lever. [10]

4. Locate all the instantaneous centers for the crossed four – bar mechanism shown in Figure 2 whose dimensions (in mm) are : $CD = 65$; $CA = 60$; $DB = 80$; $AB = 55$; $\angle DCA = 30^\circ$; Also find the angular velocities of the links AB and DB, if the crank CA rotates uniformly at 100 rpm ccw. [10]

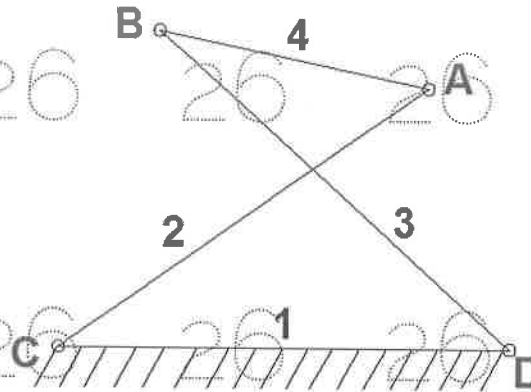


Figure: 2

OR

5. A four-bar mechanism is represented by a quadrilateral ABCD in which the fixed link AD is 400 mm long. The crank AB 75 mm long rotates at 120 rpm in *clockwise* direction, and drives the link CD 125 mm long by means of the coupler link BC which is 350 mm long. Find the angle through which CD oscillates. Also find the angular acceleration of BC, and acceleration of a point E on BC such that EC is 90 mm. [10]

- 6.a) For a Hooke's joint, prove that the maximum speed of the driven shaft (ω_1) is equal to $\omega \cos \alpha$, where ω = angular velocity of the driving shaft, and α = angle of inclination of the driven shaft with the driving shaft.

- b) Draw a neat sketch of the *Robert's mechanism*, and explain its working. How do you find the location of the (tracing) point P which produces the approximate straight line motion. [5+5]

OR

- 7.a) Draw a neat sketch of the *Ackermann Steering Gear Mechanism*, and describe its construction and working.

- b) A circle, with AD as diameter, has a point B on its circumference. There is a point C on AB produced such that if B turns about A, the product $AB \times AC$ remains constant. Prove that the point C moves in a straight line perpendicular to AB produced. [5+5]

8. A cam rotating at 150 rpm operates a reciprocating roller follower of radius 25 mm. The least radius of the cam is 50 mm, and the follower lift is 40 mm. The line of stroke of the follower is offset 10 mm from the axis of the cam. The ascent of follower occurs with uniform and equal acceleration and retardation, and descent takes place with SHM. Ascent takes place during 75° of cam rotation, and descent occurs during 90° of cam rotation. Dwell between ascent and descent corresponds to 60° of cam rotation. Draw the profile of the cam, and compute the maximum velocity and acceleration during the outstroke and return stroke. [10]

OR

9. For a tangent cam operating a reciprocating roller follower, derive the expressions for displacement, velocity, and acceleration of the follower when the follower is in contact with the cam (a) between the roller and straight flank, and (b) between the roller and nose. Also find the maximum and minimum velocities and accelerations of the follower in both the above cases. [10]

- 10.a) With the help of a neat sketch, explain the working of a reverted gear train. Give at least two applications of the same. How do you find the train value for it?
b) A standard 20° pressure angle involute teeth gear with 32 teeth and module of 6 mm meshes with a rack without interference. Find (i) the addendum of the rack, and (ii) the minimum number of teeth on the gear wheel, if the rack has a standard addendum. [5+5]

OR

- 11.a) Draw a neat sketch and explain the working of differential gear in an automobile in obtaining different speeds for the inner and outer rear wheels of the automobile, while moving along a curved path.
b) A pair of involute spur gears have 12 and 13 teeth respectively, module of 10 mm, addendum of 10 mm, and pressure angle of 20° . Check whether the gears have interference. [5+5]

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