

Code No: 134AP

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

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

DATABASE MANAGEMENT SYSTEMS

(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 DBMS? What are the advantages of DBMS? [2]
- b) Explain generalization, specialization and aggregation in E-R Model. [3]
- c) Define the terms primary key constraints and foreign key and check constraints. [2]
- d) Explain the following Operators in SQL with examples: i) SOME ii) NOT IN. [3]
- e) What is normalization? What are the conditions required for a relation to be in 1NF, 2NF? [2]
- f) Explain what are the problems caused by redundancy. [3]
- g) What is locking Protocol? [2]
- h) Explain the ACID Properties of transaction with examples. [3]
- i) What is Indexing and Hashing? [2]
- j) Explain what are the differences between tree based and Hash based indexes. [3]

PART - B

(50 Marks)

- 2.a) Develop an E-R Diagram for Banking enterprise system.
 - b) Explain the functions of Database Administrator. [5+5]
- OR**
- 3.a) Compare between super key, Candidate key, Primary Key for a relation with examples.
 - b) Construct an ER-Diagram for a hospital with a set of patients and set of medical doctors. Associated with each patient a log of the various tests and examinations conducted. [5+5]
- 4.a) Explain the fundamental operations in relational algebra with examples.
 - b) Explain various Domain constraints in SQL with examples. [5+5]
- OR**
- 5.a) Let $R = (ABC)$ and $S = (DEF)$ let $r(R)$ and $s(S)$ both relations on schema R and S . Formulate an expression in the Tuple relational calculus that is equivalent to each of the following.
i) $\prod_A(r)$ ii) $\sigma_{p=19}(r)$ iii) $r \times s$ iv) $\prod_{A,F}(\sigma_{C=D}(r \times s))$.
 - b) Explain various DML functions in SQL with examples. [5+5]

6.a) When is a decomposition said to be dependency preserving? Why this property Useful? Explain.

b) Determine the closer of the following set of functional dependencies for a relation scheme. $R(A,B,C,D,E,F,G,H)$,

$F = \{ AB \rightarrow C, BD \rightarrow EF, AD \rightarrow G, A \rightarrow H \}$

List the candidate keys of R. [5+5]

OR

7.a) Suppose that we decompose the schema $R = (A, B, C, D, E)$ into $R_1 (A, B, C)$ and $R_2 (A, D, E)$. Determine that this decomposition is a lossless-join decomposition or dependency preserving if the following set F of functional dependencies holds:

$A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A$

b) Explain 2NF, 3NF and BCNF Normal forms with example. What is the difference between 3NF and BCNF? [5+5]

8.a) Explain the Time Stamp - Based Concurrency Control protocol. How is it used to ensure serializability?

b) Explain the Check point log based recovery scheme for recovering the data base. [5+5]

OR

9.a) Explain multiple granularity of locking protocol with example.

b) What is serializability? Explain. [5+5]

10.a) Explain about Validation-Based Protocol.

b) Explain the Insertion and deletion Operations in B+ trees with example. [5+5]

OR

11.a) Explain Deletion and insertion operations in ISAM with example.

b) Explain how does it handles insert and delete operations *Extendable hashing*? [5+5]

---ooOoo---

Code No: 134AM

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

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

CONTROL SYSTEMS

(Common to EEE, ECE, EIE, ETM)

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) Classify the following as open or closed loop system with valid reasons (i) An electrical On-Off switch, (ii) Room air-conditioner. [2]
- b) Why do you need a feedback controller? Justify your answer with an example. [3]
- c) What are the effects of integral control action? [2]
- d) Find the peak overshoot for unit step response of the system described by closed loop transfer function, $G(s) = \frac{64}{s^2 + 16s + 64}$. [3]
- e) Outline the Bode plot for a Proportional Integral controller. [2]
- f) Compare between absolute stability, conditional stability and relative stability. [3]
- g) Draw the polar plot for $G(s)H(s) = \frac{1+2s}{1+3s}$. [2]
- h) What is a Phase Lag compensator and why is it used? [3]
- i) What are the advantages of State variable model of dynamic system? [2]
- j) How do you determine the system eigen values and what is its role in the system response? [3]

PART - B

(50 Marks)

2. Determine the transfer function for the block diagram shown in Figure 1. [10]

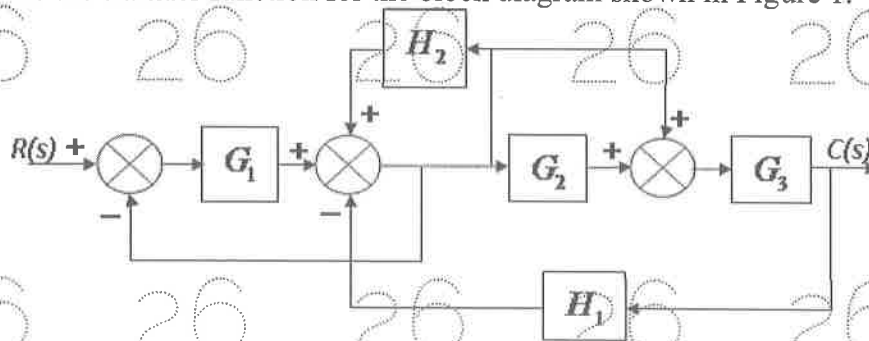


Figure: 1

OR

- 3.a) Distinguish between Open loop control system and closed loop control system.
 b) A two phase AC servo motor has the following parameters:
 Starting torque = 0.166 N-m
 Inertia = 1×10^{-5} kg-m²
 Supply voltage = 115 V
 No load angular velocity = 304 rad/sec
 Assuming torque – speed curve to be linear and zero viscous friction, derive the transfer function. [4+6]

4. The open loop transfer function of an unity feedback control system is given as

$$G(s) = \frac{K}{s(1+sT)}$$

Determine the factor by which the gain 'K' should be multiplied so that the overshoot of the unity step response be reduced from 80% to 25%? [10]

OR

- 5.a) Determine the damping ratio and natural frequency of the system if the derivative feedback is absent ($K_0=0$) in the closed loop system shown in Figure 2. What is the steady state error resulting from unit ramp input?
 b) Determine the derivative feedback constant ' K_0 ' which will increase the damping ratio of the system to 0.5. What is the steady state error resulting from unit ramp input with this setting of the derivative feedback constant? [5+5]

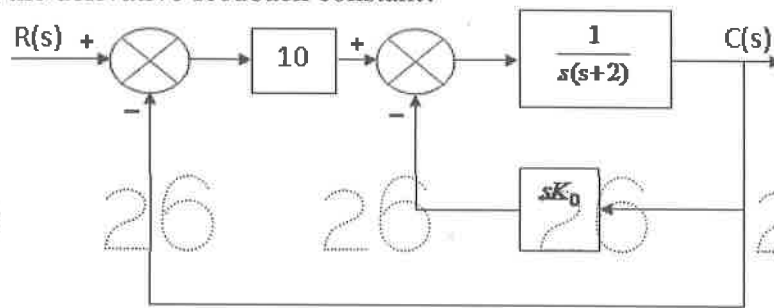


Figure: 2

6. Determine the values of K and β , so that the system whose open loop transfer function is $G(s) = \frac{K(s+1)}{s^3 + \beta s^2 + 5s + 1}$ oscillates at a frequency of oscillations of 2 rad/sec. Assume unity feedback. [10]

OR

7. Sketch the root locus of the unity feedback system having $G(s) = \frac{K}{s^2 + 2s + 2}$ for positive values of K. Sketch the new root locus when a simple pole at $s = -5$ is added to the system loop transfer function. Hence indicate the effect of adding this pole on the root locus of the system. [10]

8. Investigate closed loop stability of a system having $G(s)H(s) = \frac{K(s+4)}{s(s-2)}$ using Nyquist criterion. Determine the limiting value of 'K' for stability. [10]

OR

9. Design a lead compensator for the system with an open-loop transfer function $G(s) = \frac{K}{s^2(1+0.1s)}$ for the specifications of acceleration error constant, $K_a = 10$ and phase margin, $\phi_{pm} = 30^\circ$. [10]

10. For the system given below, obtain:

- a) Zero input response
- b) Zero state response
- c) Total response.

$$A = \begin{bmatrix} 1 & 4 \\ -2 & -5 \end{bmatrix}, B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}, u = 1 \text{ and } \begin{matrix} x_1(0) = 1 \\ x_2(0) = 0 \end{matrix}$$

OR

- 11.a) Distinguish between Transfer function model and State Space model.

- b) Diagonalize the system matrix given below.

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -2 & -5 & -4 \end{bmatrix}$$

---ooOoo---

Code No: 134AU

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

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

DYNAMICS OF MACHINERY

(Mechanical 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) Obtain the expression for gyroscopic couple. [2]
- b) Explain the D'Alembert's principle. [3]
- c) Discuss the different types of friction. [2]
- d) Discuss the different types of brakes with their applications. [3]
- e) Explain the turning moment diagram of four stroke cycle internal combustion engine. [2]
- f) Obtain the expression for speed of porter governor. [3]
- g) What is the necessity of balancing? [2]
- h) Explain with neat sketch the balancing of reciprocating masses. [3]
- i) Discuss the types of free vibrations. [2]
- j) Discuss the Raleigh's method. [3]

PART-B

(Marks 50)

2. In a Four bar mechanism shown in Figure 1, torque T_3 and T_4 have magnitude of 3000 Nm and 2000 Nm respectively. The link lengths are $AD = 800$ mm, $AB = 300$ mm, $BC = 700$ mm, $CD = 400$ mm. For the static equilibrium of the mechanism determine the required torque T_2 on link AB. [10]

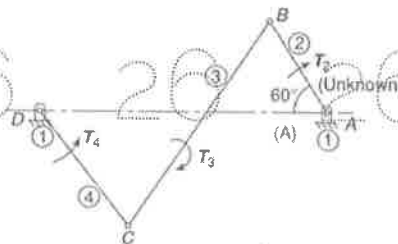


Figure: 1

OR

3. A multi-cylinder engine is to run at a speed of 600 r.p.m. On drawing the turning moment diagram to a scale of $1 \text{ mm} = 250 \text{ N-m}$ and $1 \text{ mm} = 3^\circ$, the areas above and below the mean torque line in mm^2 are : + 160, - 172, + 168, - 191, + 197, - 162. The speed is to be kept within $\pm 1\%$ of the mean speed of the engine. Calculate the necessary moment of inertia of the flywheel. Determine the suitable dimensions of a rectangular flywheel rim if the breadth is twice its thickness. The density of the cast iron is 7250 kg/m^3 and its hoop stress is 6 MPa. Assume that the rim contributes 92% of the flywheel effect. [10]

4. Four masses A, B, C and D revolve at equal radii and are equally spaced along the shaft. The mass B is 6 kg and radii of masses C and D make 90° and 240° with respect to mass B. Determine the magnitude of the masses A, C and D and the angular position mass A so that system may be completely balanced. [10]

OR

5. A disc of mass 4 kg is mounted between bearings which may be assumed simply supports. The bearing span is 48 cm the steel shaft which is horizontal, is 9 mm in diameter. The C.G. of the disc is displaced 3 mm. from the geometric centre. The damping at the centre of the disc-shaft is 49 N-sec/m. If the shaft rotates at 760 r.p.m. Find the maximum dynamic force on the shaft also find the power required to drive the shaft at this speed. [10]

6. The turbine rotor of a ship has a mass of 3500 kg. It has a radius of gyration of 0.45 m and a speed of 3000 r.p.m. clockwise when looking from stern. Determine the gyroscopic couple and its effect upon the ship: a) when the ship is steering to the left on a curve of 100 m radius at a speed of 36 km/h. b) when the ship is pitching in a simple harmonic motion, the bow falling with its maximum velocity. The period of pitching is 40 seconds and the total angular displacement between the two extreme positions of pitching is 12 degrees. [10]

OR

7. A car moving on a level road at a speed 50 km/h has a wheel base 2.8 metres, distance of C.G. from ground level 600 mm, and the distance of C.G. from rear wheels 1.2 metres. Find the distance travelled by the car before coming to rest when brakes are applied, a) to the rear wheels, b) to the front wheels, and c) to all the four wheels. The coefficient of friction between the tyres and the road may be taken as 0.6. [10]

8. A single plate clutch, effective on both sides, is required to transmit 25 kW at 3000 r.p.m. Determine the outer and inner radii of frictional surface if the coefficient of friction is 0.255, the ratio of radii is 1.25 and the maximum pressure is not to exceed 0.1 N/mm^2 . Also determine the axial thrust to be provided by springs. Assume the theory of uniform wear. [10]

OR

9. The cranks and connecting rods of a 4-cylinder in-line engine running at 1800 r.p.m. are 60 mm and 240 mm each respectively and the cylinders are spaced 150 mm apart. If the cylinders are numbered 1 to 4 in sequence from one end, the cranks appear at intervals of 90° in an end view in the order 1-4-2-3. The reciprocating mass corresponding to each cylinder is 1.5 kg. Determine: a) Unbalanced primary and secondary forces and b) Unbalanced primary and secondary couples with reference to central plane of the engine. [10]

- 10.a) A horizontal steam engine running at 120 r.p.m. has a bore of 250 mm and a stroke of 400 mm. The connecting rod is 0.6 m and mass of the reciprocating parts is 60 kg. When the crank has turned through an angle of 45° from the inner dead centre, the steam pressure on the cover end side is 550 kN/m and that on the crank end side is 70 kN/m. Considering the diameter of the piston rod equal to 50 mm, determine:

i) turning moment on the crank shaft,

ii) thrust on the bearings,

iii) acceleration of the flywheel, if the power of the engine is 20 kW, mass of the flywheel 60 kg and radius of gyration 0.6 m.

- b) In a spring loaded governor of the Hartnell type, the mass of each ball is 1 kg, length of vertical arm of the bell crank lever is 100 mm and that of the horizontal arm is 50 mm. The distance of fulcrum of each bell crank lever is 80 mm from the axis of rotation of the governor. The extreme radii of rotation of the balls are 75 mm and 112.5 mm. The maximum equilibrium speed is 5 per cent greater than the minimum equilibrium speed which is 360 r.p.m. Find, neglecting obliquity of arms, initial compression of the spring and equilibrium speed corresponding to the radius of rotation of 100 mm. [4+6]

OR

- 11.a) A cantilever shaft 50 mm diameter and 300 mm long has a disc of mass 100 kg at its free end. The Young's modulus for the shaft material is 200 GN/m^2 . Determine the frequency of longitudinal and transverse vibrations of the shaft.

- b) Find the fundamental natural frequency of transverse vibration for the system shown in figure 2 using Raleigh's method. Take $E=196 \text{ GPa}$, $I=4 \times 10^{-7} \text{ m}^4$. [5+5]

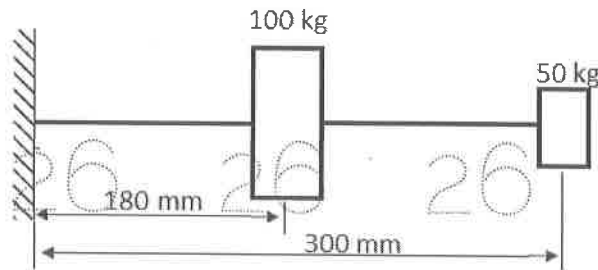


Figure: 2

---ooOoo---

Code No: 124CZ

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

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

KINEMATICS OF MACHINES
(Common to ME, MCT, 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, c as sub questions.

PART-A

(25 Marks)

- 1.a) How linkages, mechanism and structures are obtained. [2]
- b) What is the rule to find DOF of a spatial mechanism? [3]
- c) What is three centres in line theorem? [2]
- d) What is centrode and axode in a plane motion of a body? [3]
- e) Differentiate Davis and Ackermann steering gear mechanism. [2]
- f) What is a straight line motion mechanism? [3]
- g) When does the maximum acceleration is attained in SHM during return stroke? [2]
- h) What are circular arc cam with concave and convex flanks. [3]
- i) What is law of gearing? [2]
- j) What is the condition for minimum number of teeth to avoid interference? [3]

PART-B

(50 Marks)

2. Describe all the possible in versions of single of a slider crank chain. Give one practical applications for each inversion. [10]

OR

- 3.a) What is an inversion?
- b) Find the maximum and minimum transmission angles for the mechanisms as shown in Figure 1. The figures indicate the dimensions in standard units of length. [10]

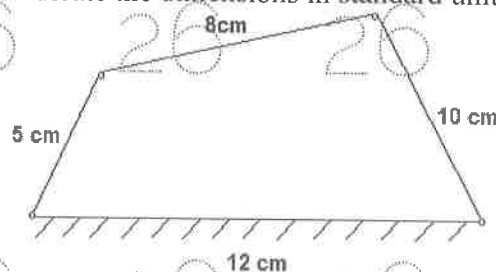


Figure: 1

4. The figure 2 shows the mechanism of a pneumatic riveter. The arms AB and BC are each 7 in. long, link BE is 20 in. and link DC 13 in. long. The centre line of the piston is horizontal and 8 in. below A. When AC is vertical, BE makes an angle of 120° with the vertical. Find the velocity ratio between D and the ram E when AC is vertical, and the efficiency of the machine if a load of 2500N on the piston causes a thrust of 5 kN at E. [10]

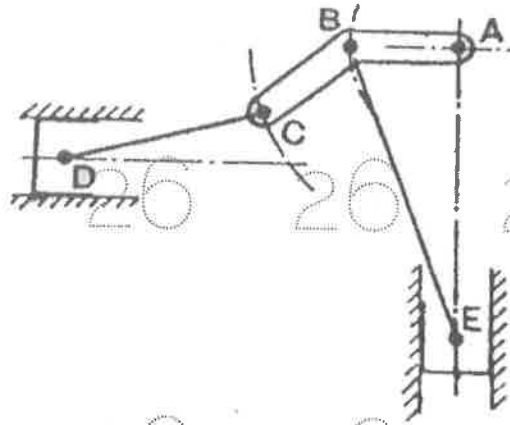


Figure: 2
OR

5. A gas engine has a stroke of 425 mm and a connecting rod 1m long. The crankshaft carries two flywheels each of which weights 6kN and has a radius of gyration of 675 mm. When the crank makes an angle of 30° with the idc on the firing stroke, there is an unbalanced turning moment on the crankshaft of 8100N.m in the direction of motion of the crank. If at this instant the angular velocity of the crank is 8.38 rad/s (80 rpm) find the acceleration of the piston and angular acceleration of the connecting rod. [10]
6. Sketch and describe the principle of Grasshopper mechanism. [10]

OR

- 7.a) What is the condition of correct steering of steering gear mechanism.
b) Explain the mechanism behind Davis steering gear. [5+5]

- 8.a) Explain all terms and label the same in a cam profile.
b) What motions are required for a cam with roller oscillating follower? [5+5]

OR

9. Draw the displacement time and velocity time diagrams for a follower in order to satisfy the following conditions. The stroke of the follower is 1 inch. The outward stroke takes place with SHM during 90° of cam rotation and follower stroke with SHM during 75° of cam rotation. The follower is to dwell in the out position for 45° of cam rotation and cam turns at uniform speed of 800 rpm. [10]

10. A bevel gear epicyclic is shown in figure 3. The wheel A is keyed to the driving shaft, the wheel F to the driven shaft and the wheel E is fixed. The arm G which supports the inclined shaft is free to turn about the common axis of the driving and the driven shafts, and the wheels B, C & D are keyed to the inclined shaft F, having 74 teeth. Find the speed of F in terms of the speed of A. What is the speed ratio when E has 81 teeth? [10]

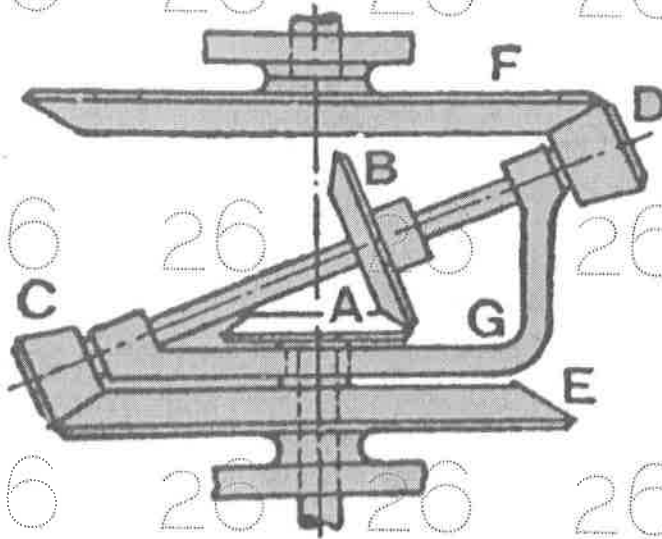


Figure: 3

OR

- 11.a) Compare cycloidal and involute tooth forms.
b) Derive an expression for arc of contact, and path of contact of pinion gear rack arrangement. [5+5]

---ooOoo---

Code No: 114CZ

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

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

KINEMATICS OF MACHINES

(Common to ME, MCT)

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) How linkages, mechanism and structures are obtained. [2]
- b) What is the rule to find DOF of a spatial mechanism? [3]
- c) What is three centres in line theorem? [2]
- d) What is centrode and axode in a plane motion of a body? [3]
- e) Differentiate Davis and Ackermann steering gear mechanism. [2]
- f) What is a straight line motion mechanism? [3]
- g) When does the maximum acceleration is attained in SHM during return stroke? [2]
- h) What are circular arc cam with concave and convex flanks. [3]
- i) What is law of gearing? [2]
- j) What is the condition for minimum number of teeth to avoid interference? [3]

PART-B

(50 Marks)

2. Describe all the possible in versions of single of a slider crank chain. Give one practical applications for each inversion. [10]

OR

- 3.a) What is an inversion?
- b) Find the maximum and minimum transmission angles for the mechanisms as shown in Figure 1. The figures indicate the dimensions in standard units of length. [10]

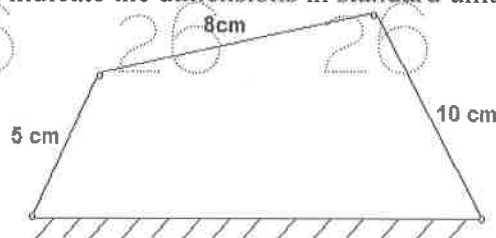


Figure: 1

4. The figure 2 shows the mechanism of a pneumatic riveter. The arms AB and BC are each 7 in. long, link BE is 20 in. and link DC 13 in. long. The centre line of the piston is horizontal and 8 in. below A. When AC is vertical, BE makes an angle of 120° with the vertical. Find the velocity ratio between D and the ram E when AC is vertical, and the efficiency of the machine if a load of 2500N on the piston causes a thrust of 5 kN at E. [10]

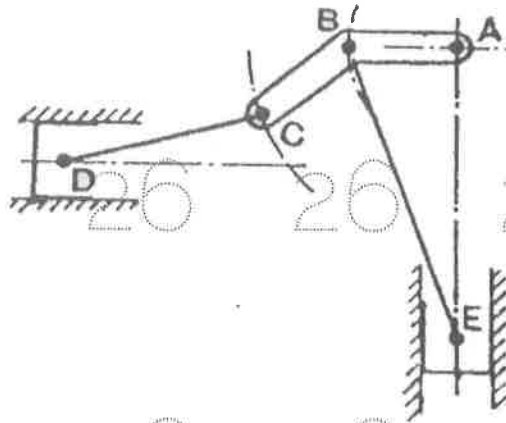


Figure: 2
OR

5. A gas engine has a stroke of 425 mm and a connecting rod 1m long. The crankshaft carries two flywheels each of which weights 6kN and has a radius of gyration of 675 mm. When the crank makes an angle of 30° with the idc on the firing stroke, there is an unbalanced turning moment on the crankshaft of 8100N.m in the direction of motion of the crank. If at this instant the angular velocity of the crank is 8.38 rad/s (80 rpm) find the acceleration of the piston and angular acceleration of the connecting rod. [10]
6. Sketch and describe the principle of Grasshopper mechanism. [10]

OR

- 7.a) What is the condition of correct steering of steering gear mechanism.
b) Explain the mechanism behind Davis steering gear. [5+5]
- 8.a) Explain all terms and label the same in a cam profile.
b) What motions are required for a cam with roller oscillating follower? [5+5]

OR

9. Draw the displacement time and velocity time diagrams for a follower in order to satisfy the following conditions. The stroke of the follower is 1 inch. The outward stroke takes place with SHM during 90° of cam rotation and follower stroke with SHM during 75° of cam rotation. The follower is to dwell in the out position for 45° of cam rotation and cam turns at uniform speed of 800 rpm. [10]

10. A bevel gear epicyclic is shown in figure 3. The wheel A is keyed to the driving shaft, the wheel F to the driven shaft and the wheel E is fixed. The arm G which supports the inclined shaft is free to turn about the common axis of the driving and the driven shafts, and the wheels B, C & D are keyed to the inclined shaft F, having 74 teeth. Find the speed of F in terms of the speed of A. What is the speed ratio when E has 81 teeth? [10]

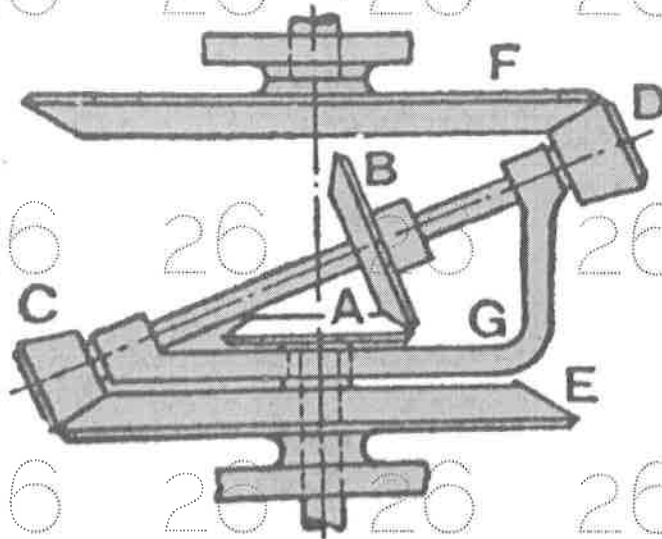


Figure: 3
OR

- 11.a) Compare cycloidal and involute tooth forms.
b) Derive an expression for arc of contact, and path of contact of pinion gear rack arrangement. [5+5]

---ooOoo---

R15

Code No: 124CN

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

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

COMPUTER ORGANIZATION
(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) List the data transfer and data manipulation instructions available in a computer.

[2]

b) What is an interrupt? What are the uses of interrupts?

[3]

c) What is synchronous bus and asynchronous bus?

[2]

d) What is hand shaking in I/O organization?

[3]

e) What are the characteristics of semiconductor RAM memories?

[2]

f) A set associative cache consists of 128 blocks divided into 4 block/set. The main memory has 8192 blocks each consists of 128 words. How many address bits are required to access a main memory location?

[3]

g) List various flags of 8086.

[2]

h) Write the special functions of general purpose registers.

[3]

i) List any four Unconditional Branch Instructions.

[2]

j) What errors are present in the following:

[3]

```
mov ax, 3d
mov 23, ax
mov cx, ch
move ax, 1h
add 2, cx
add 3, 6
inc ax, 2
```

PART-B

(50 Marks)

2.a) Explain different functional units of a digital computer. Mention the functions of different processor registers i) IR ii) MAR iii) PC.

b) What is an addressing mode? List the different types of addressing modes.

Register R5 is used in a program to point to the top of a stack. Write a sequence of instructions using the Index, Autoincrement, and Autodecrement addressing modes to perform each of the following tasks:

i) Pop the top two items of the stack, add them, and then push the result onto the stack.

ii) Copy the fifth item from the top into register R3.

iii) Remove the top ten items from the stack.

[5+5]

OR

- 3.a) Explain the different instruction formats.
b) Mention four types of operations required to perform by instructions in a computer. Show how the operation $C = A + B$ can be implemented using:

- i) Three address instruction
ii) Two address instruction
iii) One address instruction.

[5+5]

- 4.a) What is the difference between isolated I/O and memory-mapped I/O? What are the advantages and disadvantages of each?

- b) How many characters per second can be transmitted over a 1200-baud line in each of the following modes (Assume a character code of eight bits).

- i) Synchronous serial transmission
ii) Asynchronous serial transmission with two stop bits
iii) Asynchronous serial transmission with one stop bit.

[5+5]

OR

5. Explain with a block diagram the DMA transfer in a computer system. [10]

- 6.a) Explain in detail about the classification of memory.

- b) Given the hit ratio of 0.92 and cache access time of 40ns and main memory access time of 300 ns. Calculate the average access time. Discuss how read and write operations are carried out in a cache memory?

[5+5]

OR

7. Explain in detail about different memory mapping techniques. [10]

- 8.a) Explain the principles and characteristics of Pipelining.

- b) What are the various segments registers in 8086 microprocessor? [7+3]

OR

- 9.a) Draw the functional pin diagram of 8086. Briefly explain the action of 8086 when NMI and INTR pins are activated.

- b) Register R1 and R2 of computer contain the decimal value 1200 and 4600. What is the effective address of the source operand in each of the following instructions?

- i) Load 20(R1), R5
ii) Move #3000, R5
iii) Store R5, 30(R1, R2)
iv) Add -(R2), R5
v) Subtract (R1)+, R5.

[5+5]

10. Write an ALP in 8086 to sort a given set of 8-bit unsigned integers into ascending order by bubble sort method. [10]

OR

- 11.a) Explain the following 8086 instructions with examples.

- i) RET ii) LOOP iii) IRET.

- b) What is importance of CALL Instruction?

- c) Write assembly language program to list alphanumeric characters by illustrating JUMP instruction? [3+2+5]

---ooOoo---

Code No: 124CU

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

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

ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

(Common to ECE, ETM)

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 polarization? Give an expression that accounts for polarization in an isotropic material. [2]
- b) State the continuity equation. What is its significance? [3]
- c) State the Maxwell's Equations for good conductors. [2]
- d) What is Lorentz Force Law? How does it relate mechanical force to electrical force? [3]
- e) What is the expression of attenuation constant and phase constant for wave propagation in good conductors? [2]
- f) Define Brewster angle and Critical angle. [3]
- g) What are the two types of copper losses? [2]
- h) What are the characteristics of a low loss line? [3]
- i) What is Current Standing wave Ratio (CSWR)? [2]
- j) For what purpose is a quarter wave length transmission line used? Explain. [3]

PART - B

(50 Marks)

- 2.a) Obtain the expression for electric field due to Line charge density.
 - b) A point charge of 5nC lies at (0,1,0) and an infinite line charge at $\rho_l = 10nC/m$ along z-axis. Find E at (2, 3, 1). [5+5]
- OR**
- 3.a) Derive the expression of Gauss's Law for a uniformly charged sphere.
 - b) Three point charges $Q_1=30nC$, $Q_2=40nC$ and $Q_3=-70nC$ are enclosed by surface S. What is the net flux that crosses S? [5+5]
- 4.a) State Amphere's Circuit Law. Find H at (-3, 4, 0) due to a current element along x-axis.
 - b) Find an expression for the magnetic field produced by a straight current carrying conductor at a distance "x" from it. [5+5]
- OR**
- 5.a) Give an example of displacement current. Also state few differences between conduction current density and displacement current density.
 - b) Given $E=10 \sin(\omega t - \beta z) \hat{a}_y$ V/m in free space, determine \vec{D} , \vec{B} and \vec{H} . [5+5]

- 6.a) Discuss wave propagation in lossless media and in free space.
b) The electric field intensity associated with a plane wave travelling in a perfect dielectric medium is given by $E_x(z, t) = 10 \cos(2\pi \times 10^7 t - 0.1\pi z)$ V/m. Find the magnetic field intensity associated with the wave if $\mu = \mu_0$. [5+5]

OR

- 7.a) Derive the expression for total time average power through a surface.
b) A uniform plane wave is incident normally on an infinitely thick slab of a material with 25V/m electric field. The material has a dielectric constant 4. How much power penetrates the material slab? [5+5]

8. Derive the expression for the input impedance of a uniform transmission line. [10]

OR

- 9.a) What is loading? What are the types of loading?
b) An 8 km transmission line is terminated by a characteristic impedance z_0 . The voltage at 1 km from the sending end is 10% below that at the sending end. What is the voltage across the load impedance in terms of % of the sending end voltage? [5+5]

- 10.a) Discuss the advantages and disadvantages of stub matching.
b) An arial of $(200-j300)\Omega$ is to be matched with 500Ω lines. The matching is to be done by means of a low loss line 600Ω stub line. Find the position and length of the stub line used if the operating wavelength is 20 m. [5+5]

OR

- 11.a) What is a Smith chart? Explain its significance.
b) Write a brief note on the various impedance matching techniques. [5+5]

--ooOoo--

R13

Code No: 114CU

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

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

ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

(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) What is polarization? Give an expression that accounts for polarization in an isotropic material. [2]
- b) State the continuity equation. What is its significance? [3]
- c) State the Maxwell's Equations for good conductors. [2]
- d) What is Lorentz Force Law? How does it relate mechanical force to electrical force? [3]
- e) What is the expression of attenuation constant and phase constant for wave propagation in good conductors? [2]
- f) Define Brewster angle and Critical angle. [3]
- g) What are the two types of copper losses? [2]
- h) What are the characteristics of a low loss line? [3]
- i) What is Current Standing wave-Ratio (CSWR)? [2]
- j) For what purpose is a quarter wave length transmission line used? Explain. [3]

PART - B

(50 Marks)

- 2.a) Obtain the expression for electric field due to Line charge density.
b) A point charge of 5nC lies at $(0,1,0)$ and an infinite line charge at $\rho_l = 10\text{nC/m}$ along z-axis. Find E at $(2, 3, 1)$. [5+5]
- OR
- 3.a) Derive the expression of Gauss's Law for a uniformly charged sphere.
b) Three point charges $Q_1=30\text{nC}$, $Q_2=40\text{nC}$ and $Q_3=-70\text{nC}$ are enclosed by surface S . What is the net flux that crosses S ? [5+5]
- 4.a) State Amphere's Circuit Law. Find H at $(-3, 4, 0)$ due to a current element along x-axis.
b) Find an expression for the magnetic field produced by a straight current carrying conductor at a distance "x" from it. [5+5]
- OR
- 5.a) Give an example of displacement current. Also state few differences between conduction current density and displacement current density.
b) Given $E=10 \sin(\omega t - \beta z) \hat{a}_y$ V/m in free space, determine \vec{D} , \vec{B} and \vec{H} . [5+5]

- 6.a) Discuss wave propagation in lossless media and in free space.
b) The electric field intensity associated with a plane wave travelling in a perfect dielectric medium is given by $E_x(z, t) = 10 \cos(2\pi \times 10^7 t - 0.1\pi z)$ V/m. Find the magnetic field intensity associated with the wave if $\mu = \mu_0$. [5+5]

OR

- 7.a) Derive the expression for total time average power through a surface.
b) A uniform plane wave is incident normally on an infinitely thick slab of a material with 25V/m electric field. The material has a dielectric constant 4. How much power penetrates the material slab? [5+5]

8. Derive the expression for the input impedance of a uniform transmission line. [10]

OR

- 9.a) What is loading? What are the types of loading?
b) An 8 km transmission line is terminated by a characteristic impedance z_0 . The voltage at 1 km from the sending end is 10% below that at the sending end. What is the voltage across the load impedance in terms of % of the sending end voltage? [5+5]

- 10.a) Discuss the advantages and disadvantages of stub matching.

- b) An arial of $(200-j300)\Omega$ is to be matched with 500Ω lines. The matching is to be done by means of a low loss line 600Ω stub line. Find the position and length of the stub line used if the operating wavelength is 20 m. [5+5]

OR

- 11.a) What is a Smith chart? Explain its significance.

- b) Write a brief note on the various impedance matching techniques. [5+5]

--ooOoo--

Code No: 54018

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

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

NUMERICAL METHODS

(Common to ME, MIE)

Time: 3 hours

Max. Marks: 75

Answer any five questions

All questions carry equal marks

- 1.a) Design a Newton's iteration formula for the cube root of a positive real number.
 b) By using Regula Falsi method, find a positive root of the equation:
 $\tan x + \tanh x = 0$. [7+8]
- 2.a) Explain briefly about ill-conditioned systems.
 b) Consider the system of equations $x_1 - ax_2 = b_1$; $-ax_1 + x_2 = b_2$, where a is a real constant. For what value of a , the Gauss-Seidel method converge. [7+8]
- 3.a) Find $y(2.5)$, using Newton's forward formula from the following data.

x	1	2	3	4	5	6
y	1.5	3	6.5	12	19.5	29

 b) Given $u_1 = 22$, $u_2 = 30$, $u_4 = 82$, $u_7 = 106$, $u_8 = 206$, find u_6 . Use Lagrange's Interpolation formula. [5+10]

- 4.a) Fit a curve of the form $y = \frac{a}{x} + bx$ to the data given below:

x	1.0	1.2	1.4	1.6	1.8
y	0	0.1280	0.5440	1.2960	2.4320

- b) Derive the normal equations for fitting a curve $y = a + bx + cx^2$. [8+7]

- 5.a) Derive Trapezoidal rule to evaluate $\int_a^b y dx$.

- b) From the following data obtain first and second derivatives of $y = \log_e x$ at $x = 500$. [5+10]

x	500	510	520	530	540	550
$y = \log_e x$	6.2146	6.2344	6.2538	6.2729	6.2916	6.3099

6. Find the successive approximate solution of the differential equation $y' = y$, $y(0) = 1$ by Picard's method and compare it with exact solution. [15]
7. Using the shooting method, solve the boundary value problem:
 $u'' = u + 1$, $0 < x < 1$; $u(0) = 0$; $u(1) = e - 1$. [15]
8. Find the solution of the parabolic equation $u_{xx} = 2u_t$ when $u(0, t) = u(4, t) = 0$ and $u(x, 0) = x(4 - x)$, taking $h = 1$. Find the values up to $t = 4$. [15]