

FACULTY OF ENGINEERING

BE (Civil) V Semester (AICTE) (Main) Examination, March / April 2022

Subject: Structural Engineering Design and Detailing

Time: 3 Hours

Max. Marks: 70

(Missing data, if any may be suitably assumed)

PART – A

Note: Answer all questions.

(10 x 2 = 20 Marks)

1. What is workability? Mention any two tests used to find workability?
2. Explain the concept of working stress method?
3. Define partial safety factors for steel and concrete?
4. What are flanged beams?
5. Explain how the Torsional moments are considered in the design of beams?
6. What are the types of reinforcements used to resist shear in beams?
7. What is the importance of yield line theory?
8. What are the differences between one way slab and two way slab?
9. What are different types of footings?
10. What is the importance of lateral ties in columns?

PART - B

Note: Answers any five questions.

(5 x 10 = 50 Marks)

11. Using working stress method, determine the moment of resistance of a beam 250mm wide and 460mm deep, reinforced with 4 bars of 20mm diameter. Use M25 concrete and Fe 415 grade steel.
12. A reinforced concrete beam has a section of 230mm x 500mm. The tension steel consists of 4 bars of 12mm diameter. A clear cover of 25mm is provided. Determine the ultimate moment capacity of the section. Assume suitable grades and draw reinforcement details.
13. A singly reinforced beam of size 250mm x 400mm consists of 4 bars of 16mm diameter at an effective cover of 30mm. The beam is subjected to a working load of 25KN/m on an effective span of 6m. Design the beam for shear cranking suitable number of bars. Use M20 and Fe 500 grades. Sketch reinforcement details?
14. Design a slab for a single room of internal dimensions 6.9m x 3m. The slab is supported on wall of 300mm thick and subjected to a live load of 2.5KN/m². Draw neat sketches showing reinforcement details? Adopt M20 and Fe 500 grade steel.
15. Design a circular column to carry an axial working load of 900KN. Use helical reinforcement as lateral reinforcement. Adopt M20 and Fe 500 grade steel?
16. Design an isolated R.C.C footing for a rectangular column 230mm x 380mm carrying a working load of 500KN. The safe bearing capacity of the soil is 175KN/m². Adopt suitable grades of concrete and steel and draw neat sketches.
17. Write short notes on
 - a) Under and Over reinforced sections?
 - b) Assumptions of Limit state method?

FACULTY OF ENGINEERING
B.E. (EEE/EIE) V Semester (AICTE) (Main) Examination, March / April 2022

Subject: Linear Control Systems

Time: 3 Hours

Max. Marks: 70

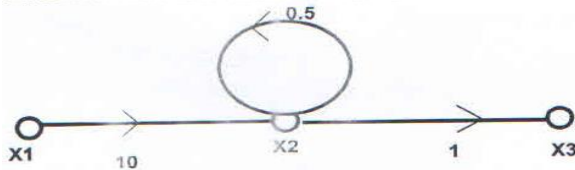
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PART – A

Note: Answer all questions.

(10 x 2 = 20 Marks)

- 1 Find the Transfer function
- X_3/X_1
- .



- 2 Explain about the Potentiometer.

- 3 The open loop transfer function of a unity feedback system is
- $G(S) = \frac{20}{s(s+10)}$
- .

Justify the nature of response of closed loop system for Unit Step input.

- 4 What is the effect on system performance, when a Proportional Controller is introducing in a system?

- 5 Determine the range of K for stability of unity feedback system whose open loop transfer function is given by
- $G(S) = \frac{k}{s(s+1)(s+2)}$
- .

- 6 What are Asymptotes? How will you find angle of Asymptotes?

- 7 Explain about Corner Frequency.

- 8 Draw the Polar Plot for
- $G(s) = \frac{s+3}{s(s+1)(s+2)}$
- .

- 9 How to choose a State Variable in a system?

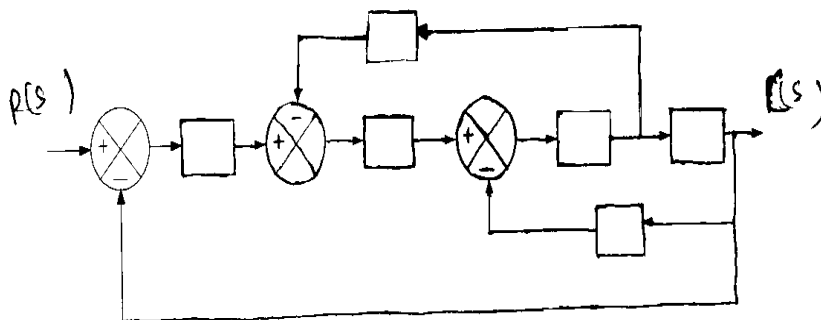
- 10 If
- $\frac{Y(s)}{U(s)} = \frac{s+4}{s^2+3s+2}$
- then draw the state model.

PART – B

Note: Answer any five questions.

(5x10 = 50 Marks)

- 11 (a) Derive the Transfer function for Field controlled DC servomotor.
 (b) Determine the overall Transfer Function $C(s) / R(s)$ for the system.



..2..

- 12 A System is given by differential equation $\frac{d^2y}{dt^2} + \frac{dy}{dt} + 8y = 8x$, where y =output, x =input. Determine all time domain specification and obtain the output response for unit step input.
- 13 Sketch the Root Locus for the unity feedback control system. Whose Open loop Transfer function is $G(S) = \frac{K}{S(1+0.1S)(1+0.2S)}$.
- 14 With the help of Nyquist plot assess the stability of a system describe by $G(S) = \frac{3}{S(S+1)(S+2)}$. What happen to the stability if the numerator of the Function is changed from 3 to 30?
- 15 Determine a State Transition Matrix where $A = \begin{bmatrix} 0 & 1 \\ -6 & -5 \end{bmatrix}$ and also explain the properties of STM.
- 16 (a) The overall transfer function of a unity feedback control system is given by $\frac{C(S)}{G(S)} = \frac{10}{S^2 + 6S + 10}$. Determine the steady state error, if the Input is $r(t) = 1+t+t^2$.
 (b) Would you explain about Lag-Lead Compensator?
- 17 Write a short note on:
 (a) Synchro act error detector
 (b) Observability and Controllability.

FACULTY OF ENGINEERING

B.E. (ECE) V Semester (AICTE) (Main) Examination, March / April 2022

Subject: Automatic Control Systems

Time: 3 hours

Max. Marks: 70

(Missing data, if any, may be suitably assumed)

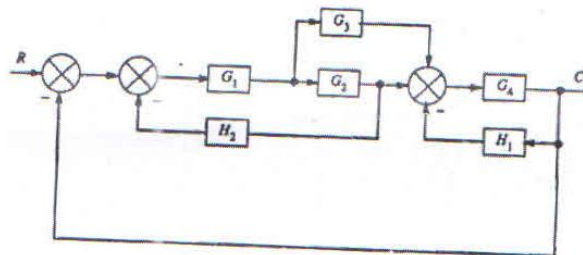
PART – A**Note: Answer all questions.****(10 x 2 = 20 Marks)**

- 1 Write the difference between Open loop and Closed loop systems.
- 2 Write the Mason's gain formula.
- 3 What are the specification of a 2nd order system?
- 4 The step response of a system is $(1 - 12e^{-t})u(t)$. Find the transfer function of the system.
- 5 Using Routh criteria, determine the stability of the systems represented by characteristic equation $s^4 + 8s^3 + 16s + 5 = 0$. Comment on location of roots.
- 6 What are the main advantages of Bode plot?
- 7 Define principle of argument.
- 8 Derive the transfer function of Zero Order Hold (ZOH) system.
- 9 Give the properties of State transition matrix.
- 10 Find the Eigen vectors for the matrix.

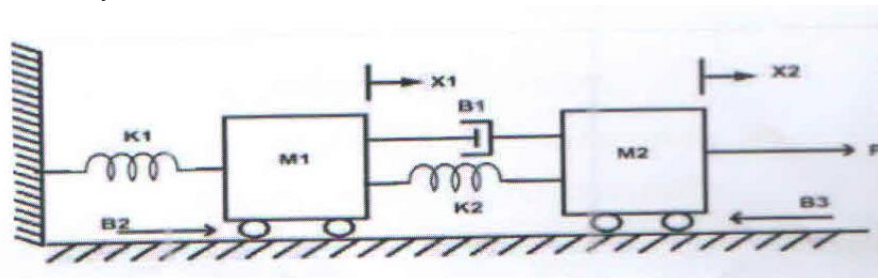
$$A = \begin{bmatrix} 0 & 1 \\ 8 & -2 \end{bmatrix}$$

PART – B**Note: Answer any five questions****(5 x 10 = 50 Marks)**

- 11 (a) Find the Transfer function $C(s)/R(s)$ of the following block diagram.



- (b) Draw the Force voltage analogous circuit for the Mechanical translational systems shown below.



..2..

- 12 (a) The closed loop transfer function of a second order system is given by $T(S) = \frac{100}{s^2 + 10s + 100}$. Determine the damping ratio, natural frequency of oscillation, rise time, settling time and peak overshoot.
- (b) What are the effects of adding open loop pole to root locus and the system?

- 13 Sketch the Root locus of $G(s) = \frac{K(s+2)(s+10)}{s(s+5)(s+2)}$.

- 14 Sketch the Bode plot of a given system $G(S) = \frac{80}{s(s+2)(s+20)}$. Determine GM, PM, ω_{gc} , ω_{pc} . Comment on the stability.

- 15(a) Write the difference between Digital and Analog control systems.
 (b) Explain the architecture of digital control systems.

- 16 Determine the state controllability and observability of the system described by the state space representation.

$$\dot{X} = \begin{bmatrix} -3 & 1 & 1 \\ -1 & 0 & 1 \\ 0 & 0 & 1 \end{bmatrix} X + \begin{bmatrix} 0 & 1 \\ 0 & 0 \\ 2 & 1 \end{bmatrix} U$$

$$Y = \begin{bmatrix} 0 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix} X$$

- 17 Write short notes on:
 (a) Controllers
 (b) Nyquist criterion of stability
 (c) State space representation

FACULTY OF ENGINEERING
B.E. (MECH/PROD/AE) V Semester (AICTE) (Main) Examination,
March / April 2022

Subject: Dynamics of Machines

Time: 3 Hours

Max. Marks: 70

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions.

(10 x 2 = 20 Marks)

- 1 Define the terms Piston effort, crank effort and crank pin effort.
- 2 State and explain D'Alembert's principle.
- 3 What are centrifugal governors? How do they differ from inertia governors?
- 4 What is meant by sensitivity of the governor?
- 5 Define the terms shaking force and shaking couple.
- 6 Define Whirling speed of shaft.
- 7 Give the classification of different types of vibration.
- 8 What are the causes and effects of vibrations?
- 9 What is meant by primary balancing and secondary balancing?
- 10 Define the term vibration isolation.

PART – B

Note: Answer any five questions.

(5 x 10 = 50 Marks)

- 11 The rotor of a turbine installed in a boat with its axis along the longitudinal axis of the boat makes 1500 r.p.m. clockwise when viewed from the stern. The rotor has a mass of 750 kg and a radius of gyration of 300 mm. If at an instant, the boat pitches in the longitudinal vertical plane so that the bow rises from the horizontal plane with an angular velocity of 1 rad/s, determine the torque acting on the boat and the direction in which it tends to turn the boat at the instant.
- 12 A multi-cylinder engine is to run at a speed of 900 r.p.m. On drawing the turning moment diagram to a scale of 1 mm = 350 N-m and 1 mm = 3°, the areas above and below the mean torque line in mm² are : + 160, -172, +168, -191, +197, -162 the speed is to be kept within $\pm 2\%$ of the mean speed of the engine. Calculate the necessary moment of inertial 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/m³ and its hoop stress is 6 MPa. Assume that the rim contributes 92% of the flywheel effect.
- 13 An inside cylinder locomotive has its cylinder centre lines 0.7 m apart and has a stroke of 0.6 m. The rotating masses per cylinder are equivalent to 150 kg at the crank pin and the reciprocating masses per cylinder to 180 kg. The wheel centre lines are 1.5 m apart. The cranks are at right angles the whole of the rotating and 2/3 of the reciprocating masses are to be balanced by masses placed at a radius of 0.6 m. Find the magnitude and direction of the balancing masses. Find the fluctuation in rail pressure under one wheel, variation of tractive effort and the magnitude of swaying couple at a crank speed of 300 r.p.m.

..2..

- 14 The measurements on a mechanical vibrating System show that it has a mass of 9 kg and that the springs can be combined to give an equivalent spring of stiffness 6.4 N/mm. If the vibrating system have a dashpot attached which exerts a force of 50 N when the mass has a velocity of 1 m/s, find: (1) critical damping coefficient, (2) damping factor
(3) Logarithmic decrement and (4) ratio of two consecutive amplitudes.
- 15 Three rotors A,B and C having moment of inertia of 2000, 6500 and 4000Kg-m² respectively are carried by a uniform shaft of 0.45m diameter. The length of shaft between rotors A and B is 6m and between B and C is 32m. Find the natural frequency of torsional vibration. The modulus of rigidity of shaft material is 85GN/m².
- 16 A horizontal steam engine running at 240 r.p.m. has a bore of 300 mm and stroke 600mm. The connecting rod is 1.05 m long and the mass of reciprocating parts is 60 kg When the crank is 60° past its inner dead centre, the steam pressure on the cover side of the piston is 1.125 N/mm² while that on the crank side is 0.125 N/mm². Neglecting the area of the piston rod, determine: (1) the force in the piston rod and
(2) the turning moment on the crankshaft.
- 17 Write short notes on the following:
(a) Rayleigh's method to find the natural frequency of multi rotor system
(b) Damped vibrations
(c) Stability of two wheeler while taking a curved path.

FACULTY OF ENGINEERING
B.E. (CME) V – Semester (AICTE) (Main) Examination, March / April 2022

Subject: Artificial Intelligence

Time: 3 Hours

Max. Marks: 70

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions.

(10 x 2 = 20 Marks)

1. Define state space search problem with an example.
2. Define agent. What is rational agent?
3. Express the following statement in predicate logic.
“All the beautiful girls need not be intelligent”.
4. Explain Sussman anomaly in planning.
5. State Baye’s theorem.
6. Explain the different applications of Expert system.
7. Differentiate between single layer and multi-layer neural networks.
8. Distinguish between supervised learning and unsupervised learning.
9. List the applications of Machine Vision.
10. Define semantic analysis.

PART – B

Note: Answer any five questions.

(5 x 10 = 50 Marks)

11. (a) Write A* algorithm and explain with an example.
(b) Write the state space solution for water jug problem.
12. (a) Explain partial order planning with an example.
(b) Explain the conversion of arbitrary wff to clausal form in predicate logic.
13. (a) Define Bayesian network and explain three important patterns of inference in Bayesian network.
(b) Explain in detail expert systems architecture and its applications.
14. Explain learning decision trees using information theory with an example.
15. Explain in detail sentence Analysis Phases in NLP.
16. (a) What is multilayer feed forward network? Explain.
(b) Explain MIN-MAX algorithm with a suitable example.
17. Write short notes on the following.
 - (a) Semantic Networks
 - (b) Machine vision techniques.
 - (c) Fuzzy set operations.

FACULTY OF ENGINEERING**B.E. (CSE) V - Semester (AICTE) (Main) Examination, March / April 2022****Subject: Automata Languages and Computation****Time: 3 hours****Max. Marks: 70****(Missing data, if any, may be suitably assumed)****PART – A****Note: Answer all questions****(10 x 2 = 20 Marks)**

1. Mention closure properties of Regular Languages.
2. Construct a DFA for $L = \{w \mid |w| \bmod 5 = 0\}$.
3. State pumping lemma for CFLs.
4. Construct a CFG for $0^*1(0 + 1)^*$.
5. Give an application for CYK algorithm.
6. What are ambiguous grammars? Give an example.
7. What is ID of a Turing machine? Give an example.
8. Construct a TM for adder function.
9. Define PCP with an example.
10. Define CHURCH's hypothesis.

PART – B**Note: Answer any five questions.****(5 x 10 = 50 Marks)**

- 11 (a) State and prove pumping lemma for Regular Languages.
(b) Construct an NFA without ϵ transitions for the given
 ϵ - NFA $\{0^n 1^n 2^n \mid n \geq 0\}$.
- 12 (a) Construct a CFG for balanced parenthesis and generate the strings
(i) $(())$ (ii) $(()) (())$
(b) Given $E \rightarrow + EE \mid * EE \mid - EE \mid x \mid y$, generate LMD, RMD and parse tree for the string " $+ *-xyxy$ "
- 13 (a) Convert the given grammar to CNF : $S \rightarrow aS \mid AB \mid \epsilon$, $A \rightarrow \epsilon$, $B \rightarrow \epsilon$, $D \rightarrow b$.
(b) Construct a PDA for $L = \{wCw^r, \text{ where } w \text{ belongs to } \{0, 1\}^*\}$
- 14 (a) Design a TM to computer $2n$, $n \geq 1$.
(b) Design a TM which recognize equal number of a's and b's.
- 15 (a) What is UTM?
(b) Give short notes on Chomsky Hierarchy.
- 16 (a) Differentiate between FA, PDA and TMs.
(b) Explain the process of converting CNF into GNF with an example.
- 17 (a) P and NP problems.
(b) Define Regular Expressions give a regular expression for strings containing not more than 3 a's given $\Sigma = \{a, b\}$.

FACULTY OF ENGINEERING

B.E. (IT) V – Semester (AICTE) (Main) Examination, March / April 2022

Subject: Web Application Development

Time: 3 Hours

Max. Marks: 70

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions.

(10 x 2 = 20 Marks)

1. What is the significance of URL?
2. Define Web browser and Web Server.
3. List out characteristics of XML.
4. Define XML comments.
5. Define JSON and syntax rules with example.
6. List naming conventions in XML.
7. What is data binding in Angular JS?
8. What do you mean by a dynamically typed language?
9. What is REPL? What purpose it is used for?
10. What are the advantages of mongo DB?

PART – B

Note: Answer any five questions.

(5 x 10 = 50 Marks)

11. (a) Illustrate the following CSS Selectors:
 - i) Type selector
 - ii) Universal Selector
 - iii) Descendant Selector
 - iv) Class Selector
 - v) ID Selector
 - vi) Attribute Selector
- (b) Explain general structure of HTML program.
12. (a) In how many ways namespaces can be used in XML. Explain.
- (b) Explain DTD in XML with example.
13. (a) Write a program to demonstrate element selector in jquery.
- (b) Explain concept of JSON schema with the help of an example.
14. (a) Explain about Angular Js directives.
- (b) How modules are defined in Angular JS explain with syntax and example.
15. (a) Explain MEAN stack Architecture.
- (b) Explain about Node JS architecture.
16. (a) Write Angular JS program for input validation.
- (b) Compare JSON with XML give an example.
17. (a) Explain the concept and purpose of namespaces in with example.
- (b) Explain about simple and complex data types in XML schema with example.

FACULTY OF ENGINEERING

B.E (Civil) V- Semester (CBCS) (Backlog) Examination, March / April 2022

Subject: Concrete Technology

Time: 3 Hours

Max. Marks: 70

(Missing data, if any may be suitably assumed)

PART – A

Note: Answer all questions.

(10 x 2 = 20 Marks)

- 1 State the chemical composition of cement.
- 2 Write about Grading of aggregate.
- 3 Define Gel space ratio.
- 4 What are the factors affecting workability of concrete?
- 5 What is the difference between segregation and bleeding?
- 6 Distinguish between 'Mean strength' and 'Target strength of concrete'.
- 7 List the advantages of Ready-Mix concrete.
- 8 Write about Fibre reinforced concrete.
- 9 Difference between High Strength Concrete and High-Performance Concrete.
- 10 Define Ferro cement.

PART - B

Note: Answers any five questions.

(5 x 10 = 50 Marks)

- 11.(a) What is Alkali aggregate reaction? How to control Alkali aggregate reaction.
(b) Explain in detail various types of cements along with suitability of each.
12. (a) Define workability of concrete? How to measure workability of concrete and explain any one of them.
(b) Write short notes on stress-strain curve of concrete.
13. (a) What are the advantages and disadvantages of Mineral admixture.
(b) Explain about ultrasonic pulse velocity test to determine the quality of concrete.
14. (a) What are the chemical admixtures? Explain any two with an example.
(b) What are the different tests of hardened concrete? Explain any one test.
15. (a) Discuss about the manufacture of light weight concrete and its application.
(b) Discuss in brief the important properties of durability of Recycled aggregate concrete.
16. Write the stepwise procedure for the concrete mix design according to IS Specifications.
17. Write short notes on any **TWO** of the following:
 - (a) High density concrete.
 - (b) Fly ash concrete.
 - (c) Hydration of cement.

FACULTY OF ENGINEERING

B.E. (EEE/EIE) V - Semester (CBCS) (Backlog) Examination, March / April 2022

Subject: Electrical Measurements and Instrumentation

Time: 3 Hours

Max marks: 70

(Missing data, if any may be suitably assumed)

PART – A

Note: Answer all questions.

(10 x 2 = 20 Marks)

1. What is deflecting torque in meters? And why it is necessary?
2. Why PMMC can't used for AC?
3. What are the advantages and disadvantages of Induction type energy meters?
4. Define power factor and frequency.
5. What is Hall Effect?
6. Distinguish between ballistic galvanometer and flux meter?
7. What are different types of Magnetic materials?
8. Draw Hysteresis loop and explain it.
9. Explain the calibration of Ammeter.
10. Which type of detectors is used in AC potentiometers?

PART - B

Note: Answers any five questions.

(5 x 10 = 50 Marks)

- 11 Explain in detail about Dynamometer type Instruments with neat sketch and also derive its torque equation.
- 12 Explain the following with neat diagrams and principle of working: (i) power factor meter (ii) synchroscope.
- 13 a) Explain in detail about Hall Effect transducers with neat sketch.
b) Explain in detail about Strain Gauges with neat sketch
- 14 The bridge has following details:
Arm AB $R_1 = 1000\Omega$ in parallel with $C_1 = 0.5\mu F$.
Arm BC $R_3 = 1000\Omega$ in series with $C_3 = 0.5\mu F$.
Arm CD $L_4 = 30$ mH in series with $R_4 = 200\Omega$
The supply frequency is 100Hz. Find the constants of arm DA to balance the bridge.
- 15 Explain in detail about A.C Polar and Coordinate type of Potentiometers.
- 16 Explain in detail about construction working of Megger with neat sketch.
- 17 Write short notes on following (i) Instrument transformer with neat sketch
(ii) Measurement of leakage factor.

FACULTY OF ENGINEERING**BE (ECE) V - Semester (CBCS) (Backlog) Examination, March / April 2022****Subject: Digital Signal Processing****Time: 3 Hours****Max marks: 70****(Missing data, if any may be suitably assumed)****PART – A****Note: Answer all questions.****(10 x 2 = 20 Marks)**

1. List the advantages of Digital Signal Processing.
2. Check whether the signal $y(n) = \sin 3n$ is periodic or non-periodic?
3. Why the ROC of Z-transform cannot contain any pole? Explain
4. In the implementation of a digital system what are the effects of finite-word-length? Explain
5. Give the various steps involved in the design of IIR filter.
6. Differentiate between FIR and IIR filter.
7. Why it is not possible to take the DFT of sequency having infinite length? Explain
8. Find the circular convolution of $x(n) = \{2, 1, 3, -6\}$ with $h(n) = \{2, 6, -1, 3\}$
9. Explain Gibbs Phenomenon?
10. List the various differences between DSP processors and microprocessors.

PART - B**Note: Answers any five questions.****(5 x 10 = 50 Marks)**

11. a) State and prove shifting property of DFT.
b) Find the output $y(n)$ of a filter whose impulse response is $h(n) = \{1, 1, 1\}$ and input signal $x(n) = \{3, -1, 0, 1, 3, 2, 0, 1, 2, 1\}$. Using Overlap save method
12. a) Write short notes on classification of systems.
b) Define Linearity, Time Invariant, Stability and Causality.
13. a) Define DFS. State any Four properties of DFS.
b) Find the IDFT of the given sequence $x(K) = \{2, 2-3j, 2+3j, -2\}$.
14. a) Discuss digital and analog frequency transformation techniques.
b) Discuss IIR filter design using Bilinear transformation and hence discuss frequency warping effect.
15. a) Compare various windowing functions.
b) Design an FIR Digital Low pass filter using rectangular window whose cut off freq is 2 rad/s and length of window $N=9$.
16. a) Define Interpolation and Decimation. List out the advantages of Sampling rate conversion.
b) Discuss the sampling rate conversion by a factor I/D with the help of a Neat block Diagram.
17. a) Write a short notes on On-Chip peripherals of Programmable DSP's.
b) Give the Internal Architecture of TMS 320C5X 16-bit fixed point processor.

FACULTY OF ENGINEERING

BE (MECH/AE) V - Semester (CBCS) (Backlog) Examination, March / April 2022

Subject: Heat Transfer

Time: 3 Hours

Max marks: 70

(Missing data, if any may be suitably assumed)

PART – A

Note: Answer all questions.

(10 x 2 = 20 Marks)

1. Explain thermal conductivity and thermal diffusivity.
2. Why does metal feel colder than wood, even if both are at the same temperature
3. List out the applications of lumped parameter analysis?
4. Why fins are used? How to increase the effectiveness of the fin?
5. Differentiate between mean film temperature and bulk mean temperature.
6. Differentiate between Velocity and thermal boundary layer.
7. What is black body? How does it differ from gray body? Give examples of each.
8. Enumerate the factors on which the energy exchange through radiation depends.
9. Discuss the importance of heat exchangers for industrial applications.
10. Differentiate between nucleate boiling and pool boiling.

PART - B

Note: Answers any five questions.

(5 x 10 = 50 Marks)

11. Derive the heat conduction equation in Cartesian co-ordinate systems.
12. Define efficiency and effectiveness of the fin. Derive the expression of efficiency for a rectangular fin with an insulated end.
13. A vertical pipe 80 mm diameter and 2 m height is maintained at a constant temperature of 120°C. The pipe is surrounded by still atmospheric air at 30°C. Find heat loss by natural convection.
14. Two very long concentric cylinders of diameters $D_1 = 0.2$ m and $D_2 = 0.5$ m are maintained at uniform temperatures of $T_1 = 950$ K and $T_2 = 500$ K and have emissivities $\epsilon_1 = 1$ and $\epsilon_2 = 0.7$, respectively. Determine the net rate of radiation heat transfer between the two cylinders per unit length of the cylinders.
15. A counterflow double pipe heat exchanger is used to heat water using oil as the heating fluid. The heat exchanger area is 16 sq.m and it is observed that water inlet and outlet temperatures are 35°C and 75°C while the corresponding oil temperatures are 110°C and 75°C. If water flows at the rate of 68 kg/min, calculate the overall heat transfer coefficient for the heat exchanger. Take specific heat of oil as 1.9 kJ/kg °C.
16. (a) Explain the Boiling Heat transfer Phenomena, its types and applications.
(b) Determine the stable film boiling heat transfer coefficient for the film boiling of saturated water at atmospheric pressure on an electrically heated 1.5mm dia horizontal platinum wire with temperature difference of 250°C. What would be the power dissipation per unit length of the heater.
17. (a) Explain Wein's displacement law of radiation.
(b) Enumerate the differences between drop-wise and film-wise condensation.

FACULTY OF ENGINEERING

B.E. (PROD) V Semester (CBCS) (Backlog) Examination, March / April 2022

Subject: Machine Tool Engineering

Time: 3 hours

Max. Marks: 70

(Missing data, if any, may be suitably assumed.)

PART – A

Note: Answer all questions

(10 x 2 = 20 Marks)

- 1 Describe in brief the desirable characteristics of cutting tool materials?
- 2 How are the cutting tools classified? Name a few tools of each type.
- 3 List the various operations on lathe.
- 4 What is chip breaker? Describe various forms.
- 5 Why tools fail during cutting? Explain, giving reasons of tool wear.
- 6 What are the methods of gear cutting?
- 7 Differentiate up milling and down milling.
- 8 What is FMS? Explain.
- 9 Explain method of thread production.
- 10 What is adaptive control?

PART – B

Note: Answer any five questions

(5 x 10 = 50 Marks)

- 11 In orthogonal turning of a 50mm dia mild steel bar on a lathe, the following data were obtained: Rake angle = 15° , Cutting speed=100m/min, Feed=0.2mm/rev, Cutting force=180 N, Feed force=60 N. Calculate the shear plane angle, coefficient of friction, cutting power, the chip flow velocity and shear force, if the chip thickness=0.3 mm.
- 12 Draw a merchant's circle diagram and derive expressions to show relationships among the different forces acting on the cutting tool.
- 13 Explain the sources of heat generation in metal cutting and also the measurement of interface temperature with the help of tool-work thermocouple.
- 14 a) Explain the different machining operations performed on lathe.
b) Explain with schematic diagram the principle of thread cutting on a lathe.
- 15 a) What are the various types of milling cutters that are used in milling?
b) What are the differences between simple and differential indexing? Explain the relative merits.
- 16 a) What are the different types of bonds used in the manufacturing of abrasive wheels?
b) What is group technology? What is its relevance in NC and CNC machining?
- 17 Write short notes on:
 - a) Built-up edge phenomena
 - b) Cutting fluids
 - c) Group Technology

FACULTY OF ENGINEERING**B.E. (CSE) V Semester (CBCS) (Backlog) Examination, March / April 2022****Subject: Automata Languages & Computation****Time: 3 hours****Max. Marks: 70****(Missing data, if any, may be suitably assumed)****PART – A****Note: Answer all questions****(10 x 2 = 20 Marks)**

1. Differentiate DFA and NFA.
2. State pumping lemma for Regular Languages.
3. What do you mean by Ambiguous grammar? Give an Example.
4. State the general form of transition function of NPDA.
5. Mention closure properties of CFLs.
6. Define Chomsky Normal Form (CNF).
7. Define turning machine. How a TM accepts a language?
8. What do you understand by the term LBA.
9. Distinguish between classes of P and NP.
10. State Rice Theorem.

PART – B**Note: Answer any five questions****(5 x 10 = 50 Marks)**

- 11 a) Construct a DFA
b) What is minimization of FA? Explain with an example.
- 12 a) Given CFG $G = (\{S, A\}, \{a, b\}, P, S)$ where
P Consists of $S \rightarrow aAS \mid a$
 $A \rightarrow SbA \mid SS \mid ba$
Given the LMD, RMD and parse tree for "aabbaa".
b) What are ambiguous grammars? Give examples.
- 13 Convert the following Grammar to CNF.
 $S \rightarrow aAa \mid aBC$
 $A \rightarrow aS \mid bD \mid \epsilon$
 $B \rightarrow aS \mid c \mid b$
 $C \rightarrow abb \mid DD$
 $B \rightarrow aDa$
- 14 a) Convert the following grammar into GNF.
 $A \rightarrow BC$ $B \rightarrow CA/b$ $c \rightarrow AB/A$
b) Obtain a CFG for generating all integers.
- 15 a) Obtain a TM to multiply two unary no's separated by the delimiter '1'.
b) Consider the CFG $S \rightarrow A1A2 \mid A2A3$, $A1 \rightarrow A3A3 \mid 1$, $A3 \rightarrow A1A2 \mid 0$
Test 10010 is a member or not using CYK algorithm.
- 16 a) Explain Various Types of Turing machines.
b) What are recursively enumerable languages? Give example.
- 17 a) Explain undecidability.
b) Explain the classes of P, NP and explain the terms NP – complete and NP-hard.
Show the PCP with two lists lists $X = (b, bab^3, ba)$ and $y = (b^3, ba, a)$ has a solution.
Give the solution sequence.

FACULTY OF ENGINEERING**B.E. (IT) V Semester (CBCS) (Backlog) Examination, March / April 2022****Subject: Automata Theory****Time: 3 Hours****Max. Marks: 70****(Missing data, if any, may be suitably assumed)****PART – A****Note: Answer all questions.****(10 x 2 = 20 Marks)**

1. Distinguish between NFA and DFA.
2. State Myhill-Nerode theorem?
3. What do you mean by ambiguous grammar?
4. State pumping Lemma for CFG.
5. What-is Chomsky Hierarchy? Explain
6. Define 'δ' function in push down Automata?
7. Define Turing machines.
8. State Church's hypothesis?
9. Define P, NP problems.
10. Define universal language.

PART – B**Note: Answer any five questions.****(5 x 10 = 50 Marks)**

11. (a) Construct DFA

	0	1
→ q0	{q0,q1}	{q0}
q1	∅	{q2}
q2	∅	{q3}
q3	{q3}	{q3}

- (b) Write a short note on application of finite automata?

12. (a) Prove that the
- $L = \{a^m b^n \mid m > n\}$
- is not regular?

- (b) What are the Closure properties of Regular Languages?

13. Check the membership of the string "baaba" using CYK algorithm.

$$S \rightarrow AB|BC$$

$$A \rightarrow BA|a$$

$$B \rightarrow CC|b$$

$$C \rightarrow AB|a$$

14. Construct Turing machine to accept palindrome over the alphabet
- $\{0,1\}$
- .

15. (a) Define PCP

- (b) Check the instance of the given PCP has a solution.

W_i	X_i
100	001
11	111
111	11

16. (a) Convert the given CFG into CNF.

$$S \rightarrow asb|aA|dB|a|b$$

$$A \rightarrow aA|a$$

$$B \rightarrow bB|b$$

- (b) State closure properties of CFL's.

17. (a) Write short notes on restricted turing machine.

- (b) Explain Halting problem.

FACULTY OF ENGINEERING

B. E. III / IV (Civil) I – Semester (NON-CBCS) (Backlog) Examination,
March / April 2022

Subject: Theory of Structures – I

Time: 3 hours

Max. Marks: 75

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions.

(25 Marks)

1. Define distribution factor.
2. Write the slope deflection equation for a prismatic beam of flexural rigidity 'EI' and span 'l' if it's Right end sinks down by ' Δ '.
3. Define rotation factor in Kani's method.
4. Write the effect of change in temperature on a three hinges arch.
5. State and explain Castigliano's theorems.
6. What is rotational factor and displacement factor?
7. Define stiffness of a beam.
8. What is the difference between absolute stiffness and relative stiffness?
9. State Eddy's theorem?
10. Find the Horizontal thrust of a three-hinge parabolic arch if span 60m and central rise 10m subjected to UDL of 40kN/m over entire span.

PART – B

Note: Answer any five questions.

(5 x 10 = 50 Marks)

- 11 Analyse the continuous beam shown in Figure 1 using Slope Deflection Method and draw the shear force diagram. Assume EI is same for all spans.

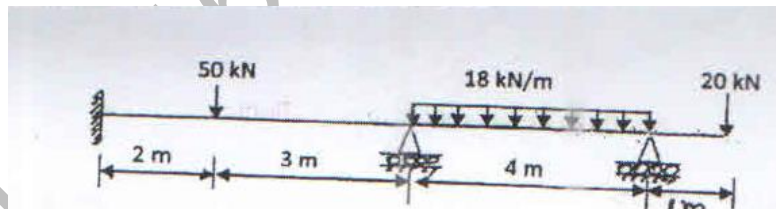


Figure 1

- 12 For the pin-jointed plane truss shown in Figure 2, find the vertical displacement of the joint D. Assume $AE = 2 \times 10^6 \text{ N}$.

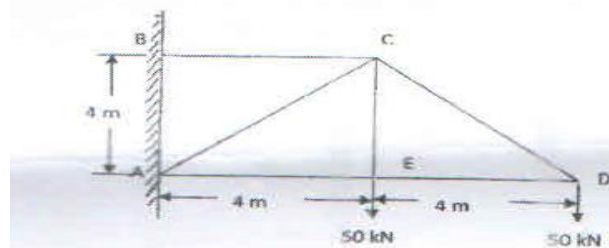
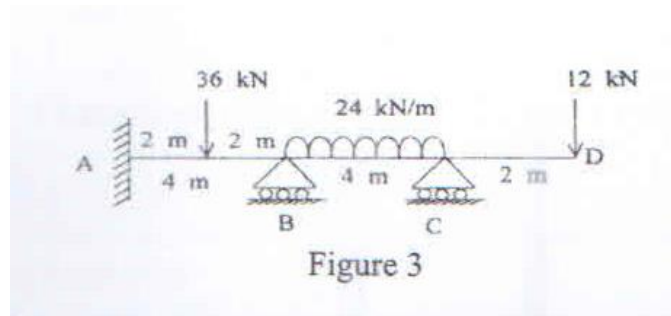


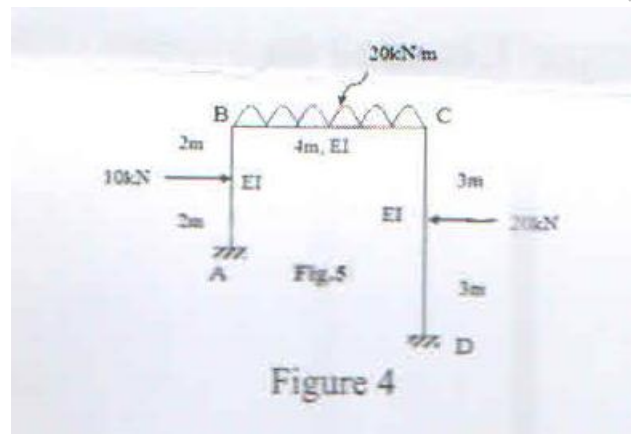
Figure 2

-2-

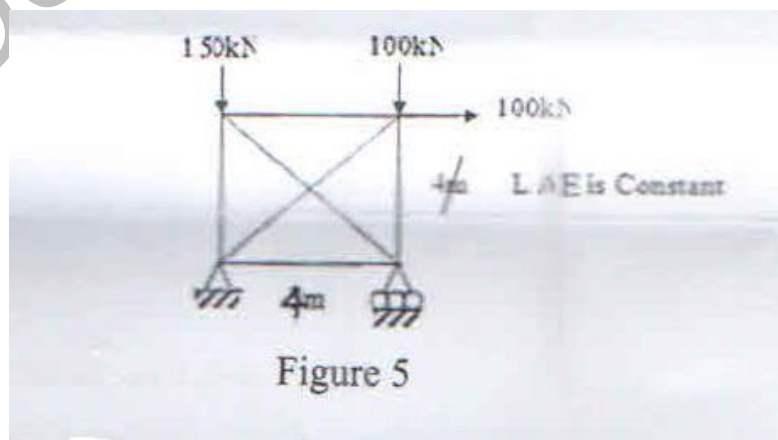
- 13 Analyse the continuous beam shown in Figure 3, using moment distribution method and draw the bending moment diagram and shear force diagram. EI is uniform.



- 14 Analyse the frame shown in Figure 4. By Kani's method and draw its BMD.



- 15 Find the forces in all the members of the truss shown in Figure 5. Take AE as same for all members.



- 16 A symmetrical three hinged circular arch has a span of 16m and a rise to the central hinge of 4m. it carries a vertical load of 16 kN at 4m from the left-hand end. Find (a) the magnitude of the thrust at the springing (b) the reactions at the supports (c) BM at 6m from the left-hand hinge.
- 17 A two hinged parabolic arch of span 24m and rise 4m is supported by a point load of 15 kN at a distance of 6m from the left support. Find the horizontal thrust and normal thrust.

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FACULTY OF ENGINEERING

**B.E. III / IV (EEE/EIE) I - Semester (NON-CBCS) (Backlog) Examination,
March / April 2022**

Subject: Power Electronics

Time: 3 Hours

Max. Marks: 75

(Missing data, if any may be suitably assumed)

PART – A

Note: Answer all questions.

(25 Marks)

1. What is meant by fast recovery diodes?
2. Compare power BJT with power MOSFET
3. Draw the Symbol and structure of SCR
4. Derive average load voltage and average load current of single-phase full wave rectifier with RL load.
5. Draw output voltage and current wave forms of a single – phase half wave – controlled rectifier with R load.
6. What is Cuk regulator?
7. Differentiate between Linear voltage regulator and switched mode regulators.
8. Write the complete classification of convertors
9. What are the two gating schemes in a 3- phase inverter?
10. What is multilevel inverter?

PART - B

Note: Answers any five questions.

(5 x 10 = 50 Marks)

11. a. Explain the working of UJT firing circuit with neat diagram.
b. Explain resistance firing of SCR.
12. Derive the relation between forward current gain and current gain of a BJT and explain how it operates like a switch.
13. With neat waveforms and circuit diagram explain the operation of full wave-controlled rectifier with RL load & freewheeling diode.
14. a. Derive the output voltage of Buck Chopper.
b. Explain with relevant circuit diagrams and waveforms how complimentary impulse commutation is achieved?
15. Explain the 120 degrees mode operation of 3 phase bridge inverter with neat diagrams.
16. A 3 phase fully controlled bridge rectifier is supplied at 230 volts per phase and at a frequency of 50Hz. The source inductance $L_s = 5$ mH and the load current on the dc side is constant at 12 amps. If the load consists of dc source voltage of 230 Volts having an internal resistance of 2Ω . Find (i) Firing angle ' α ' (ii) Overlap angle ' β '.
17. Write a short note on the following (i) SPWM (ii) Class B Chopper.

FACULTY OF ENGINEERING
B.E. III / IV (ECE) I - Semester (NON-CBCS) (Backlog) Examination,
March / April 2022

Subject: Digital System Design with Verilog HDL

Time: 3 Hours

Max. Marks: 75

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions.

(25 Marks)

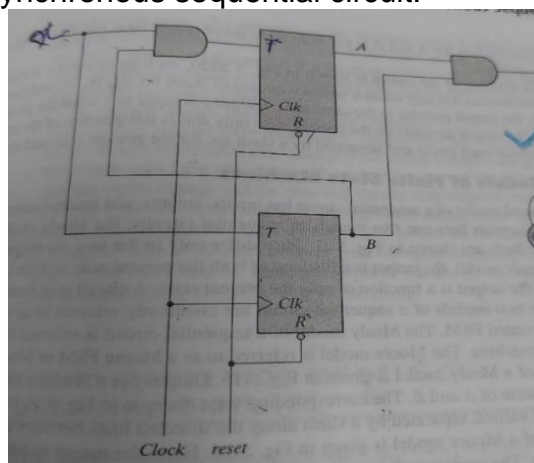
- 1 Explain compiler directives used in Verilog.
- 2 Explain representation of numbers in Verilog.
- 3 Differentiate between initial and always statement in Verilog.
- 4 What is RTL code with example?
- 5 Write the Verilog code for T flip flop in behavioral model.
- 6 Draw blocks of ASM chart.
- 7 Define transition and flow table in asynchronous sequential circuits.
- 8 Explain Race condition with example.
- 9 Draw neat diagram of BJT SRAM cell.
- 10 Draw simplified architecture of FPGA and CPLD with application.

PART – B

Note: Answer any five questions.

(5 x 10 = 50 Marks)

- 11 (a) What are system task and compiler directives supported in Verilog HDL?
(b) Write Verilog code for 4-Bit binary adder.
- 12 (a) Write Verilog code for CMOS NAND gate in switch level modeling.
(b) Explain multi-way branching statement used in Verilog HDL.
- 13 (a) Draw the flow chart for FSM as Arbiter circuit and explain.
(b) Explain one hot encoding with example.
- 14 Analyze the given synchronous sequential circuit.



..2..

- 15 (a) Design vending machine controller and implement verilog code.
(b) Differentiate between ASM and ASMD chart.
- 16 (a) Explain design flow of FPGA.
(b) Draw the FPGA and CPLD simplified architecture.
- 17 write a short notes on:
(a) Memory devices
(b) CAD tools.

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FACULTY OF ENGINEERING

**B.E. III / IV (MECH/PROD/AE) I - Semester (NON-CBCS) (Backlog) Examination,
March / April 2022**

Subject: Design of Machine Elements

Time: 3 Hours

Max. Marks: 75

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions.

(25 Marks)

- 1 Sketch the state of stress in bi-axial and tri-axial systems of loading.
- 2 What is S-N curve?
- 3 Suggest the valuable conditions, the following keys are preferred
a) Sunk taper key b) Feather key
- 4 Explain briefly miner's rule.
- 5 What are the stresses induced in a welded joint under eccentric loading?
- 6 What is distortion energy in distortion energy theory of failure?
- 7 Name some methods to prevent fatigue failure of machine parts.
- 8 Among a solid shaft and a hollow shaft of same material and same outer diameter, which shaft is preferred under bending and why?
- 9 Suggest the valuable conditions, a Knuckle joint is preferred over a cotter joint.
- 10 Explain compound and differential screw.

PART – B

Note: Answer any five questions.

(5 x 10 = 50 Marks)

- 11 A shaft made of steel of yield strength 700 MPa is subjected to static loads consisting of bending moment 10 kN-m and a torsional moment 30 kN-m. Determine the diameter of the shaft using a) Max principal stress theory and b) Max shear stress theory. Take $E = 210 \text{ GPa}$ and Poisson's ratio = 0.25.
- 12 A shaft is subjected to bending moment that varies from +450N-m to -250 N-m and a twisting moment at the critical section varies from 350N-m CW to 150N-m CCW. Determine the shaft diameter for the following data. Factor of safety=2, Ultimate strength=580 MPa, yield stress=350 MPa, endurance stress=300 MPa, size correction factor=0.80, surface correction factor=0.80, fatigue stress concentration factor=1.4
- 13 A shaft made of mild steel is required to transmit 150kW at 350 rpm. The supported length of the shaft is 4 meters. It carries two pulleys each weighing 1400 N supported at a distance of 1.5 meter from the ends respectively. Assuming safe values of stress, determine the diameter of the shaft.
- 14 Design a C.I. flange coupling (protective type) to connect two shafts 150 mm diameter running at 300 Rpm for transmitting 4500 N-m torque. Assume permissible shear stress for shaft, bolt and key is 75 MPa, crushing stress for the bolt and key is 200 MPa and shear stress for flange is 10 MPa.

..2..

- 15 Design the Gib and Cotter joint with clear dimensions for connecting the square rods and the joint to carry a maximum load of 40 kN. Assume that the gib and cotter are of same material and having the permissible stresses as 25 MPa, 20MPa and 60 MPa in tension, shear and crushing respectively.
- 16 The lead screw of a lathe has trapezoidal threads. To drive the tool carriage the screw has to exert an axial force of 30kN. The thrust is carried by the collar. The length of the lead screw is 2 m. Coefficients of friction at the collar and nut are 0.12 and 0.15 respectively. Suggest suitable size of the screw and height of the nut if the permissible bearing pressure is 5MPa.
- 17 Sketch
- Hook's joint
 - Turn buckle
 - Castle nut
 - Foundation bolt.

FACULTY OF ENGINEERING
B.E. III / IV (AE) I Semester (NON-CBCS) (Backlog) Examination,
March / April 2022
Subject: Design of Machine Components

Time: 3 Hours

Max. Marks: 75

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions.

(25 Marks)

1. Briefly explain ductility of a material.
2. What do you understand by yield point of a metal?
3. Write the formula for calculating maximum tensile stress and maximum compressive stress.
4. Define torsional shear stress with a simple sketch.
5. What is meant by stress concentration?
6. Write short notes on the influence of various factors on the endurance limit of a ductile material.
7. Name the different types of keys.
8. What are transmission shafts?
9. What are the three types of cotter joints used to connect two rods by a cotter?
10. Differentiate between differential and compound screws.

PART – B

Note: Answer any five questions.

(5 x 10 = 50 Marks)

11. The load on a bolt consists of an axial pull of 20KN together with a transverse shear force of 10 KN. Find the diameter of the bolt required according to (a) Maximum principal stress theory and (b) Maximum principal strain theory. Take permissible tensile stress at elastic limit = 100MPa and Poisson's ratio = 0.3.
12. A steel shaft 50 mm in diameter and 500mm long is subjected to a twisting moment of 1100 N-m. The total angle of twist being 0.6° . Find the maximum shearing stress developed in the shaft and the modulus of rigidity.
13. Explain the Goodman Method for combination of stresses.
14. A machine component is subjected to a flexural stress which fluctuates between $+300 \text{ MN/m}^2$ and -150 MN/m^2 . Determine the value of minimum ultimate strength according to Gerber relation. Take yield strength = $0.55 \times$ ultimate strength; endurance strength = $0.5 \times$ ultimate strength and FOS = 2
15. A marine type flange coupling is used to transmit 3.75 MW at 150 rpm. The allowable shear stress in the shaft and bolts may be taken as 50 MPa. Determine the shaft diameter and the diameter of the bolts.
16. Explain the Gib and Cotter joint for the strap end of a connecting rod with the help of a sketch and the different terms used in it.
17. Discuss the various types of power threads. Discuss their relative advantages and disadvantages also.

FACULTY OF ENGINEERING

**B.E. III / IV (CSE) I – Semester (NON-CBCS) (Backlog) Examination,
March / April 2022**

Subject: Automata Language and Computation

Time: 3 hours

Max. Marks: 75

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions.

(25 Marks)

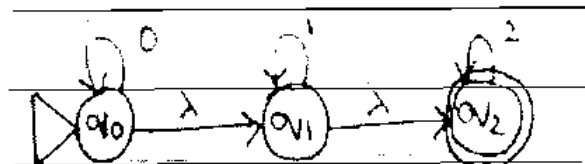
- 1 Distinguish between NFA and DFA.
- 2 Define strings, alphabets and languages.
- 3 What do you mean by ambiguous grammar?
- 4 Write any three decision properties of regular languages.
- 5 State the pumping lemma for CFG
- 6 Define Chomsky Normal Form (CNF)
- 7 Define turing machine. How a TM accepts a language?
- 8 State church's hypothesis
- 9 Define PCP and MPCP.
- 10 What is universal language?

PART – B

Note: Answer any five questions

(5 x 10 = 50 Marks)

- 11 a) Construct DFA for the language $L = \{W | W \text{ does not contain the string sub string } 001\}$.
- b) Construct the regular Expression for the given DFA



- 12 a) Find Parse tree for the expression 'abbede' by considering the productions
 $S \rightarrow aAcBe$
 $A \rightarrow Ab/b$
- b) What is ambiguous grammar? Explain with example.
- 13 Construct PDA for the Language $L = \{WCW^R | w \in (0,1)^*\}$
- 14 a) Construct the turing machine to accept the language of palindrome over alphabets $\{a,b\}$.
- b) Explain Halting problem of Turing machine.

15 a) Convert the given CFG into CNF.

$S \rightarrow asb|aA|dB|a|b$

$A \rightarrow aA|a$

$B \rightarrow bB|b$

b) State any closure properties of CFL's

16 a) Explain Restricted satisfiability problem.

b) Explain the terms NP-Hard and NP- Complete

17 Define

a) PDA

b) GNF

c) Church hypothesis

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Code No. D-3122/NON-CBCS

FACULTY OF ENGINEERING
B.E. III / IV (IT) I Semester (NON-CBCS) (Backlog) Examination,
March / April 2022

SUBJECT: DESIGN AND ANALYSIS OF ALGORITHMS

Time: 3 Hours

Max. Marks: 75

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions.

(25 Marks)

1. Explain randomized algorithms.
2. Write the control abstraction for greedy method.
3. Differentiate implicit and explicit constraints.
4. Define maxheap. Give an example.
5. State the optimality principle.
6. What do you mean by a minimal spanning tree?
7. State all pairs shortest path with example.
8. Define articulation point.
9. Define chromatic number of a graph.
10. State Node Covering Decision problem.

PART- B

Note: Answer any five questions

(5 x 10 = 50 Marks)

11. (a) Explain weighted union with an example.
(b) Write the algorithm for merge sort and explain with an example.
12. (a) Solve the Knapsack problem using Greedy approach where $n=3$, $m=20$, $(p_1, p_2, p_3) = (25, 24, 15)$ and $(w_1, w_2, w_3) = (18, 15, 10)$.
(b) Write an algorithm to search an element using binary search technique. Analyze the time complexity.
13. (a) Explain the Kruskal's algorithm for MST using example.
(b) Explain the concept of multistage graphs.

14. (a) Explain Dictionaries and heap data structure.
(b) Explain Reliability design problem.
15. (a) State 'n' Queen's problem and write an algorithm for n queen's.
(b) Explain Hamiltonian cycle with an example.
16. (a) Explain the graph coloring problem with an example.
(b) Explain non-deterministic algorithm for traveling salesman problem.
17. Write notes on any two the following
(a) 0/1 Knapsack problem
(b) Reliability Design
(c) Optimal storage on tapes.
