FACULTY OF ENGINEERING

B. E. (Civil) (CBCS) VII – Semester (Main & Backlog) Examination, March/April 2021

Subject: Finite Element Techniques

Time: 2 hours   Max. Marks: 70

Note: Missing Data, if any, may be suitably be assumed.

PART – A

**Answer any five questions.**   **(5x2 = 10 Marks)**

1. Write stiffness matrix for a 2 noded (2-DOF) beam elements.

2. Explain about the Galerkin's method.

3. Derive the strain-displacement matrix B for a 1-D, 2-node bar element.

4. Distinguish between the problem of plane stress and plane strain.

5. A triangular element has its nodes at (3.0, 3.0), (1.0, 0.0) and (0.5, 0.5). Determine the area co-ordinates of a point (2.0, 2.0).

6. Derive the shape functions for higher order 3-node bar element using Lagrangian polynomials.

7. Using one-point Gauss quadrature technique, evaluate the integral $I = \int e^x \cos x \, dx$ from limits -1 to 1. Compare the results with exact solution.

8. What is meant by iso-parametric formulation?

9. Give two examples of axi-symmetric problems.

10. Write the Jacobian matrix J for an axisymmetric ring element terms of (r, z) co-ordinates.

PART – B

**Answer any four questions.**   **(4x15 = 60 Marks)**

11. For the two nodded stepped bar shown in Fig.1, determine the nodal displacements, element stresses and reaction forces.

$E_{all} = 0.7 \times 10^5$ MPa, $E_{st} = 2 \times 10^5$ MPa.
$A_{all} = 2400$ mm², $A_{st} = 600$ mm².

Fig 1
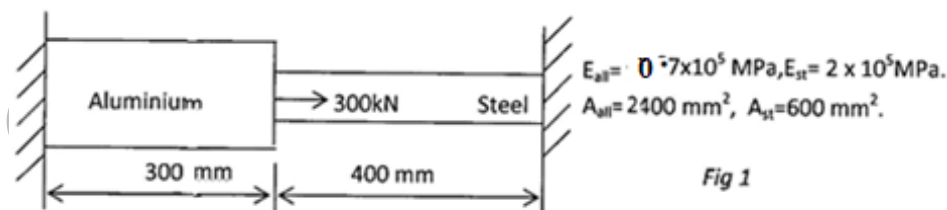
12. The nodal coordinates of a triangular element is shown in Fig.2. At the interior point P, the x coordinate is 3.3 cm and y coordinate is 5cm, determine the shape functions N_1, N_2 & N_3 and B matrix for plane strain condition.   [10]

Fig 2

…..2
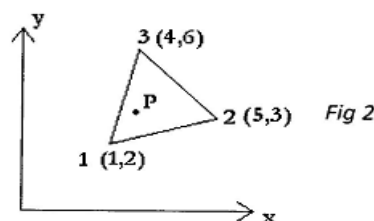
13. Determine the nodal displacements, stresses in elements and reaction forces for pin jointed truss shown in Fig.3. Take E = 200 GPa, Area of Cross section = 1200 mm² for all members.

Fig 3
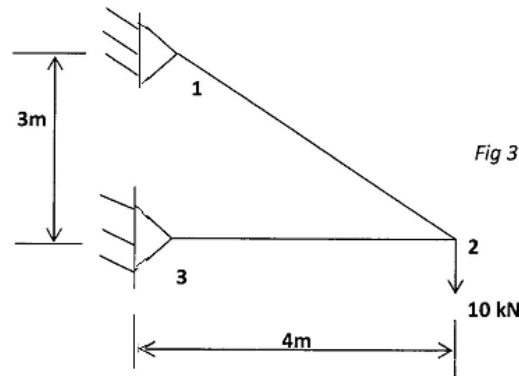
14. The (x, y) coordinates of nodes of a 4-node quadrilateral element shown in Fig.4 in cm are : 1(1,1), 2(5,1), 3(6,6) and 4(1,4). The element displacement vector q = [0, 0, 0.20, 0, 0.15, 0.10, 0, 0.05]ᵀ. Find (i) x, y coordinates of a point P, whose location in the master element is given by ξ= 0.5 and η–0.5 and (ii) u, v displacements of the point P.

Fig 4
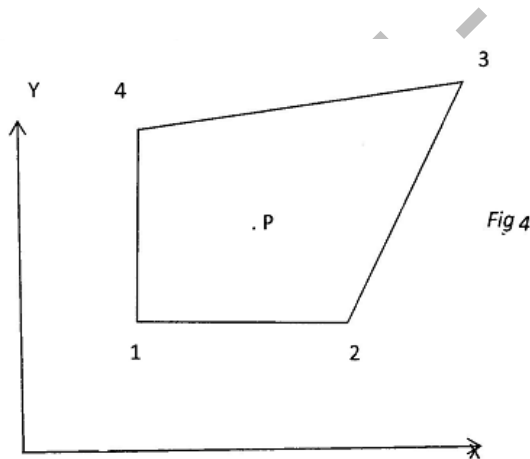
15. Derive the strain-displacement matrix 'B' for an axisymmetric element.

16. Evaluate the stiffness matrix for CST element having nodes at 1(20, 25), 2(75, 25) and 3(45, 120) mm with E = 210 GPa, µ = 0.25 and thickness 8 mm. Consider the element for plane stress condition.

17. Answer short notes on the following:

    (a) Derive the equilibrium equations for 3-D continua subjected to body forces.

    (b) Explain about the Lagrangian and the Serendipity elements.

    (c) Using two-point Gauss quadrature techniques, evaluate the integral, $I = \int [x^4 - \cos x] dx$ from -1 to 1.

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FACULTY OF ENGINEERING

B.E. (EEE) VII-Semester (CBCS) (Main & Backlog) Examination, March/April 2021

Subject : Electrical Machine Design

Time: 2 Hours   **Max. Marks: 70**

Note: Missing Data, if any, may be suitably be assumed.

PART – A

Note: Answer any Five Questions   **(5x2 = 10Marks)**

1. What are the properties of ideal insulating materials
2. What is leakage flux? Define leakage coefficient.
3. Define heating time constant.
4. Write the disadvantages of higher specific magnetic loading.
5. What is optimization?
6. Define short circuit ratio of a synchronous machine.
7. Write the advantages of digital computers.
8. Write the output equation of 1-ø and 3-ø transformers.
9. What are the disadvantages of having large number of poles?
10. Write a brief comparison between copper and aluminum when used as windings in electrical machines.

PART – B

Note: Answer any Four Questions   **(4x15 = 60Marks)**

11. a) Write about the classification of magnetic materials.
    b) Write about application of insulating materials.

12. Calculate the mmf required for the air gap of a machine having core length=0.32m including 4 ducts of 10mm each, pole arc = 0.19m, slot pitch = 65.4mm, slot opening = 5mm, air gap length = 5mm, flux per pole = 52mWb. Given carter's coefficient is 0.18 for opening /gap =1, and is 0.28 for opening /gap = 2.

13. A 5kW, 250V ,4pole ,1500rpm shunt generator is design to have a square pole face average flux density in the gap $=0.42 wb/m^2$, ampere conductors per meter =15,000 . Find the main dimensions of the machine. Assume full load efficiency =0.87 and the ratio of pole arc to pole pitch=0.66.

14. Estimate the stator core dimensions, no of stator slots and no of stator conductors per slot for a 100 KW, 3300V, 50Hz, 12pole Y-connected slip ring IM. B_{av}= $0.4 wb/m^2$, ac = 25000amp.cond/m, efficiency = power factor = 0.9.Choose main dimensions to give best power factor. The slot loading should not exceed 500 amp-cond/m.

15. a) What are the different types of enclosures used in rotating electrical machines.
    b) Derive the output equation for a DC Machine.

16. a) What the major considerations to evolve a good design.
    b) Derive the KVA rating for a single phase transformer.

17. Explain synthesis method and analysis method along with their flowchart.

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FACULTY OF ENGINEERING

B.E. (EIE) VII Sem. (CBCS)(Main & Backlog) Examination, March/April 2020

Subject: Analytical Instrumentation

Time: 2 Hours   Max. Marks: 70

Note: Missing Data, if any, may be suitably be assumed.

PART – A

Note: Answer any Five Questions   (5x2 = 10Marks)

1. What are the limitations of Beer's Law?
2. What is the difference between Photovoltaic cell and photo Emissive cell?
3. List out the different types of IR Spectrophotometer.
4. Explain the resolution of Mass Spectrometer.
5. Draw and Explain Michelsom's Interferometer.
6. What are the different methods are used for measurement of Peak Areas?
7. Define Polarographs.
8. What are Biosensors?
9. Explain about Water Pollution Monitoring Instruments.
10. Write about Magnetic Wind Instruments.

PART – B

Note: Answer any Four Questions   (4x15 = 60Marks)

11. a) Explain Electromagnetic Spectrum with a neat sketch.
    b) Describe the source of error and calibration of Spectrophotometer.

12. a) Explain the different types of Infrared Spectrophotometers.
    b) Explain the principle and working of FTIR with the help of block diagram.

13. a) With the help of neat diagram explain the working of Gas Chromatography.
    b) Explain Nuclear Magnetic Resonance Spectrometer with relevant sketch.

14. a) Explain the operation of Conductivity Meter with relevant diagram.
    b) Explain in detail about Selective Ion Electrodes.

15. a) With a neat diagram explain paramagnetic Oxygen Analyzer.
    b) Explain Infrared Gas Analyzer with relevant diagram.

16. a) Explain the working of Amino Acid Analyzer.
    b) Explain the application of Mass Spectroscopy.

17. Write short note on the following:
    a) Wet Chemical Air Analysis.
    b) Electrodes of pH Measurement.

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FACULTY OF ENGINEERING

B. E. (ECE) (CBCS) VII – Semester (Main & Backlog) Examination, March/April 2021

Subject: Microwave Techniques

Time: 2 hours   Max. Marks: 70

Note: Missing Data, if any, may be suitably be assumed.

PART – A

Answer any five questions.   **(5x2 = 10 Marks)**

1. Define cut-off frequency. Derive it for a parallel plane waveguide.

2. Establish the relationship between free space wavelength, cut-off wavelength and guide wavelength.

3. What are the properties of S-matrix?

4. What is BWO? Explain.

5. What is bunching in a Klystron amplifier?

6. Explain the transit time effect.

7. What is negative resistance in a Gunn diode?

8. Distinguish between microstrip line and strip line.

9. Calculate the coupling factor of a directional coupler when the incident power is 600mW and power in auxiliary waveguide is 350 μW.

10. What are the advantages and disadvantages of a circular waveguide?

PART – B

Answer any four questions.   **(4x15 = 60 Marks)**

11. Explain wave impedance and obtain the expressions of wave impedance for TE, TM & TEM waves guided along parallel planes. Also sketch the variations of wave impedance with frequency.

12. Discuss the propagation of EM waves in a rectangular waveguide. Derive the expressions for electric and magnetic fields for transverse magnetic mode.

13. Explain the working of a directional coupler giving its scattering matrix and explain the following terms (i) Directivity (ii) Coupling factor (iii) Insertion loss (iv) Isolation.

14. With a neat diagram, explain magnetron. What is Pi-mode? How is it separated from other modes?

15. (a) What is transferred electron effect?

    (b) Explain the Gunn effect based on two valley model theory.

16. (a) For a frequency of 6GHz and plane separation of 10cm, with air dielectric between planes, find the following parameters of TE_1 mode. (i) Cut-off frequency (ii) Cut-off wavelength

    (iii) Wave impedance (iv) guide wavelength (v) Is it possible to propagate TE_3 mode?

    (b) Explain the working of a circulator using an application.

17. Write a short note on:
    (a) Limitations of conventional tubes at microwave frequencies.
    (b) IMPATT diode.

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FACULTY OF ENGINEERING

B.E. VII-Semester (CBCS) (M/P) (Main & Backlog) Examination, March/April 2021

Subject : Industrial Engineering

Time: 2 Hours   **Max. Marks: 70**

Note: Missing Data, if any, may be suitably be assumed.

PART – A

Note: Answer any Five Questions   **(5x2 = 10 Marks)**

1. Define Management?
2. What are off-shore training programs?
3. Describe Scheduling in Production Control?
4. What is Inventory Cost?
5. Define "Quality" how different it is from Inspection?
6. Explain Double Sampling plan?
7. List the types of Decision Making?
8. What are Confidence Limits in Quality Indices?
9. Write the role of Labour participation in Management?
10. Define Process Capabilities?

PART – B

Note: Answer any Four Questions   **(4x15 = 60 Marks)**

11. a) Write the benefits of Scientific Management to the Industry?
    b) Describe the functions of Personnel Management?

12. a) State objective of Production Planning and Control?
    b) Explain non-analytical methods of Job-Evaluations?

13. a) Derive an Algebraic Expression for Economic Order Quantity (EOQ).
    b) Write the importance of Inventory Control?

14. a) Write the characteristics of Operating Curve in Single Sampling Plan?
    b) Write the advantages of Control Charts

15. a) Explain the steps involved in Decision Making?
    b) Explain the types of Decision Making Environments?

16. A biscuit manufacturing company buys a lot of 10,000 bags of wheat per annum. The cost per bag is Rs.500 and the ordering cost is Rs.400. The inventory carrying cost is estimated at 10 percent of the price of the wheat. Determine Economic Order Quantity and also find the number of orders to be placed.

17. Write short notes on:
    a) Management by Objectives (MBO)
    b) Progress Report in Production Control
    c) Decision making under Risk

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FACULTY OF ENGINEERING
B.E. (A.E) VII-Semester (CBCS) (Main & Backlog) Examination, March/April 2021

Subject : Metrology & Automobile Instrumentation

Time: 2 hours   Max. Marks: 70

Note: Missing Data, if any, may be suitably be assumed.
PART – A

Answer any five questions.   **(5x2 = 10 Marks)**

1   Define metrology. Explain the significance of metrology.
2   Differentiate between accuracy and precision.
3   Define Straightness and flatness and list two ways of estimating them
4   Define a comparator. Discuss the functional requirements of a comparator
5   What are the gear geometries that are tested for functionality?
6   List the instruments used in machine tool testing.
7   What is a transducer? Name different types of transducers used for engineering applications.
8   Differentiate between Threshold and resolution.
9   Explain the concept of ambient temperature compensation in thermocouples.
10 What is the relationship between electric resistance with temperature?

PART – B

Answer any four questions.   **(4x15 = 60 Marks)**

11 a) Explain the phenomenon involved in 'wringing' of slip gauges.
   b) Differentiate between hole basis and shaft basis systems.

12 a) With the help of a neat sketch, explain the construction details of tool maker's microscope.
   b) Explain with a neat sketch the principle, operation and uses of an optical projector.

13 a) Explain the various geometrical tests that are to be done to get a better accuracy in the machine tool
   b) Describe a gear tooth vernier caliper and explain its use for checking tooth thickness and depth of tooth

14 a) What are strain gauges? Explain the applications of Wire and foil type resistance strain gauges with neat sketches.
   b) Explain static and dynamic characteristics of instrumentation.

15 a) Explain the various types of materials used in thermos couples
   b) List the instruments used for pressure measurement and explain working principle of bourdon pressure gauge with a neat sketch.

16 a) Explain the uses of proving ring with a sketch to measure load.
   b) State and explain Taylor's principle of plain limit gauges.

17 a) Explain the working mechanism of a dial indicator.
   b) With the help of a neat sketch, explain the construction details of a tool maker's microscope.

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FACULTY OF ENGINEERING

B. E. (CSE) (CBCS) VII – Semester (Main & Backlog) Examination, March/April 2021
Subject: Information Security

Time: 2 hours   Max. Marks: 70

Note: Missing Data, if any, may be suitably be assumed.

PART – A

Answer any five questions.   **(5x2 = 10 Marks)**

1. What are critical characteristics of Information?
2. What is the difference between DOS and DDOS attack?
3. What is Data confidentiality?
4. Differentiate between Law and Ethics.
5. What is Digital Forensics?
6. What is the role of a proxy server?
7. What are the different firewall processing modes?
8. Define Public Key Infrastructure and specify its role in cryptography?
9. What are the three major steps in executing a project plan?
10. List the components of Information system.

PART – B

Answer any four questions.   **(4x15 = 60 Marks)**

11. Difference between Threat and Attack? Explain different types of attacks.
12. (a) Explain Secure Software Development Life Cycle.
    (b) Explain in detail International Laws & Legal Bodies.
13. Explain Firewall Architectures in detail.
14. (a) What is VPN? Briefly discuss two approaches.
    (b) What is Honey pot? Explain its role.
15. (a) Explain about the Security Maintenance Model?
    (b) What are the technical aspects of Information System?
16. (a) Explain Cipher Methods.
    (b) What is Man-in-the-middle attack on crypto systems?
17. Write short notes on:
    (a) Security education, Training & Awareness.
    (b) Defense in depth.
    (c) Cost Benefit Analysis.

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FACULTY OF ENGINEERING

B. E. (CBCS) (IT) VII – Semester (Main & Backlog) Examination, March/April 2021

Subject: Wireless Mobile Communication

Time: 2 hours   Max. Marks: 70

Note: Missing Data, if any, may be suitably be assumed.

PART – A

Answer any five questions.   **(5x2 = 10 Marks)**

1. Define TDMA.

2. Write three features of 3G wireless technologies.

3. What is meant by pseudo-noise sequence?

4. What is meant by Handoff in cellular systems? Mention the techniques.

5. What are the goals of Mobile IP?

6. Write the advantages of CDMA.

7. Mention the applications of DHCP.

8. Write the significance of Hiper LAN.

9. What is meant by selective retransmission in mobile TCP?

10. Write the applications of J2ME.

PART – B

Answer any four questions.   **(4x15 = 60 Marks)**

11. (a) Describe the 2G cellular systems in detail.

    (b) Discuss the importance of frequency reuse in cellular systems.

12. (a) Explain about hidden and exposed terminals vs near and far terminals with an example.

    (b) Explain the methods used to improve capacity and coverage in cellular systems in detail.

13. Explain about GSM architecture with the help of a suitable diagram.

14. (a) Discuss briefly about Traditional TCP vs Mobile TCP.

    (b) Explain about fast retransmit/fast recovery in mobile TCP networks.

15. (a) Explain about DHCP protocol architecture in detail with a suitable diagram.

    (b) Discuss briefly about how to overcome congestion in Mobile TCP.

16. (a) Write briefly about IEEE 802.11 protocol architecture.

    (b) Explain about Bluetooth.

17. Write a short notes on the following.

    (a) 3G cellular Technology.

    (b) FH-SS(Frequency Hopped Spread Spectrum)

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FACULTY OF ENGINEERING

BE 4/4 (Civil) I-Semester (Backlog) Examination March/April 2021

subject: Foundation Engineering

Time : 2 Hours   Max. Marks: 75

Note: Missing Data, if any, may be suitably be assumed.

PART – A

Note: Answer any Seven Questions   **(7x3 = 21Marks)**

1. What is the basic principle involved in the development of New mark's chart?
2. Sketch the vertical pressure distribution below a point load on a horizontal plane.
3. Define Allowable bearing capacity.
4. Brief the corrections to be applied on Standard penetration number.
5. Using a drop hammer of 22kN capacity and the height of drop being 6m, the average penetration over the last 6 blows was 12.5 mm. Determine the allowable load on the pile using Engineering news formula.
6. Write the uses of under-reamed piles.
7. When do you prefer a pneumatic caisson?
8. List out the components of well foundation.
9. What is meant by Area Ratio?
10. Explain about log of bore holes.

PART – B

Note: Answer any Three Questions   **(3x18 = 54 Marks)**

11. a) Derive an expression for the vertical stress by using Boussinesq's theory below the ground surface due to a point load acting on it. Also mention the assumptions.
    b) A rectangular area 4m x 6m carries a uniformly distributed load of 100 kN/m² at the ground surface. Estimate the vertical pressure at a depth of 6m vertically below the centre and also below a corner of the loaded area.

12. a) Differentiate between General shear failure and Local shear failure. How the ultimate bearing capacity in Local shear failure is determined?.
    b) A 3m x 2m rectangular footing is located at a depth of 5m in stiff clay of saturated unit weight of 20 kN/m³. The undrained shear strength of clay at 5m depth is given as 100 kN/m². Compute net value of ultimate bearing capacity, with a factor of safety equal to 3. Also, determine the maximum load that could be taken by the footing.

13. a) Briefly explain how the load carrying capacity of a pile is determined using pile load test.
    b) A group of 20 piles, arranged in 4 x 5 pattern are provided in a Clay deposit to a depth of 12m. The size of each pile is 450 mm dia provided at a c/c spacing of 1.05 m. The average properties of the clay along the shaft are q_u = 100 kPa, adhesion factor = 0.58. The unconfined compressive strength of the clay at the tip of piles is q_u = 160 kPa. Determine the safe load carrying capacity of the pile group. Adopt FS=2.50.

14. a) Discuss the comparative merits and demerits of open caissons and pneumatic caissons.
    b) Explain the measures for rectification of tilts of well foundations with neat sketches.

15. a) Discuss the types of braced excavations with sketches.
    b) Write short notes on transportation and storage of samples.

16. a) What is "Proportioning of Footings"? Explain its objective and the procedure.
    b) Write a note on "Dynamic formulae" and comment on their validity.

17. a) Explain the process of sinking of well foundation.
    b) Explain about well point method of dewatering.

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FACULTY OF ENGINEERING

B.E. 4/4 (EEE) I-Semester (Backlog) Examination, March/April 2021

Subject : Electric Drives and Static Control

Time: 2 hours   **Max. Marks: 75**

Note: Missing Data, if any, may be suitably be assumed.

PART – A

Answer any seven questions.   **(7x3=21 Marks)**

1   Sketch the closed-loop lock diagram of adjustable speed drive.
2   What do you understand by constant torque and constant power drive?
3   The energy loss at no-load during speed reversal of a dc shunt motor is 400W, then calculate the energy loss during starting, dynamic braking and plugging.
4   Which type of braking is worst form of braking? Justify.
5   Justify continuous conduction mode of an electric drive is preferred over discontinuous mode.
6   Compare circulating and non circulating modes of Dual converter.
7   A.C. voltage controller fed 3-ϕ induction motors are suitable for fan or pump type of loads. Justify.
8   List the merits and demerits of PWM type VSI.
9   List the industrial applications of switched reluctance motor.
10 Distinguish true synchronous mode and self-controlled mode of synchronous motor.

PART – B

Answer any three questions.   **(3x18 = 54 Marks)**

11 (a) Explain four quadrant operation of an electric drive with an example.
    (b) Discuss about modified speed-torque characteristics of dc shunt motor.

12 (a) A 220V, 960 rpm and 80a dc series motor is driving a load whose torque is same at all speeds. Resistances of armature and filed are each 0.05Ω. Calculate magnitude and direction of motor speed and current if the terminal voltage is changed from 220V to -200V and the number of turns in field winding is reduced to 80%. Will the motor speed reverse? Assume linear magnetic circuit.
    (b) The energy lost during starting of a dc series motor is independent of its armature circuit resistance. Justify your answer with a mathematical proof.

13 (a) Compare 1-ϕ fully controlled and half-controlled rectifier fed dc drives.
    (b) A 220V, 1500 rpm, 10A separately excited motor with armature resistance of 0.5Ω is fed from a 1-ϕ fully controlled rectifier available 1-ϕ ac 230v, 50 Hz source. Determine the value of firing angle when (a) motor is running at 1200 rpm and rated torque (b) When motor is running at -800 rpm and twice the rate torque. Assume continuous conduction.

14 (a) A 3-ϕ, 440 V, 50Hz, 10 kW, 960 rpm, 6-pole, star connected slip-ring induction motor has the following constants per phases: $R_1 = 0.4\Omega$, $R_2 = 0.6\Omega$, $X_1 = X_2 = 1.4\Omega$. The load torque is proportional to speed and the motor is controlled by static rotor resistance control. The stator to rotor turns ratio is 2. Calculate the value of external resistance so that motor runs at 800 rpm for duty ratio of 0.6.
    (b) Explain static Scherbius drive of slip-ring induction motor drive.

15 (a) Explain the working of BLDC motors.
    (b) Explain self-controlled mode of synchronous motor with neat diagram.

16 (a) Describe four quadrant operation of a hoist load with neat diagram.
    (b) Define electric braking, types of electric braking and list the advantages of electric braking.

17 Write short notes on any **two** of the following:
    (a) Circulating current mode of Dual converter
    (b) VSI fed 3-ϕ Induction motor drive.
    (c) Switched reluctance motors.

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FACULTY OF ENGINEERING

B. E. 4/4 (ECE) I – Semester (New)(Backlog) Examination, March/April 2021

Subject: VLSI Design

Time: 2 hours   Max. Marks: 75

Note: Missing Data, if any, may be suitably be assumed.

PART – A

Answer any seven questions.   **(7x3=21 Marks)**

1. What is Moore's law? Explain its relevance with respect to evolution of IC Technology.
2. Critique the Enhancement mode of NMOSFET in three conditions.
3. Why is good design should follow lamda based design rules.
4. Compare DRAM with SRAM.
5. Design D flip flop using transmission gates.
6. What cross talk is in interconnects?
7. Why are buffers inserted in long connecting wires?
8. Draw the circuit of a Wilson current mirror. Give the expression for Iout.
9. What is latch-up effect in CMOS and how to prevent it.
10. Draw common gate Amplifier and Source-degenerated current mirror.

PART – B

Answer any three questions.   **(3x18 = 54 Marks)**

11. a) Explain the operation of NMOS transistors and derive its current equation in linear region and in Saturation region.
    b) Draw the AOI logic gate diagram and CMOS circuit for the expression.

$$f = \overline{[(a.b) + (c.d)]}$$

12. a) Calculate the resistance for nMOSFET with channel length $L = 8\lambda$ and width

    $W = 2\lambda$. The sheet resistance of n- channel is $10^4 \ \Omega/m$.

    b) List rules associated with stick diagram layout. Explain different symbols used for components in stick diagram.

13. a) Explain the design and operation of a barrel shifter.
    b) Compare carry select and carry skip adders.

14. a) What is the model to represent RC delay in interconnects in ICs. Derive the expression for the delay.
    b) How is inductance measured in interconnects.

15. a) Derive the expression for the voltage gain of a common source amplifier with current mirror load.
    b) Explain source degenerated current mirror.

16. a) Design 4 x 1 MUX using transmission gates.
    b) Design NAND based ROM. Explain its operation.

17. Write short notes on:
    a) 3T DRAM cell
    b) BiCMOS inverter
    c) Common gate amplifier

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FACULTY OF ENGINEERING
B.E. 4/4 (ECE) I – Semester (Old) Examination, March/April 2021

Subject: VLSI Design

Time: 2 hours   **Max. Marks: 75**

Note: Missing Data, if any, may be suitably be assumed.

PART – A

Answer any seven questions.   **(7x3=21 Marks)**

1. State Operator precedence in Verilog.
2. Write Verilog code in data flow style of modeling for AOI Logic.
3. Write the difference between Blocking and non-blocking assignment statements.
4. Define the following terms relevant to Verilog HDL.
   i) System Tasks
   ii) Simulation versus Synthesis
5. Implement the following function using AOI Logic F = AB + CD.
6. Define Ion implementation and oxidation.
7. Why Lambda based design rules are more popular? Give reasons.
8. Draw the stick diagram of three input CMOS NAND gate.
9. What is meant by carry skip?
10. Implement D Latch using transmission gates.

PART – B

Answer any three questions.   **(3x18 = 54 Marks)**

11. a) Write Verilog HDL code for 1-bit full adder using two half adders and OR gate using Data Flow modeling.
    b) Explain the concept of continuous assignment statement in Verilog HDL.

12. a) Write a Verilog HDL program for sequence detector which can detect "110" sequence using Moore Machine. Allow overlapping of sequences.
    b) Write short notes on File-Based tasks and functions.

13. a) Explain the operation of enhancement type NMOS transistor with neat diagrams.
    b) Draw the transfer characteristics of CMOS inverter and explain various regions of operation.

14. a) Obtain the expression for rise time of CMOS inverter.
    b) Draw the stick diagram and layout of CMOS two input NOR gate.

15. a) Explain the operation of Barrel shifter with neat diagram.
    b) Explain about NAND based ROM memory.

16. a) Write Verilog HDL source code for a gate level description of a 4 to 1 multiplexer circuit. Draw the relevant logic diagram. Write the stimulus for the same and simulation outputs also.
    b) Write a short note on sequential and parallel blocks.

17. Answer any two of the following:
    a) BICMOS Inverter
    b) Estimation of sheet resistance
    c) 6 Transistor RAM cell.

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FACULTY OF ENGINEERING
BE 4/4 (M/P/AE) I-Semester (Backlog) Examination, March/April 2021
Subject: Metrology and Instrumentation

Time: 2 hours   Max. Marks: 75

Note: Missing Data, if any, may be suitably be assumed.

PART – A

Answer any seven questions.   **(7x3=21 Marks)**

1 Define accuracy and precision.
2 What are the various types of plug gauges? Sketch any two of them and state their specific applications.
3 Distinguish between allowance and tolerance.
4 Explain the working principle of strain gauge load cells.
5 List various devices used for measuring of force.
6 Explain about interchangeability.
7 Define primary texture and secondary texture with neat sketch.
8 State the laws of thermoelectricity.
9 Define root mean square value in analysis of surface roughness.
10 Define Surface Roughness.

PART – B

Answer any three questions.   **(3x18 = 54 Marks)**

11 (a) Explain the Taylor's principles of plain limit gauges and also explain different types of limit gauges.
   (b) Explain the principle and working of sine bar.

12 (a) Explain Tool maker's microscope and its applications.
   (b) Sketch and describe the optical system of N.P.L flatness interferometer.

13 (a) With a neat sketch explain the operation of Taylor–Hobson Talysurf in measurement of surface finish.
   (b) Derive the expression for measuring the effective diameter of screw thread by 3 wire method.

14 (a) Sketch and explain the principle of working of LVTD displacement transducer.
   (b) Explain with help of neat diagram the working of accelerometer using seismic transducer.

15 (a) Explain the working of high pressure measurement bulk modulus gauge with neat diagram?
   (b) Describe the working of Pizeo-electric load cell. Derive the output response (Q_o) of first order system with ramp signal for given input signal (Q_i)?

16 (a) Explain the working of Parkinson gear tester. Write short notes on surface roughness measurement by Profilometer.
   (b) Explain the types of errors that occur in measuring instruments.

17 Write short notes on the following.
   (a) Rosette Gauges
   (b) Sigma comparator

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FACULTY OF ENGINEERING
BE IV/IV (CSE) I-Semester (Backlog) Examination, March / April 2021

Subject: Artificial Intelligence

Time: 2 Hours   Max .Marks: 75

Note: Missing data, if any, may be suitably assumed

PART – A
**Answer any seven questions.**   **(7x3=21 Marks)**
1   Define terms: Artificial Intelligence and Rational Agent.
2   What is horn clause? Differentiate normal clause from horn clause with an example.
3   Give the relations to convert universal quantifier into existential quantifier and vice versa.
4   Define entropy.
5   What is meant by parsing?
6   What is ramification and qualification?
7   Differentiate between crisp set and fuzzy set.
8   Can we implement OR function using a perceptron. Justify
9   What are the capabilities of an expert system?
10 What are the different levels for naturel language understanding?

PART – B
Answer any three questions.   **(3x18=54 Marks)**
11 (a) Illustrate the algorithm of A* with a suitable example.
   (b) Convert the following English sentences to FOL
       (i) All student are smart.
       (ii) There is a healthy food that is delicious.
       (iii)Everybody loves somebody.
       (iv)Every dog chases every cat.

12   Explain how values are propagated in the game tree using MINIMAX and ALPHA-BETA
       Pruning. Show the nodes that will be pruned.
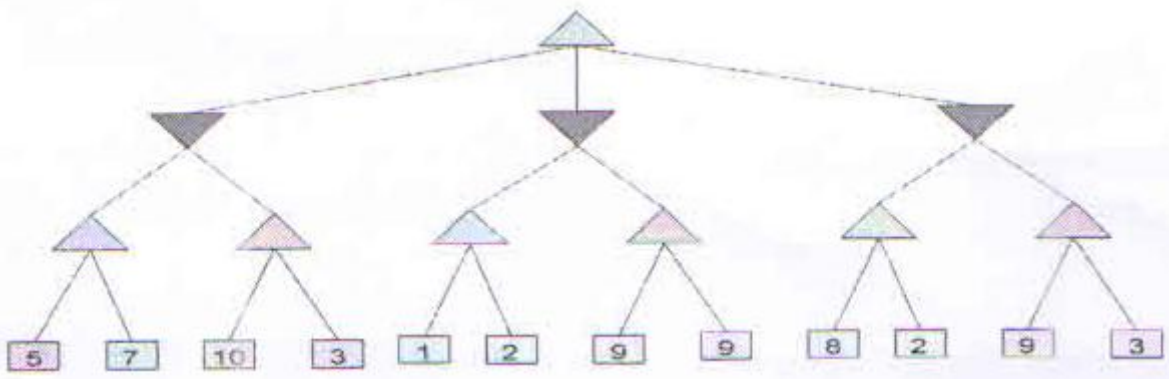
13 (a) What is propositional calculus? Explain resolution with and example.
   (b) Use preposition resolution refutation method to prove that (C V D) can be proved from
       {A V B, ~A V D, C V ~B}.

14   Discuss the architecture of expert systems and explain the main components of an expert
       system.

15   Explain Bayesian belief network with an suitable example.

16 (a) What is STRIPS planning system? Explain different lists used in defining the operators in STRIPS.

(b) Discuss the formal search methods and recursive STRIPS.

17   Write short notes on any two questions of the following:
(a) Different phases in natural language processing
(b) Common sense knowledge represented
(c) Model of learning agent

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FACULTY OF ENGINEERING
BE IV/IV (IT) I-Semester (Old)(Backlog) Examination, March / April 2021

Subject: VLSI Design

Time: 2 Hours   Max .Marks: 75

Note: Missing data, if any, may be suitably assumed

PART – A

Answer any seven questions.   **(7x3=21 Marks)**

1 Explain how a MOSFET works as a switch.
2 Explain VLSI Design hierarchy.
3 Draw the CMOS diagram of XOR gate.
4 Write about the layers used to create MOSFET.
5 What is latch up and its prevention?
6 What are DC characteristics of the CMOS inverter?
7 What is C^2 MOS circuit?
8 Define dual rail logic network.
9 What is structural gate level modeling?
10 Define D latch and master salve D flip-flop.

PART – B

Answer any three questions.   **(3x18=54 Marks)**

11 (a) Illustrate bubble pushing using De Morgan's law.
   (b) Draw the CMOS diagram of XOR and XNOR logic gate and explain with a truth table.

12 (a) Obtain the layouts for series and parallel connected FETS.
   (b) Draw the stick diagram representation of 4 i/p AOI gate.

13 (a) Explain the CMOS inverter switching characteristics and derive the delay expression.
   (b) Explain the effect of charge storage on the floating gate.

14 (a) Draw the block diagram of differential cascade voltages switch logic. Design a two input
       XOR and XNOR logic gate using above model.
   (b) Implement two input AND and NAND gates using complementary pass transistor logic.

15 (a) Write a Verilog code for 4-bit ripple carry adder using data flow modeling.
   (b) Implement 2X1 multiplexer using TG logic. Give its truth table.

16 (a) What is domino logic? Draw the domino AND and OR gates.
   (b) Obtain the expression for time constant of an m-rung ladder structure of a interconnect line
       in terms of line resistance and capacitance.

17   Write notes on the following:
         (a) Scaling theory
         (b) Layout of a transmission gate
         (c) Photo lithography

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FACULTY OF ENGINEERING
BE IV/IV (IT) I-Semester (New) (Backlog) Examination, March / April 2021

Subject: VLSI Design

Time: 2 Hours   Max .Marks: 75

Note: Missing data, if any, may be suitably assumed

PART – A

Answer any seven questions.   **(7x3=21 Marks)**

1 Draw the VLSI Design hierarchy and brief the steps involved.
2 Explain the pass characteristics of pFET.
3 Draw the layout of transmission gate.
4 List the layers used in CMOS ICs.
5 Define propagation delay of inverter and write the expression for the same.
6 Write the steps to prevent latch up.
7 Draw the pseudo-nMOS structure of (i) NOR2 (II) NAND2 gates.
8 Draw the flow chart of refresh operation in DRAM and write the expression for refresh frequency.
9 Differentiate between blocking and non-blocking assignments in Verilog.
10 Define crosstalk and write the expression for induced current.

PART – B

Answer any three questions.   **(3x18= 54 Marks)**

11 (a) Draw FET RC model and derive an expression for the drain resistance R_n.
   (b) Use bubble pushing to obtain the CMOS logic circuit of the function.

12 (a) Draw the layout and stick diagram of CMOS AOI gate.
   (b) Explain the design rules used in CMOS ICs.

13 (a) Draw RC switch equivalent circuit of an inverter. Derive an expression for the fall time of the inverter.
   (b) Draw the layout of the following in the physical design of (i) nwell   (ii) active area pFET

14 (a) Draw the structure of 6T SRAM cell and explain write 1 operation in SRAM.
   (b) Explain pre-charge and evaluation modes of dynamic CMOS. Draw the dynamic CMOS logic circuit for the function.

15 (a) Write Verilog code for 8 to 3 priority encoder using behavioral modeling.
   (b) Obtain the RC interconnect model using RC ladder circuits..

16 (a) Explain the nFET trans conductance and drain characteristics.
   (b) Write the sequence of steps involved in fabrication of CMOS ICs.

17 (a) Draw the circuit causing charge leakage in C^2MOS. Derive an expression for hold time.
   (b) Illustrate the concept of sliceable floor plan with an example.

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