FACULTY OF ENGINEERING
BE (Civil) V Semester (AICTE) (Main & Backlog) Examination,
March / April 2022
Subject: Hydrology and Water Resources 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. Define actual evapotranspiration

2. Define surface runoff

3. List out the forms of subsurface water

4. Define duty and delta of the crop

5. Explain various canal losses?

6. Elaborate the concept of probable Maximum Precipitation

7. What are the components of Hydrograph?

8. What is an aquifer? Define unconfined aquifer

9. List out the components of sprinkler system

10. What is meant modular outlet?

PART - B

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

11. a) Explain briefly the evaporation process
    b) Describe a commonly used evaporimeter?

12. Define flood frequency. How flood discharge is measured

13. Develop the equation relating the steady – state discharge from a well in a unconfined aquifer and depths of water table at two known positions from the well. State clearly all the assumptions involved in your derivation.

14. Distinguish between macro and micro irrigation systems.

15. a) What is canal lining? What are its advantages?
    b) Enumerate various types of linings used for canal

16. Define precipitation. What are the types of precipitation? Discuss the methods used to measure the precipitation.

17. Define unit hydrograph. Mention the components of hydrograph. Write the uses of unit hydrograph.

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FACULTY OF ENGINEERING
B.E. (EEE/EIE) V - Semester (AICTE) (Main & Backlog) Examination,
March / April 2022
Subject: Signals and 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. Define Energy and power of signals.
2. State Sampling theorem.
3. What is Causality condition for LTI system?
4. Define Convolution Sum.
5. Define System function.
6. What is the condition of convergence of Laplace Transform?
7. Define Fourier series.
8. Explain the multiplication property of continuous time Fourier series.
9. What is the sufficient condition for existence of DTFT?
10. Distinguish between DFT & DTFT.

PART – B

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

11. (a) Express the signal shown in terms of step and lamp.

(b) Find which of the following signals are casual / non-casual.

     (i) $x_1(t) = e^{at}u(t)$ **(ii)** $x_2(n) = \left(\dfrac{1}{2}\right)^n u(n+2)$ **(iii)** $x_3(t) = \sin(t)$

     (iv) $x_1(n) = u(n+3) - u(n-2)$ **(v)** $x_2(n) = \left(\dfrac{1}{2}\right)^n u(n+2)$.

12. (a) Explain Convolution integral.

(b) What is Stability? Find whether the following system with impulse response h(t) is stable or not. $h(t) = \left(\dfrac{1}{RC}\right)e^{-t/RC}u(t)$.

13. Using classical method Laplace transform to solve

$\dfrac{d^2 y(t)}{dt^2} + 4\dfrac{dy(t)}{dt} + 4y(t) = \dfrac{dx(t)}{dt} + x(t)$ if the initial conditions are

$y(0^+) = \dfrac{9}{4};\ \dfrac{dy(0^+)}{dt} = 5$ and input $x(t)\ is\ e^{-3t}u(t)$.

14. Explain the solution of differential equations obtained using Laplace Transform method.

15 (a) Define Z transform.

    (b) List the properties of convergence.

    (c) Find the Z transform and ROC for the signal $x(n) = a^n u(n)$.

16 Find the DFT of a sequence $x(n) = \{1,2,3,4,4,3,2,1\}$.

17 Find trigonometric Fourier series for periodic signal $x(t)$.

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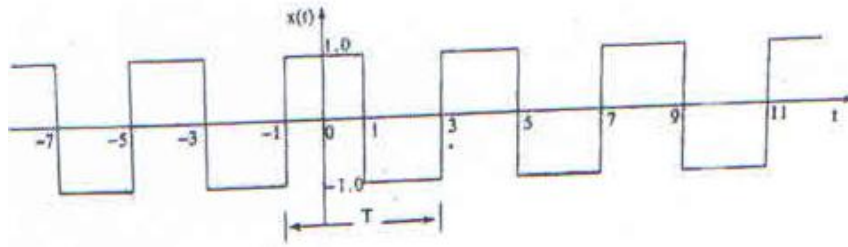
FACULTY OF ENGINEERING
B.E. (ECE)V-Semester (AICTE) (Main & Backlog) Examination, March / April 2022
Subject: Antennas and Wave Propagation

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 about the Antenna Field regions.
2 Give comparison between far fields of small loop and short dipoles.
3 Explain Huygens principle.
4 Write advantages and disadvantages of rhombic antenna.
5 Write types of wave propagation and its applications.
6 What is parasitic array?
7 Explain about Beam scanning.
8 Write about radiation hazards.
9 Define LOS Distance.
10 Find the range of LOS system when transmitting antenna and receiving antenna height are 100m and 10m.

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

11 (a) Derive Friis transmission equation.
   (b) An antenna has a field pattern given by $E(\theta) = Cos^2\theta$ for $0^o \leq \theta \leq 90^o$. find the directivity.

12 With neat sketches and expressions illustrate about the modes of Helical antenna and also write their wide band characteristics.

13 Explain about working principle of
   (a) Parabolic antenna
   (b) Lens antenna

14 (a) Explain about Binomial array and write its advantages.
   (b) Derive an expression for radiation pattern of a broadside uniform linear array of 4 elements with $\lambda/2$ spacing and draw its radiation pattern.

15 Write short notes on
   (a) Virtual Height
   (b) Line of sight distance
   (c) Critical frequency
   (d) Skip distance
   (e) Maximum usable frequency

16 (a) Define Retarded potential and derive expressions for V(r, t), A(r, t).
   (b) Explain Wheat stone bridge impedance measurement of an antenna.

17 (a) Deduce an expression for critical frequency on a ionized region in terms of its maximum ionization density.
   (b) A television transmitter antenna has a height of 200m and the receiving antenna has a height of 40m. What is the maximum range of communication through space wave propagation?

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FACULTY OF ENGINEERING
B.E. (MECH/AE) V - Semester (AICTE) (Main & 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 about overall heat transfer coefficient.
2   State Stefan Boltzmann law.
3   Derive the expression for critical radius of insulation for sphere.
4   What are the applications of the fins?
5   Define Reynold's number.
6   Draw the hydrodynamic boundary layer on horizontal flat plate.
7   Define conduction.
8   Define total emissive power and monochromatic emissive power.
9   Write the expression for LMTD in counter flow heat exchanger.
10 Distinguish between film wise and drop wise condensation.

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

11 (a) Derive the general heat conduction equation in cylindrical coordinate system.
   (b) A pipe with OD 20mm is covered with two insulating materials. The thickness each insulating layer is 10mm the conductivity of first insulating layer is 6 times that of the second insulating layer. Initially, insulating layers are placed in the order of first and second layer. Then they are place in the order of second and first layer. Calculate the percentage of change in heat transfer, increase and decrease in heat transfer. Assume a length of 1m in both arrangement there is no change in temperature.

12 A long aluminium cylinder 5.0 cm in diameter and initially at 200°C is suddenly exposed to a convection environment at 70°C with heat transfer coefficient of 525 $W/m^2.K$. Calculate the temperature at the radius of 1.25 cm, 1 minute after the cylinder exposed to the environment.

13 (a) Derive the equation for rectangular fin insulated at the tip.
   (b) Consider a stainless steel spoon (k=15.1W.m.K), partially immersed in the boiling water at 95°C in a kitchen at 25°C. the handle of the spoon has a cross section 0.2cmX1cm and it extends 18cm in the air from the free surface of the water. If the heat transfer coefficient on the exposed surface of the spoon is 15W/m^2K. Estimate the temperature difference across the exposed surface of the spoon handle. State your assumptions. If any.

14 A water heater if fabricated by a resistance wire wound uniformly over a 10mm diameter and 4 m long tube. The resistance element maintains a uniform heat flux of 1000 W/m^2. The mass flow rate of water is 12 kg/h, and its inlet temperature is 10°C. Estimate the surface temperature of the tube at exit.

15 A cubical room 4mx4mx4m is heated through the floor by maintaining it at uniform temperature of 350 K, while side walls are well insulated. The heat loss takes place through the ceiling at 300 K. Assuming that the all surfaces have an emissivity of 0.8, determine the rate of heat loss by radiation through the ceiling.

16 Ina heat exchanger, hot fluid enters at 180°C and leaves at 118°C. The cold water enters at 99°C and leaves at 119°C. Find the LMTD, NTU and effectiveness in the following cases of heat exchanger:
 (i) Counter flow   (ii) One shell pass and multiple tube passes
(iii) Two shell passes and multiple tube passes,   (iv) Cross flow both fluids unmixed and (v) Cross flow, the cold fluid unmixed.

17 (a) Explain Kirchhoff's Law.
    (b) Explain with neat sketch the various regimes in Pool boiling.

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

Subject: Computer Aided Design and Manufacturing

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 product life cycle?
2. What is geometric modelling?
3. What are the elements of a Numerical Control machine?
4. What are the various types of robots?
5. Explain Generative process planning?
6. Explain about rotation.
7. What are NURBS?
8. Define a post processor.
9. What are the elements of CIMS?
10. What is reverse engineering?

PART – B

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

11. (a) Explain in detail about 2D transformations?

    (b) Explain the differences between sequential and concurrent engineering?

12. (a) Explain in detail about Boundary representation (B-Rep) approach?

    (b) Find the equation of a Bezier curve defined by the following control points
    P0=(1,3,0),P1=(4f,2,0),P2=(4,3,0) and P3=(5,5,0).Also find points on the curve
    for u=1/2,3/4.

13. (a) What is manual part programming?

    (b) Write down the advantages of NC machines?

14. (a) Explain about MICLASS code system?

    (b) Write down the differences between a CNC and a DNC?

15. (a) Explain about rapid prototyping?

    (b) With a neat sketch explain scanning laser beam device?

16. (a) Write down the properties of B spline curves?

    (b) Explain programming with MACROS?

17. (a) Explain about Flexible manufacturing systems?

    (b) Write a note on Non-contact inspection.

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FACULTY OF ENGINEERING
B.E. (CSE) V - Semester (AICTE) (Main & Backlog) Examination, March / April 2022

Subject: Professional Elective – II
Web & Internet Technologies

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 URL? Explain with example.
2 Explain how to create Tables in HTML? List out its properties also.
3 List out the various data types with their ranges in JavaScript.
4 Write Java script function to validate phone number.
5 Define XML namespace. Give example.
6 Explain about XML processors.
7 What is the difference between Servlet Context and Servlet Config objects?
8 Differentiate between JSP and Servlets.
9 Define JSP directives with example.
10 Explain deployment Descriptor, with an example.

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

11 (a) Describe HTTP. Explain the syntax of HTTP Request and Response.
   (b) Create a candidate Registration form with Candidate name, Gender,
       Qualification (Drop down list), Technology skills (check box), and bio data.

12 (a) Demonstrate about Object orientation in Java script.
   (b) Explain Event handling mechanism in java script with an example.

13 (a) Design a XML document for products and write an XML schema definition.
   (b) Write a DTD for the XML document which has the student details with the
       following fields – roll number, name, course, address. Assume value for
       each field.

14 (a) Describe the feature of Servlets with its life cycle.
   (b) Explain about various Session Handling mechanism in Java servlets.

15 (a) What is the purpose of JSP tag extensions? Briefly explain.
   (b) Mention and explain various scripting elements of Java Server Pages.

16 (a) Write a program to insert values into employee table using JDBC.
       (Use type-4 driver).
   (b) What is well formed XML document? Give example.

17 Write short notes on:
   (a) JDBC Drivers
   (b) XML processors
   (c) HTTP protocol

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FACULTY OF ENGINEERING
B.E. (CSE)V-Semester (AICTE) (Main & Backlog) Examination, March / April 2022
Subject: Professional Elective – II
Embedded 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 Differentiate between Microprocessors and Microcontrollers.
2 Draw the structure of PSW register.
3 Write the various interrupts generated in 8051.
4 List a few data transfer instructions of 8051.
5 Illustrate how a 4x4 matrix keyboard can be connected to I/O ports of 8051.
6 Write a few LCD commands and their HEX codes.
7 Define a Task and show the state diagram of Task states.
8 Define a semaphore and write its functionality.
9 Define a Host and Target system.
10 Differentiate between cross-complier and cross-assembler.
PART – B
Note: Answer any five questions.   **(5 x 10 = 50 Marks)**

11 (a) Explain Embedded system design process.
   (b) Draw the architecture of 8051 and list its salient features.

12 (a) Write the syntax of DJNZ and CJNE instructions of 8051. Write an ALP using
        to demonstrate the use of CJNE.
    (b) Draw the structure of TMOD register and explain the various modes of
        operation.

13 (a) Draw the interfacing diagram of ADC0808 with temperature sensor and
        explain.
    (b) Write five LCD instructions with their bit positions.

14 (a) Illustrate a shared data problem. Propose a solution to overcome shared
        data problem.
    (b) Write briefly about Mail Boxes and pipes.

15 (a) Write the steps involved i0n Getting Embedded Software into the Target
        system.
    (b) List the various Laboratory tools used in testing on a Host machine.

16 (a) What are SFRs of 8051. Write their address range in RAM. List atleast 10
        SFRs. (b) List and brief the functions provided by µCOS-II for Message
        Queue.

17 (a) Draw the block diagram of ADC0808 with 8 analog channels and write the
        Steps to program it.
    (b) Write the features of Simulator used in testing.

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FACULTY OF ENGINEERING
B.E. (CSE) V Semester (AICTE) (Main & Backlog) Examination, March / April 2022

Subject: Graph 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. Define a graph?

2. Give an example of a sub graph?

3. List the different representation of a Planer Graph?

4. List the properties of Cut Set?

5. Define a Chromatic Number?

6. What is Euler Graph?

7. What is Maximum Matching?

8. Define Hall's Theorem?

9. Define Kuratowski's Theorem?

10. What is a plane?

PART – B

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

11. Write mathematical definitions involving basic graphs?

12. Differentiate the potential use of directed and undirected graphs?

13. Explain the Chromatic Partitioning and Chromatic Polynomial?

14. Demonstrate the Edge Coloring & Vertex Coloring with the examples?

15. Describe the Combinational and Geometric Graphs in detail?

16. Explain the types of trees and their connectivity with the examples?

17. Write short notes on the five-color theorem and four color conjectures?

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FACULTY OF ENGINEERING
B.E. (CSE)V-Semester (AICTE) (Main & Backlog) Examination, March / April 2022

Subject: Professional Elective – II
Data Analytics

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 an attribute in data analysis?
2 What is a simple attribute?
3 What are the phases of data analytics lifecycle?
4 What is descriptive analytics used for?
5 What are the benefits of multivariate data analysis techniques?
6 What is data preprocessing in data analytics?
7 What are the steps in data preprocessing?
8 How do you do data analysis in R?
9 What are data visualization techniques?
10 What are the key principles of good data visualization?

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

11 (a) Explain about the minkowski distance in measuring the data analytics.
     (b) Explain in detail the discrete versus continuous attributes.

12 Explain about the descriptive bivariate analysis in data analytics.

13 Discuss briefly the noisy data and inconsistent data.

14 Briefly discuss the data exploration versus presentation concepts.

15 Explain about the common representation methods in data virtualization.

16 (a) Explain the proximity measures for ordinal attributes.
     (b) Explain the various numeric attributes in data analytics.

17 Write short notes on:
     (a) Feature extraction
     (b) Stemming

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

Subject: Signals and 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. Determine whether the following signal is energy signal or power signal $x(t)=u(t)$.
2. Evaluate following integral $\int_{-\infty}^{\infty} \delta(t+2)e^{-2t}\, dt$.
3. Write dirichlet's conditions.
4. What is half wave symmetry? How is it useful?
5. Find Fourier transform of $x(t)=1/t$.
6. What is ROC?
7. Sketch the following signals $X(n)=u(n+4)-u(n-2)$.
8. What is aliasing effect?
9. Define Z transform. What are the two types of Z transform?
10. Find the Z-transform and its ROC of $\delta[n+3]$.

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

11. (a) Define the following properties for a continuous time system
     i) Causal or non-causal   ii) Time variant or time invariant
     iii) Linear or nonlinear   iv) Stable or unstable.
    (b) Examine the following systems with respect to the above properties
     (i) $y(t)= cos[x(t)]$ (ii) $y(t)= log10\ |x(t)|$

12. Discuss the Orthogonal Signal Space and obtain the expression for mean signal error.

13. Determine the inverse Laplace of the following functions.
        i) $\frac{1}{s(s+1)}$ ii) $\frac{3s^2+8s+6}{(s+2)(s^2+2s+1)}$

14. (a) State and prove sampling theorem for band limited signals.
    (b) Find DTFT of the following sequences (i) $\left(\frac{1}{2}\right)^n sin\left(\frac{n\pi}{4}\right)u(n)$ (ii) $\left(\frac{1}{2}\right)^{n-2} u(n-2)$

15. (a) Find the z-transform of $x(z)=\frac{1+2z^{-1}}{1-2z^{-1}+z^{-2}}$ if $x(n)$ is anticausal, using long division method.
    (b) State and prove the time shifting property of Z transform.

16. (a) Give the relationship between Fourier Transform and Laplace Transform
    (b)Define the following basic signals with graphical representation
       i) Unit Sample Signal   ii) Unit Step Signal
       iii) Ramp Signal   iv) Sinusoidal signal.

17. (a) State and prove initial and final value theorems of z-transform.
    (b) State and prove any three properties of Fourier series.

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FACULTY OF ENGINEERING
B.E. (I.T.) V - Semester (AICTE) (Main & 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 Define Finite Automata and give different kinds of FA.

2 Design a DFA that accepts 010 as substring over alphabet $\Sigma = \{0, 1\}$.

3 Construct ε-NFA for the regular expression $(a + bb + c^*)$.

4 State Pumping Lemma for regular languages.

5 Differentiate between Derivation and Recursive Inference. Give an example.

6 Construct CFG for the RE$(a + b)^*01(a + b)^*$.

7 Design a PDA which accepts language generated by CFG.

$$G = \{\{S\}, \{0, 1\}, \{S \rightarrow 0S0 \mid 1S1 \mid \varepsilon\}, S\}$$

8 Explain instantaneous description for a PDA with an example.

9 List out the problems that computer cannot solve?

10 Differentiate between multi tape and multi track Turing machine. Give diagram.

PART – B

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

11 (a) Design a DFA and NFA that accepts all the strings ending with either 00 or 11 over alphabet $\Sigma = \{0, 1\}$.
   (b) Convert the given NFA to DFA.

δ	0	1
$\rightarrow$q0	q0	{q0, q1}
q1	q2	q2
*q2	ϕ	ϕ

12 Write all the rules for conversion of DFA to RE using State Elimination Method. Convert the DFA given below to regular expression using State Elimination Method.

δ	0	1
$\rightarrow$q1	q1	q2
q2	q1	q3
*q3	q3	q3

13 (a) State Pumping Lemma for Context Free language and
    Prove $= L\{a^n b^n c^n \mid n \geq 1\}$ is not CFL.
   (b) What is Ambiguous Grammar? Show that the following grammar is ambiguous

S   a S b S
S   b S a S
S ε

14 Define CNF. Illustrate steps needed to generate Chomsky normal Form of CFL
$S \rightarrow Aba \mid bC$, $A \rightarrow BC \mid b$, $B \rightarrow b \mid \varepsilon$, $C \rightarrow A \mid \varepsilon$

15 Design a TM for multiplication of two numbers using sub routine.

16 Design a PDA for Language $L = \{a^n b^{2n} \mid n \geq 1\}$ and PDA is defined as following:
$M = \{q0, q1, q2, q3\}, \{a, b\}, (a, Z), \delta, q0, Z, \{q3\} \}$.

17 (a) Explain Reduction and show that a language that is not recursive is undecidable.
   (b) What is PCP? Test whether following PCP instance has a solution or not.
   $A = \{1, 10111, 10\}$ $B = \{111, 10, 0\}$

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FACULTY OF ENGINEERING

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

Subject: Transportation Engineering - I

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 (i) Off tracking   (ii) overtaking sight distance   (iii) super elevation

2 State the limiting values of different types of gradients used for geometric design of highways.

3 Explain any three important Engineering Surveys essential for highway alignment.

4 What are the uses of volume studies?

5 What is EALF? What are the factors affecting it?

6 What are the types of joints in CC Pavement?

7 List out any four assumptions of Westergaard's in his rigid pavement analysis?

8 Explain the effect of type pressure and contact pressure on pavement?

9 Enumerate the functions of Dowel bar.

10 What is signal coordination? Also explain the need for signal coordination.

PART – B

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

11. (a) Find the safe over taking sight distance for a high way having a design speed of 100 kmph. Maximum acceleration of overtaking vehicle can be assumed as 1.6kmph/sec. Assume all other data suitably.
    (b) State the major impact factors considered for evaluation of alternative routes during highway alignment surveys.

12. (a) In detail explain the different types of parking surveys?
    (b) Write about CBR value and its significance in pavement design.

13. a) Explain the various methods of presenting traffic volume data.
    b) Explain the methods of travel time and delay study. Also explain the methods of data collection and analysis of it.

14. a) Explain the functional aspects of different layers used in pavements.
    b) Draw neat cross sections of rigid and flexible pavements, also differentiate between flexible and rigid pavements?

..2

15. (a) Write the concept of ESWL. and ESAL. with diagrams? What is the need of conversion of wheel loads and axle loads in to standard axles?
    (b) Write a short note on construction of WBM road.

16 (a) Define highway capacity as per HCM. List and explain the conditions on which highway capacity depends.
    (b) Determine suitable diameter, spacing and length of the bars according to the guidelines of IRC:58 for the following design inputs: h=270mm, b=3.5m, f=1.5, W=2380kg/cm^2. D=1.60cm, S=1250kg/cm^2, B=17.5kg/cm^2.

17 Write short notes on any Two of the following
    (a) Horizontal curves.
    (b) Bitumen properties.
    (c) Built-up spray grout.

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

SUBJECT: Electrical Machines - II

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. Derive the emf equation for a single-phase Transformer.

2. How the rating of a transformer is specified? Justify.

3. While connecting transformer in parallel, what factors must be taken in Consideration?

4. What is the purpose of conducting Routine Test on transformer?

5. What is starting torque and max. torque in induction motor.

6. What is the effect of load on the efficiency of an induction motor?

7. What are different starting methods of 3-Phase induction motors?

8. A 3 Phase 4 pole induction motor with rotor resistance to be 0.5 ohm is running 1050rpm. What is the equivalent load resistance?

9. Can you reverse the direction of rotation of a single-phase (Split-phase) induction motor? How?

10. Which motor, capacitor-start of resistance-start motor has a larger starting torque?

PART – B

Note: Answer any five questions.   (5 x 10 = 50 Marks)

11 a) Explain OC and SC tests on Single phase Transformer.
   b) 5 KVA, 500/250 V, 50 Hz, single phase transformer gave the following readings.
   O.C. Test: 500 V, 1A, 50 W (L.V. side open)
   S.C. Test: 25V, 10A, 60 W (L.V. side shorted)
   Determine: i) The efficiency on full load, 0.8 lagging p.f.
   ii) The voltage regulation on full load, 0.8 leading p.f.
   iii) The efficiency on 60% of full load, 0.8 leading p.f.
   iv) Draw the equivalent circuit referred to primary and insert all the values in it.

12. a) Explain constructional features of poly phase transformers
    b) State and explain the conditions necessary for parallel operation of two three-phase transformers.

13. a) Explain, with the help of sketches, the construction of a 3-phase phase-wound
    b) Derive the equation of torque of a 3-phase induction motor from basics.

..2

14. a) Explain the working of a rotor rheostat starter used for a 3-phase slip-ring induction motor with the help of neat sketches.
    b) Explain the principle of induction generator.

15. a) Explain the double revolving theory with respect to single phase Induction motor.
    b) Explain the construction and working of a Repulsion motor.

16. a) Draw the slip and torque characteristic of 3 phase induction motor and explain it.
    b) Explain the working of an on-load tap-changer with the help of neat schematic diagram.

17. a) Two single phase furnaces are supplied at 110V from a 3 Phase, 1100V Supply by the use of Scott connected transformer. If the total output is 500 KW at 0.8 Pf lagging. Find the transformation ratio and currents in the winding of each transformer.
    b) Explain about single phasing on three phase induction motor.

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

Subject: Instrumentation 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. State working principle of Seismic Displacement pickup.
2. What id AC Tachogenerator.
3. What is radiation thermometer?
4. Mention various force measurement methods.
5. What is Anemometer?
6. Draw the Block diagram of voltage divider method.
7. Define relative Humidity.
8. Classify Microscopes.
9. What are the Characteristics of Piezo-electric microphone?
10. Explain Capacitive Microphone.

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

11. Explain the working of a DC tacho-generator with a suitable diagram.

12. Explain the various force measurement using suitable diagram.

13. Explain Venturimeter in detail.

14. Explain the measurement of Liquid level with variable permeability method.

15. Explain the piezoelectric Microphone in detail with suitable diagram.

16. Write short notes on:
    (i) Rotameter
    (ii) Piezoelectric accelerometer

17. Explain in detail the construction of Thermocouple with suitable diagram describing various protective sheaths.

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FACULTY OF ENGINEERING
B.E. (ECE) V - Semester (CBCS) (Backlog) Examination, March / April 2022

Subject: Computer Organization and Architecture

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 Represent the number (+46.5) as a floating point binary number with 24 bits. The normalized fraction mantissa has 16 bits and the exponent has 8 bits.
2 Draw the flowchart for a multiplication operation.
3 Write the Basic Computer instruction formats for the memory, register and I/O reference instructions.
4 Draw the microinstruction format and specify each field.
5 Differentiate between software interrupt and a subroutine call.
6 Determine the number of clock cycles that it takes to proves 200 tasks in a six-segment pipeline.
7 Distinguish between RISC and CISC processors.
8 Why does DMA have priority over the CPU when both request a memory transfer?
9 What is meant by 'Locality of reference' property and how does it help in faster execution of the programs.
10 What is address space and memory space in virtual memory system?

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

11 Explain floating point addition and subtraction with the help of an example.

12 (a) Explain the common bus system of a basic computer with a neat sketch.
   (b) Explain the operation of an address sequencer in a micro programmed control unit.

13 (a) What is the need for addressing mode? Explain various addressing modes of general purpose computer.
   (b) Compare between pipeline and super pipeline processors.

14 (a) Explain instruction pipeline conflicts and their remedies.
   (b) Formulate a six-segment instruction pipeline for a computer. Specify the operations to be performed in each segment.

15 (a) Explain in detail about virtual memory address translation.
   (b) A digital computer has memory unit of 64K x 16 and a cache memory of 1K words, the cache uses direct mapping with a block size of four words.
      i) How many bits are there in the tag, index block and word fields of the address format?
      ii) How many bits are there in each word of cache and how are they divided into functions? Include a valid bit.

..2

16 (a) What are the cache design elements? Explain Set-associative cache mapping in cache memory.
   (b) What do you mean by memory hierarchy? Describe in detail.

17 (a) Explain cycle stealing, burst mode and interleaved modes operation of a DMA controller.
   (b) Explain pipeline hazards and it remedies.

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FACULTY OF ENGINEERING
B.E. (MECH/PROD/AE) V Semester (CBCS) (Backlog) Examination, March / April 2022
Subject: Operation Research

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 Operation Research?
2. State the assumptions made in L.P.P
3. What is Duality? Give its significance.
4. What is the use of sensitivity analysis?
5. Explain degeneracy in transportation problem.
6. What is an unbalanced assignment problem?
7. State the features of Individual Replacement & Group Replacement.
8. Define the terms : (i) Pure Strategy   (ii) Mixed Strategy.
9. Give some assumptions made in sequencing problem.
10. What do you mean by FIFO, LIFO & SIRO in queuing theory?

PART – B

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

11. Solve using Simplex method

    Maximize $Z = 2x_1 + 5x_2$

    Subject to constraints $x_1 + 4x_2 \leq 24$

                              $3x_1 + x_2 \leq 21$

                              $x_1 + x_2 \leq 9$

                              $x_1, x_2 \geq 0$.

12. Use Dual Simplex method & solve

    Minimize $Z = 4x_1 + 4x_2 + 8x_3$

    Subject to constraints

        $4x_1 + 6x_2 + 10x_3 \geq 4$

        $6x_1 + 2x_2 + 14x_3 \leq 6$

        $2x_1 + 8x_2 + 12x_3 \leq 10$

        $x_1, x_2, x_3 \geq 0$.

13. Evaluate the optimum solution for the following Transportation problem.

		D₁	D₂	D₃	D₄	Supply
Origin	S₁	6	8	4	9	32
	S₂	12	6	18	20	18
	S₃	9	18	10	10	50
	Demand	35	25	10	30	

Table header: Ware house (spanning D₁, D₂, D₃, D₄, Supply)

14. A firm is considering the replacement of a machine, whose cost price is Rs.12,200 and its scrap value is Rs 200. From experience the running costs are found to be as follows. When should the machine be replaced?

Year	1	2	3	4	5	6	7	8
R. Cost	200	500	800	1200	1800	2500	3200	4000

15. There are seven jobs each of which has to go through the machines A & B. Processing time in hours are as follows:

Job:	1	2	3	4	5	6	7
Machine A	10	20	12	14	22	11	9
Machine B	10	12	4	6	8	1	3

Determine the sequence of these jobs that will minimize the total elapsed time. Also find Idle time for machine A & B.

16. Find the shortest route for the following Traveling salesman problem.

	1	2	3	4	5
1	∞	2	5	7	1
2	6	∞	3	8	2
3	8	7	∞	4	7
4	12	4	6	∞	5
5	1	3	2	8	∞

17. a) A self-service store employs one cashier at its counter. Nine customers arrive on an average every 5 minutes while the casher can serve 10 customers in 5 minutes. Assuming Poisson distribution for the arrival rate and exponential distribution for service time, find

    1. Average number of customers in the system.
    2. Average number of customers in the queue.
    3. Average time a customer spends in the system.

  b) Write a short note on genetic algorithm.

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FACULTY OF ENGINEERING
B.E. (CSE) V - Semester (CBCS) (Backlog) Examination, March / April 2022

Subject: Computer Graphics

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 Computer Graphics and its applications.
2 Distinguish between Random and Raster Scan display.
3 What are the different physical input devices available?
4 What are the different types of input modes?
5 Differentiate views and projections.
6 What are four lighting types that are sufficient for rendering simple scene?
7 What are the parameters for specifying lighting?
8 What are different graphical objects used in animation?
9 Why parametric polynomial curves and surfaces are considered important for 3D graphics?
10 What is Aliasing?

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

11. Define Computer graphics. What are the major elements in a graphics system? Explain in detail each element with a diagram.

12. Discuss about Display Lists along with a suitable example.

13. How transformations are applied in homogeneous coordinates?

14. Explain different hidden surface removal algorithms.

15. Define Scene graph and discuss Open Scene Graph API.

16. Discuss about the following:
    (a) Frames
    (b) Perspective projections

17. Write notes on:
    (a) Line segment clipping
    (b) B-Splines

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FACULTY OF ENGINEERING
B.E. (IT) V - Semester (CBCS) (Backlog) Examination, March / April 2022

Subject: Computer Networks

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 layers of ISO-OSI reference model.
2 Differentiate between static and dynamic Web documents.
3 List the applications of UDP.
4 What is a daemon Process?
5 What are the services of Transport Layer?
6 What is a Computer Network? Give example.
7 What is Digital Signature?
8 Differentiate between unicasting, multicasting and broadcasting.
9 Differentiate between TCP and UDP.
10 Differentiate Substitution Ciphers and Transposition Ciphers.

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

11 What are the functions of Network Layer? List out its design issues.

12 Explain in detail the elements of transport protocol.

13 Describe about connection-oriented communication with block diagram using
   elementary socket system calls.

14 Compare between static and dynamic web documents.

15 (a) Explain in detail about any Symmetric Key algorithm like DES.
   (b) Explain in detail about approaches for web security.

16 Discuss briefly the network layer design issues.

17 What is congestion? Discuss about causes for congestion. Explain any three
   congestion control Algorithms.

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FACULTY OF ENGINEERING
BE III / IV (Civil) I - Semester (NON-CBCS) (Backlog) Examination,
March / April 2022
Subject: Transportation Engineering

Time: 3 Hours   **Max. Marks: 75**

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

PART – A
Note: Answer all questions.   **(25 Marks)**

1. Classify Indian road network

2. List various engineering surveys to be adopted for fixing of a highway alignment?

3. Describe service volume of highway?

4. Define traffic concentration?

5. Indicate the importance of bituminous Interface treatments?

6. Discuss the importance of softening point of bitumen in flexible pavements?

7. Classify Indian railways based on speed criteria?

8. List different types of sleepers?

9. What are the three basic components of a runway?

10. List the corrections to be applied to the basic runway length?

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

11. a) Describe the concept of roadway mobility and accessibility.
    b) Enumerate various points a highway alignment should confirm to under ideal conditions

12. Draw three sketches showing fundamental relationship of traffic flow, density and speed and explain interrelation among different parameters?

13. a) Discuss the desirable properties of bitumen to be used in flexible pavement construction?
    b) Explain various factors affecting design of flexible pavements?

14. a) List various types and discuss the functions of rails?
    b) A curve of 4o exists on a standard Gauge of 1435mm. The permissible speed is 64.4kmph. Find out the amount of equilibrium cant?

15. a) Describe the Imaginary surfaces considered during the design and orientation of various geometric elements of an airport?
    b) The runway gradation map indicates that there is a rising gradient of 1.2% (for 500m long) meeting a falling gradient of 0.6% (for 450m long), There is again an upgrade of 0.8% (for 450m long). Design the runway profile?

16. a) State three critical cases of combination of stresses in the analysis of rigid pavements?
    b) Define time mean speed and space mean speed?

17. Discuss briefly about following organizations
    a) Airports Authority of India (AAI)
    b) National Highways Authority of India (NHAI)

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FACULTY OF ENGINEERING
B.E. III / IV (EEE/EIE) I – Semester (NON-CBCS) (Backlog) Examination, March / April 2022
Subject: Linear Integrated Circuits

Time: 3 Hours   Max. Marks: 75

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

PART – A
Note: Answer all questions.   **(25 Marks)**

1. Define input offset and input bias current.
2. Draw the circuit diagram of a inverting Op-Amp.
3. Draw and explain clipper.
4. How the precision diode is different from conventional diode rectifier?
5. Discuss about 555 timer.
6. Write the advantages of R-2R D/A converter over weighted resistor D/A converter.
7. What is the output voltage for a three terminal Fixed Voltage regulator.
8. What is Hybrid regulator?
9. Distinguish between passive and active filter.
10. Draw the circuit diagram for band reject filter.

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

11. a) Derive the voltage gain equation for an inverting and non-inverting modes of Op-Amp
    b) Explain the working of a practical differentiator Op-Amp with relevant circuit diagram.

12. Draw the circuit of a full waver precision rectifier circuit and explain its operation.

13. a) Explain working of Successive Approximation A/D converter.
    b) Explain the operation of 555 timer.

14. a) Explain the operation of series regulator with an Op-Amp.
    b) Explain the operation of hybrid regulator with neat diagram.

15. a) Design a Narrow Band Pass filter using Op-Amp with the resonant frequency is 100 Hz and Q = 2. Assume C = 0.01 μF.
    b) Write a short note switch capacitor filter.

16. Derive the equation for H_{LP}, H_{HP}, H_{BP} and H_N from a universal filter.

17. a) Discuss about Schmitt trigger.
    b) Explain about current sensing protection.

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FACULTY OF ENGINEERING
B.E. III / IV (ECE) I – Semester (NON-CBCS) (Backlog) Examination, March / April 2022
Subject: Automatic Control Systems

Time: 3 Hours   Max. Marks: 75

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

PART – A
Note: Answer all questions.   **(25 Marks)**

1. Define transfer function.
2. Write Mason's gain formula.
3. What is servomechanism?
4. Define pole and zero.
5. What are static error constants?
6. Define gain margin and phase margin.
7. What is lag -lead compensator? Give an example.
8. What are the advantages of digital control system?
9. What is state vector?
10. What are the advantages of state space analysis?

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

11. Derive transfer function for armature controlled DC motor.

12. The signal flow graph for a feedback control system is shown in fig. Find closed loop transfer function C(S)/R(S).
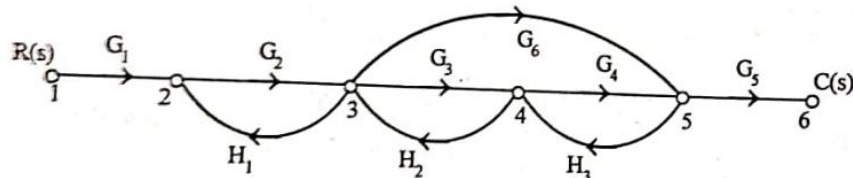
13. A positional control system with velocity feedback is shown in fig. What is the response of the system for unit step input?
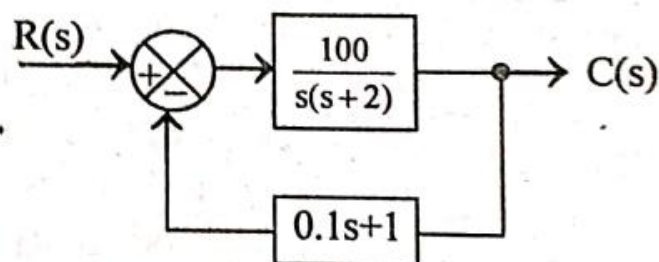
14. Sketch the bode plot of G(S) and find PM & GM.

$$G(s) = \frac{10}{s\,(1+0.4s)\,(1+0.1s)}$$

15. Sketch the root locus of system whose open loop transfer function is G(s) and unity feedback is unity feedback.

$$G(s) = \frac{K}{s\,(s^2 + 4s + 13)}$$

16. A linear time invariant system is characterized by homogenous state equation $\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix}$ = $\begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x1 \\ x2 \end{bmatrix}$. Compute the solution of the homogenous equation, assuming the initial state vector $X_0 = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$

17. Explain in detail about lag compensation and lead compensation.

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FACULTY OF ENGINEERING
B.E III / IV (MECH) I - Semester (NON-CBCS) (Backlog) Examination,
March / April 2022
Subject: Manufacturing Processes

Time: 3 Hours   **Max. Marks: 75**

(Missing data, if any, may be suitably assumed)
PART – A
Note: Answer all questions.   **(25 Marks)**

1. Explain the function of risers
2. Enlist any three casting defects. Mention their causes and remedies.
3. What is weldability? State the factors affecting weldability.
4. State the differences between carburizing and oxidizing flames.
5. State the advantages of powder metallurgy over casting.
6. Compare the SAW and SMAW based on merits and demerits.
7. What are the advantages of rubber pad forming over conventional forming?
8. Differentiate between forward and backward extrusion.
9. Explain briefly about spinning in sheet metal.
10. What is bend allowance and how it is calculated?

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

11 a) Discuss the allowances given on patterns for machining, distortion, shaking and draft.
  b) Elucidate the phenomenon of directional solidification in sand casting

12 a) Explain the principle of investment casting with a neat sketch.
  b) Explain the concept of blow moulding process. Mention the advantages of the process.

13 a) Describe the GTAW process. How GTAW is different from PAW process?
  b) Discuss with sketches, the types of pattern allowances.

14 a) Explain the principle of Friction Welding with a neat sketch. Mention its applications.
  b) Sketch and explain electro-hydraulic forming with neat sketch.

15 a) Discuss the significance of yield criteria in metal forming operations.
  b) Discuss the advantages of cold working over hot working with suitable examples.

16 a) What is the principle of resistance welding? Explain the sport welding process along with its applications.
  b) Explain Ultrasonic Welding process with a neat diagram.

17 Write short notes on:
  a) Injection Moulding
  b) Explosive Welding

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

Time: 3 Hours   **Max. Marks: 75**

(Missing data, if any, may be suitably assumed)
PART – A
Note: Answer all questions.   **(25 Marks)**

1. Explain the general pattern colour code used in foundries.
2. "Die casting produces sound castings compared to sand casting". Why?
3. What is undercut in welding? State the causes and remedies.
4. What is the principle of resistance welding?
5. Differentiate between blanking and piercing operations.
6. What is the cause for wrinkling in deep drawing operation? How it is avoided?
7. Name various single point cutting tool materials available.
8. Describe the basic elements of machining.
9. Define lathe machine mention the types of lathe.
10. Differentiate between up milling and down milling.

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

11 a) How are patterns classified? Describe them with neat sketches.
  b) Explain shell moulding process with a neat sketch

12 a) What are the different methods of welding? Describe them in brief
  b) Explain different types of flames in gas welding and mention their applications.

13 a) Define yielding. Explain the tresca and von-mises yield criteria under plane strees and plane strain conditions.
  b) Explain about hydrostatic extrusion with a neat sketch along with its applications.

14 a) Explain about spinning process in detail with its merits and demerits.
  b) Explain the injection moulding of plastics with a neat sketch.

15 a) Explain the mechanics of orthogonal cutting.
  b) How a built-up edge is formed? Explain its effect.

16 a) Differentiate between shaping and planning machines.
  b) Draw a neat sketch of slotter and mention its parts.

17 Write short notes on the following:
  a) Blow moulding
  b) Welding defects
  c) Wire drawing

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

Subject: Data Communication

Time: 3 Hours   Max. Marks: 75

(Missing data, if any, may be suitably assumed)
PART – A
Note: Answer all questions.   **(25 Marks)**

1. List the key elements of Communication model.
2. Represent frequency modulation with a waveform.
3. Define: (a) Byte stuffing (b) Jitter.
4. Define piggy backing.
5. Distinguish between circuit packet switching.
6. List the different types of packet switching.
7. Differentiate between Layer 2 and Layer 3 switches.
8. What is CSMA/ CD?
9. Describe the relative merits and demerits of different LAN topologies.
10. Distinguish between piconet and Scatternet.

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

11 (a) Explain TCP/IP reference model.
   (b) Describe the elements of Data Communication model.

12 (a) Explain HDLC frame structure.
   (b) Write short notes on Stop and Wait ARQ.

13 (a) Explain ATM architecture.
   (b) Write about xDSL.

14 (a) Explain the functionality of bridges and switches.
   (b) What are the key elements of a LAN?

15 (a) Discuss the third generation systems of cellular wireless networks.
   (b) Explain Bluetooth Architecture.

16 (a) Distinguish Synchronous and Asynchronous transmission.
   (b) Write short notes on Error Correction techniques.

17 (a) Give Overview of operation of cellular systems.
   (b) Explain briefly ASK, PSK, FSK and QAM.

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FACULTY OF ENGINEERING
B.E. III / IV (I.T.) I - Semester (NON-CBCS) (Backlog) Examination,
March / April 2022
Subject: Theory of Automata

Time: 3 hours   **Max. Marks: 75**

(Missing data, if any, may be suitably assumed)
PART – A

**Note: Answer all questions.**   **(25 Marks)**

1   Design a DFA for strings containing odd number of one (1's).

2   Write a regular expression for all strings ending with 1 where $\Sigma=\{0, 1\}$.

3   Convert following DFA to RE.
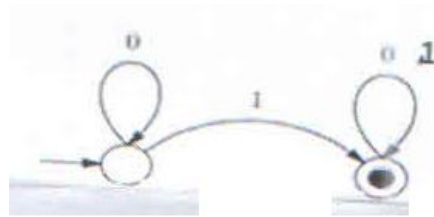
4   Define context free grammar (CFG).

5   State the pumping lemma for context free languages.

6   Define PDA.

7   When does a Turing Machine halt?

8   Define Multi-tape Turing Machine.

9   Define Recursive Language.

10 Define Modified PCP.

PART – B

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

11 Construct DFA for (0+1)*10(0+1)
     Construct NFA for (0+1)* 11

12 Minimize the following DFA
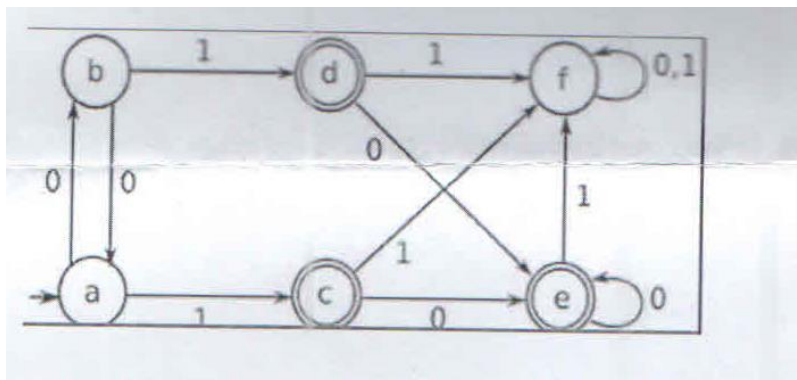
13 (a) Design a PDA for language L = { 0^n1^n, where $n \geq 1$ } .
   (b) Give the instantaneous descriptions for string 00011.

14 Design Turing machine for language L = { 0^n1^n, where $n \geq 1$ }. Justify your design with a suitable example.

15 (a) Explain about undecidable problems.
   (b) Show that grammar S → aS | aSbS |∈ is ambiguous.

16 (a) Rewrite the grammar after eliminating ∈-productions
         S → AB
         A → aAA / ∈
         B → bBB / ∈
   (b) Construct ∈-NFA for (0+1)*11(0+1)*.

17   Write short notes:
      (a) Multi-stack machine
      (b) Applications of CFG
      (c) Travelling Salesman Problem (TSP)

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