Narasaraopeta Engineering College (Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16CE2105

II B.Tech I Semester Supple Examinations, September-2023

FLUID MECHANICS

(CE)

Time: 3 hours **Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B.**

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. (a) Define specific gravity and mass density of a fluid.
   (b) State and explain Pascal's law on pressure.
   (c) What is path line and streak line?
   (d) State the difference between pitot tube and pitot static tube.
   (e) What are hydraulic-coefficients. Name them.
   (f) Explain the working principle of syphon.

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) Distinguish between ideal fluids and real fluids. Explain the importance of compressibility in fluid flow. **[06]**
   (b) A capillary tube having inside diameter 5 mm is dipped in water at 20°C. Determine the height of water which will rise in the tube. Take σ = 0.075 gm(f)/cm and θ = 60°. Specific weight of water at 20°C = 998 kg(f)/m^3. **[06]**

3. (a) Derive the expression for pressure force on a inclined plane surface submerged in liquid and its centre of pressure. **[06]**
   (b) Calculate the pressure at a height of 8000 m above sea-level if the atmospheric pressure is 101.3 kN/m^2 and temperature is 15^{0}C at the seal-level assuming (i) air is compressible, (ii) pressure variation follows adiabatic law, and (iii) pressure variation follows isothermal law. Take the density of air at the sea-level as equal to 1.285 kg/m^3. Neglect variation of 'g' with altitude. **[06]**

4. (a) Explain uniform flow with source and sink. **[02]**
   (b) Derive, from first principles, the condition of irrotational flow. **[05]**
   (c) If for a two-dimensional potential flow, the velocity potential is given by, ϕ = 4x(3y-4), determine the velocity at a point (2,3). Determine also the value of stream function ψ at the point (2,3). **[05]**

5. (a) State Bernoulli's theorem. Mention the assumptions made. How is it modified while applying in practice? **[05]**
   (b) A 20 cm X 10 cm venturimeter is provided in a vertical pipe line carrying oil of sp. gravity 0.8, the flow being upwards. The difference in elevation of the throat section and entrance section of the venturimeter is 50 cm. The differential U-tube mercury manometer shows a gauge deflection of 40 cm. Calculate: (i) the discharge of oil, (ii) the pressure difference between the entrance section and the throat section. Take C_d = 0.98, sp. gravity of mercury = 13.6. **[07]**

6. (a) What do you mean by 'velocity of approach'? Find an expression for the discharge over a rectangular wier with velocity of approach. **[05]**

(b) A rectangular orifice of 1.5 m wide and 1.2 m deep is fitted in one side of large tank. The water level on one side of the orifice is 2 m above the top edge of the orifice, while on the other side of the orifice, the water level is 0.4 m below its top edge. Calculate the discharge through the orifice if $C_d = 0.62$. **[07]**

7. (a) For the two cases of flow in a sudden contraction in a pipeline and flow in a sudden expansion in a pipe line, draw the flow pattern, piezometric grade line and total energy line. **[06]**

(b) Three pipes of lengths 800 m, 600 m and 300 m and of diameters 400 mm, 300 mm and 200 mm respectively are connected in series. The ends of the compound pipe are connected to two tanks, whose water surface levels are maintained at a difference of 15 m. Determine the rate of flow of water through the pipes if f = 0.005. What will be the diameter of a single pipe of length 1700 m and f = 0.005, which replaces the three pipes? **[06]**

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Narasaraopeta Engineering College (Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16EE2105

II B.Tech I Semester Supple Examinations, September-2023

COMPLEX VARIABLES AND STATISTICAL METHODS

(EEE)

Time: 3 hours **Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B.**

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. (a) Show that every differentiable function is continuous.

(b) Determine and classify all singularities of the given function $\frac{1-e^{2z}}{z^4}$.

(c) Find the residue at $z=0$ for the function $\frac{1-\cos(z)}{z}$.

(d) Six coins are tossed 6400 times. Using the Poisson distribution, find the approximate probability of getting six heads r times.

(e) Explain the term Standard error of a statistic.

(f) Define the standard normal variate and write 95% confidence limits of mean μ.

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) Find the analytic function, whose real part is $\frac{\sin 2x}{\cosh 2y-\cos 2x}$

(b) If $f(z)$ is analytic function, prove that $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)|f(z)|^2=4|f'(z)|^2$

3. (a) Evaluate $\int_C \frac{\cos\pi z^2}{(z-1)(z-2)^3}dz$ where C is $|z|=3$ by Cauchy integral formula.

(b) Find the Laurent series expansion of $\frac{z^2-1}{z^2+5z+6}$ about $z=0$ in the region $2<|z|<3$ and for $|z|>3$.

4. (a) Evaluate the integral $\oint_C \frac{z\cosh \pi z}{z^4+5z^2+4}dz$, $C:|z|=4$.

(b) Evaluate the integral $\int_0^{2\pi} \frac{1}{1-2a\cos\theta+a^2}d\theta$, where a is a complex constant and $|a|<1$ and $|a|>1$.

5. (a) A target is to be destroyed in a bombing exercise. There is 75% chance that any one bomb will strike the target. Assume that two direct hits are required to destroy the target completely. How many bombs must be dropped in order that the chance of destroying the target is $\geq 99\%$.

(b) In a distribution which is exactly normal, 12% of the items are under 30 and 85% are under 60. Find the mean and standard deviation of the distribution.

6. (a) Define parameter and statistic. Explain the sampling distribution of a statistic?

(b) Given one observation from a population with probability density function $f(x,\theta)=\frac{2}{\theta^2}(\theta-x), 0\leq x\leq\theta$. Obtain $100(1-\alpha)\%$ confidence interval for θ.

7. (a) Write the procedure for testing of Hypothesis.

(b) The mean height of 80 boys , who participated in the athletic competition in a college was 167 cm with a standard deviation of 9 cm. The mean height of the remaining 160 boys who did not participate in the athletic competition was 163 cm with a standard deviation of 10cm. Test the hypothesis at 5% level of significance, whether the students who participated in athletics are taller the other students.

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Narasaraopeta Engineering College (Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16ME2101

II B.Tech I Semester Supple. Examinations, September-2023

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(ME)

Time: 3 hours **Max Marks: 60**

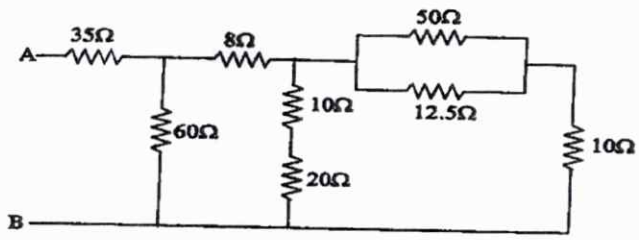
Question Paper Consists of **Part-A** and **Part-B.**

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. (a) Determine the equal resistance between terminal A and B.



(b) Classify DC motor based on their construction and excitation.

(c) Mention the characteristics of an ideal transformer.

(d) Define armature reaction in alternators.

(e) Draw the output characteristics of a transistor in CE configuration.

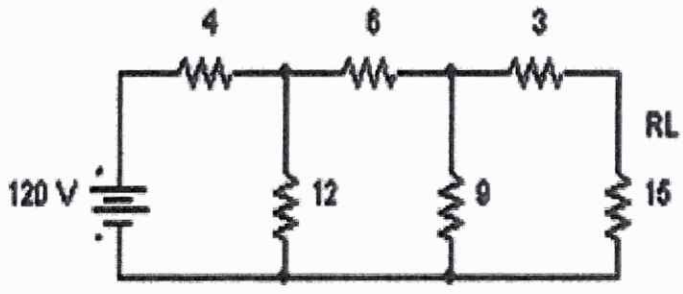
(f) What is an integrated circuit?

[2+2+2+2+2+2]

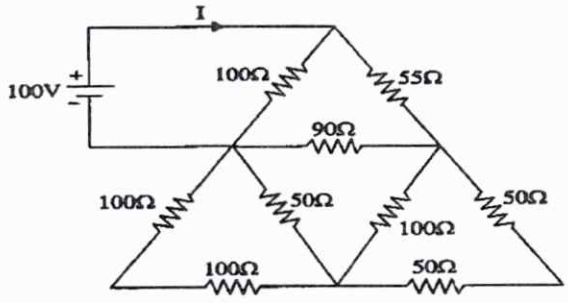
PART-B

4 X 12 = 48

2. (a) In the given circuit, obtain the load current and the power delivered to the load using Kirchhoff's laws.(all resistor value are in Ohms) 6M



(b) Determine the total current taken from the source. 6M



3. (a) Illustrate the operation of three point starter. 6 M
(b) Describe the Armature & Field control methods used for the speed control of DC Motor. 6 M

4. (a) Obtain the EMF equation of a Single phase transformer. 6 M
(b) A 230/2300V transformer takes a no load current of 6.5A and absorbs 187W. If the resistance of primary is 0.06Ω, find (a) Core loss (b) no load power factor (c) active component of current and (d) magnetizing current. 6 M

5. (a) List the methods used to predetermine the voltage regulation of an alternator and explain Synchronous Impedance method. 6 M
(b) Brief about principle of operation of 3-Phase induction motor. 6 M

6. (a) Detail the working principle of full wave rectifier and derive the expressions for the ripple factor and efficiency. 6 M
(b) Explain the working of NPN and PNP transistor. 6 M

7. (a) What is the need for V to I and I to V converter? How are they realized using op-amp? 6 M
(b) Describe the working of an op-amp differentiator and derive its output equation. 6 M

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Narasaraopeta Engineering College (Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16ME2105

II B.Tech I Semester Supple Examinations,September-2023

THERMODYNAMICS

(ME)

Time: 3 hours **Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B.**

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. (a) Define open system and closed system
   (b) Write SFEE for a multiple inlet heat exchanger
   (c) Differentiate heat pump and refrigerator
   (d) Draw PV diagram for a pure substance
   (e) State Dalton's law of partial pressure
   (f) What do you understand by Mean Effective Pressure

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) Derive the following: I) System II) Property III) Path IV) Process V) Specific Heat **6M**
   (b) 1 kg of a fluid is compressed reversibly according to a law pv = 0.25 where p is in bar and v is in m^3/kg. The final volume is 1/4 of the initial volume. Calculate the work done on the fluid and sketch the process on a p-v diagram. **6M**

3. (a) Derive steady flow energy equation using first law principles. **6M**
   (b) Steam enters a turbine at a pressure of 10 bar and 300°C with a velocity of 50 m/s. The steam leaves the turbine at 1.5 bar and with a velocity of 200 m/s. Assuming the process to be reversible adiabatic and neglecting the change in potential energy, determine the work done per kg of steam flow through the turbine. **6M**

4. (a) A domestic food freezer maintains a temperature of – 15°C. The ambient air temperature is 30°C. If heat leaks into the freezer at the continuous rate of 1.75 kJ/s what is the least power necessary to pump this heat out continuously. **6M**
   (b) In an air turbine the air expands from 6.8 bar and 430°C to 1.013 bar and 150°C. The heat loss from the turbine can be assumed to be negligible. Show that the process is irreversible, and calculate the change of entropy per kg of air. **6M**

5. (a) Explain the formation of stream from ice at -25^{O} C to stream at 250^{O} C using P-V, T-S and P-T diagrams. **6M**
   (b) Find the specific volume, enthalpy and internal energy of wet steam at 18 bar, dryness fraction 0.9. **6M**

6. (a) 0.45 kg of carbon monoxide (28) and 1 kg of air at 15°C are contained in a vessel of volume 0.4 m^3. Calculate the partial pressure of each constituent and the total pressure in the vessel. The gravimetric analysis of air is to be taken as 23.3% oxygen (32) and 76.7% nitrogen (28).

(b) Explain briefly Dalton's law and Gibbs-Dalton law. **8M + 4M**

7. Draw the Otto Cycle on P-V and T-S diagrams and derive an expression for thermal efficiency and work done **12M**

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Narasaraopeta Engineering College (Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16EC2102

II B.Tech I Semester Supple Examinations, September-2023

ELECTRONIC DEVICES AND CIRCUITS

(ECE)

Time: 3 hours **Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B.**

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. (a) Compare drift and diffusion currents of a Semiconductor in detail.
   (b) Find the value of dc resistance of a Ge junction diode, if the temperature is 25° C and I0 = 20μA with an applied voltage of 0.1V.
   (c) What are the limitations of zener voltage regulator circuit?
   (d) What is Early Effect?
   (e) Define thermal runaway.
   (f) What are applications of JFET and MOSFET devices?

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) Derive the expression for Concentration of Hole and Electron in an intrinsic semiconductor and also prove the Fermi level position in intrinsic semiconductor.
   (b) Define Hall effect and Derive Hall coefficient expression along with applications of it.

3. (a) Explain PN diode characteristics in forward bias and reverse bias regions.
   (b) The reverse saturation current Io in a germanium diode is 6μA. Calculate the current flowing through the diode when the applied forward biase voltages are 0.2,0.3 and 0.4 V at room temperature.

4. (a) Obtain the expression for ripple factor in the case of Full Wave Rectifier with capacitor filter.
   (b) Explain the following diodes in detail. (i)Photo diode (ii) Varactor diode

5. (a) Explain CE configuration with the help of input and output characteristics.
   (b) A transistor is operated at a forward current of 2μA and with the collector open circuited. Calculate the junction voltages VC and VE, the collector to emitter voltage VCE assuming ICO = 2μA, IEO = 1.6μA and αN = 0.98.

6. (a) Explain about the need for biasing in electronic circuits, what are the factors affecting the stability factor.
   (b) In a voltage divider bias circuit, VCC = 20 V and RC = 1.5 kΩ, the Q point is VCE = 8V and IC = 4mA. Stability factor S = 12 and β = 50. Find R1, R2 and RE.

7. (a) Draw the structure of p-channel MOSFET and qualitatively explain the static drain and gate characteristics of the device.
   (b) What is UJT and draw the Construction, operation of a UJT along with its characteristics.

Narasaraopeta Engineering College (Autonomous)
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Subject Code: R16EC2103

II B.Tech I Semester Supple Examinations, September-2023

SIGNALS AND SYSTEMS

(ECE)

Time: 3 hours **Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B.**

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. (a) What are the conditions to be satisfied for a discrete time sinusoidal sequence to be periodic?

(b) What do you mean by Gibb's phenomenon?

(c) State the properties of Hilbert transform?

(d) What conclusions can be drawn from Paley-Weiner criterion?

(e) What is Nyquist rate and Nyquist Interval?

(f) What is correlation? Write the properties of cross correlation for orthogonal signals?

[2+2+2+2+2+2]

PART-B

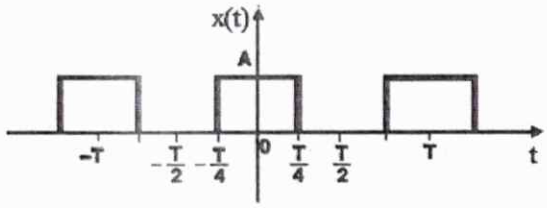
4 X 12 = 48

2. (a) Prove that the complex exponential signals are orthogonal functions?

(b) Determine whether the following signals are energy signals or power signals, and calculate their energy or power

(i) r(t-2) - r(t-3) (ii) $(3+e^{2t})\,u(t)$

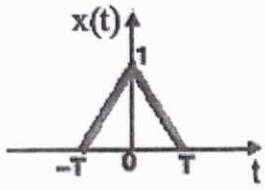
3(a) Determine the trigonometric form of Fourier series of the waveform shown in fig.



(b) State and prove any two properties of Fourier series?

4. (a) what is Hilbert transform? State and prove the properties of Hilbert transform.

(b) Determine the Fourier Transform of the triangular pulse shown in fig.



5. (a) Using Laplace transform determine the natural response of the system represented by the following equation

$$\frac{d^2y(t)}{dt^2} + 1.5\,\frac{dy(t)}{dt} + 0.36\,y(t) = 0.1\,\frac{dx(t)}{dt} + 0.7\,x(t) \quad ; \quad y(0) = 0.3 \quad ; \quad \left.\frac{dy(t)}{dt}\right|_{t=0} = -0.2$$

(b) Explain causality and physical realizability of a system and hence give Paley-Weiner criterion.

6. (a) State and prove the sampling theorem for band limited signals.
(b) A signal $x(t) = \sin(200\Pi t)$ is sampled at a rate of (a) 150 Hz (b) 225 Hz (c) 300 Hz. For each of these cases, can you recover the signal x(t) from the sampled signal $x_s(t)$?

7. (a) Write the procedure to find the convolution of two signals graphically.
(b) Find the autocorrelation and ESD of the signal $x(t) = e^{-t} u(t)$ using the relationship between convolution and correlation.

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Narasaraopeta Engineering College (Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16EC2104

II B.Tech I Semester Supple Examinations, September-2023

CONTROL SYSTEMS

(ECE)

Time: 3 hours **Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B.**

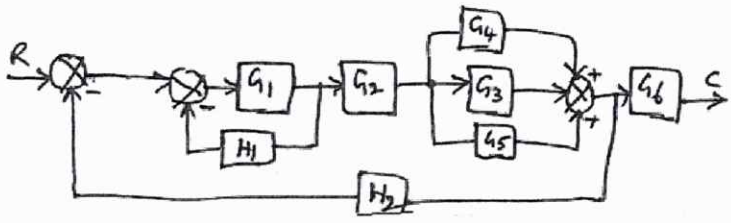
Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A **[2+2+2+2+2+2]**

1.	(a)	What are the advantages and disadvantages of closed loop control system?	[2M]
	(b)	State and explain the Mason's gain formula.	[2M]
	(c)	Define steady state error.	[2M]
	(d)	What is the necessary and sufficient condition for stability?	[2M]
	(e)	Why frequency domain compensation is normally carried out using the Bode plots?	[2M]
	(f)	What are the properties of state transition matrix?	[2M]

PART-B **4 X 12 = 48**

2.	(a)	What is the classification of control systems and discuss the importance of mathematical modelling of a control system.	[6M]
	(b)	Derive an expression for the transfer function of an armature-controlled DC servo motor.	[6M]
3.	(a)	What are the requirements for good servomotor.	[6M]
	(b)	Using block diagram reduction technique find the transfer function for the system shown in below Figure. 	[6M]
4.	(a)	What is meant by step, ramp, parabolic and impulse inputs.	[6M]
	(b)	The open-loop transfer function of a control system with unity feedback is $G(s)=\frac{150}{s(1+0.25S)}$. Evaluate the error series for the system.	[6M]
5.	(a)	Explain in detail about Routh-Hurwitz criterion.	[6M]
	(b)	Sketch the complete root locus for the system having $G(s)H(s)=\frac{K(S+11)}{s^2+4S+20}$.	[6M]

6.	(a)	Explain about gain crossover frequency and phase cross over frequency.	[6M]
	(b)	Discuss the calculation of gain crossover frequency and phase crossover frequency with respective to the polar plots.	[6M]
7.	(a)	Explain the design procedure of PID controllers.	[6M]
	(b)	Write short notes on the following: (i) Controllability and observability (ii) Diagonalization	[6M]

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Narasaraopeta Engineering College (Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16EC2106

II B.Tech I Semester Supple Examinations, September-2023

ELECTRICAL AND MECHANICAL TECHNOLOGY

(ECE)

Time: 3 hours **Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B.**

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. (a) What are the applications of DC shunt motor?
   (b) Define slip of an Induction motor?
   (c) What are the classifications of measuring Instruments?
   (d) Explain about soldering?
   (e) Explain the term Black body Radiation?
   (f) What is a Worm and Worm Wheel?

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) Explain the Principle operation of Dc generator? **[6M]**
   (b) Derive the EMF equation of Transformer? **[6M]**

3. (a) Explain the principle operation of three phase induction motor? **[6M]**
   (b) Describe the Synchronous Impedance method of predetermining the voltage Regulation of an Alternator? **[6M]**

4. Draw the block diagram of general purpose of CRO? Explain the functions of various blocks? **[12M]**

5. Explain the a) Arc welding b) Resistance welding c) Gas welding **[12M]**

6. (a) What are the heat transfer parameters? **[6M]**
   (b)b Explain the Radiative properties? **[6M]**

7. (a) Discuss relative merits and demerits of belt, rope and chain drive for transmission of power? **[6M]**
   (b) What are the classifications of gears and applications? **[6M]**

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Narasaraopeta Engineering College (Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16CS2103

II B.Tech I Semester Supple Examinations, September-2023

JAVA PROGRAMMING

(CSE)

Time: 3 hours **Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B.**

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. (a) What are the four main features of OOPs?

(b) What are the differences between object-oriented programming and structural programming?

(c) What is the difference between public, private and protected access modifiers?

(d) What is the purpose of Alive () function in Java.

(e) What are the types of variables in OOP?

(f) Difference an interface and an abstract class?

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. Explain briefly the following object oriented concepts. [4M]

   i) Inheritance ii) Polymorphism

   b) What are the levels of data abstraction? Explain briefly. [4M]

3. a) Write a Java program to sort a given set of strings in the reverse alphabetical order where the strings are supplied through the command line. [4M]

   b) What do you understand by static class and non static class? Can we make an instance of an abstract class? Justify your answer with an example? [4M]

4. a. What is Constructor chaining? Explain with the help of example. [4M]

   b. What are the differences between Error and Exception? [4M]

5. a. What do you mean by Event Delegation Model? Explain with example. [4M]

   b. Differentiate between overloading and overriding. [4M]

6. a. Why AWT? What is java.awt package? Explain with the help of example. [4M]

7. b. Define JApplet, JPanel, JFrame with a python code example. [4M]

8. Explain about paint (), update (), repaint () methods with an example program. [8M]

9. a. Define Applet life cycle. Explain with example. [4M]

   b. What do you mean by Adapter classes? Explain with example. [4M]

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Narasaraopeta Engineering College (Autonomous)

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Subject Code: R16CS2104

II B.Tech I Semester Supple Examinations, September-2023

DATA STRUCTURES

(CSE)

Time: 3 hours **Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B.**

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. a) Write the advantages of ADT

b) Give the best, average, worst case time complexity of merge sort

c) Write the applications of queues

d) What are the advantages of linked list?

e) Define level and depth of a binary tree.

f) List any two differences between graphs and trees.

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) Explain how to implement polynomial ADT using array.
   b) Explain the time complexity and space complexity with example.

3. (a) Rearrange following numbers using quick sort: 10, 6, 3, 7, 17, 26, 56, 32, 72
   b) How to delete an elements from binary heap. Explain

4. (a) Explain the procedure to evaluate postfix expression. Evaluate the following Postfix expression 7 3 4 + - 2 4 5 / + * 6 / 7 +.
   b) the operations performed on simple queue with an example.

5. (a) Explain how linked list can be used for representing polynomials using a suitable example.
   b) Write an algorithm to delete an element from doubly linked list.

6. (a) Construct a binary tree given the pre-order traversal and inorder traversals as follows:
   Pre-Order Traversal: G B Q A C K F P D E R H
   In-Order Traversal: Q B K C F A G P E D H R
   b) Write an iterative function to search for a key value in Binary search tree.

7. (a) Explain how to represent a graphs
   b) What are connected components of graph? Is there a method to find out all the connected components of graph? Explain

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Narasaraopeta Engineering College (Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16CS2105

II B.Tech I Semester Supple Examinations, September-2023

COMPUTER ORGANIZATION

(CSE)

Time: 3 hours **Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B.**

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. (a) Draw the block diagram for Basic Computer.
   (b) List and define the various types of Computer Register.
   (c) List the Data Manipulation and Data Transfer Instructions.
   (d) Draw the diagrammatic representation of the Memory Hierarchy.
   (e) Define Handshaking process in Asynchronous Data Transfer.
   (f) Write about 2's complement and 1's complement.

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) Write short note on Register Transfer Language (RTL).
   (b) List the various types of Logical Micro-operations. And explain with an example.

3. (a) Explain about various phases of Instruction Cycle.
   (b) Draw the flowchart and give some brief description about the Memory Reference Instructions.

4. (a) Explain about various types of instruction formats with an example.
   (b) Write the differences between RISC and CISC.
   (c) Write short note on Design of Control Unit.

5. (a) Explain about the Memory Mapping techniques in Cache Memory.
   (b) Explain about the hardware organization of Associative memory.

6. (a) Explain about Daisy Chaining Priority.
   (b) Explain about the DMA Controller with a block diagram.

7. (a) Draw the flowchart for Booths multiplication and explain it.
   (b) Explain about the Hardware Implementation of Addition and Subtraction with Signed Magnitude Data.

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Narasaraopeta Engineering College (Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16CS2106

II B.Tech I Semester Supple Examinations, September-2023

FORMAL LANGUAGES AND AUTOMATA THEORY

(CSE)

Time: 3 hours **Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B.**

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. (a) What are the components of Finite State Automata?
   (b) Define terms: Strings, Finite State Machine.
   (c) Write the advantages of Non-Deterministic Finite automata.
   (d) State the applications of Regular Languages.
   (e) Define Greiback Normal Form.
   (f) List out several types of Turing Machines.

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) What is Fine State Machine? Explain the mathematical representation of FSM.
   (b) List the advantages and disadvantages of Finite State Machine.

3. (a) Define Context Free Grammar. State and explain the closure properties of CFG.
   (b) Define a language. Explain the operations on lanaguages

4. (a) Describe the procedure of converting NFA to DFA with a suitable example
   (b) (0+1) * 011 for this regular expression draw the NFA with ϵ-closures and convert it into NFA.

5. (a) Simplify the following CFG

   $T \rightarrow aaB|abA|aaT$

   $A \rightarrow aA$

   $B \rightarrow ab|b$

   $C \rightarrow ad$

   (b) Give a regular expression that generates the language L over the alphabet $\sum = \{a, b\}$ where each b in the string is followed by exactly one or three a's.

6. (a) Prove the following grammar is ambiguous: $S \rightarrow aS \mid aSbS \mid \varepsilon$.
   (b) Construct the PDA to the following grammar:

   $S \rightarrow AB$

   $A \rightarrow BS/b$

   $B \rightarrow SA/a$

7. (a) How to determine whether a problem is NP-Hard or P? Illustrate with an example
   (b) Construct a Turing Machine that accepts those strings beginning with a '1'.