AR23

CODE: 23MET204 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March - 2026

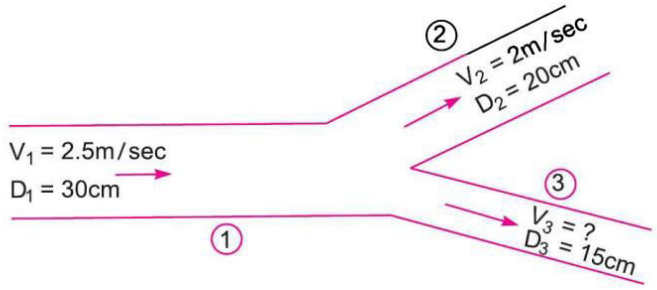
FLUID MECHANICS AND HYDRAULIC MACHINERY

(MECHANICAL ENGINEERING)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	BTL
		UNIT-I			
1.	a)	Define density, specific gravity and weight density.	7	1	1
	b)	While one end of a U-tube mercury manometer is connected to a horizontal pipe in which water is flowing, its other end is open to the atmosphere. If the difference of mercury levels in the two limbs of this U-tube manometer is found to be 25 cm and the vertical height of water above mercury remains 10 cm below the pipe axis, find the pressure in the pipe.	7	1	3
		(OR)			
2.	a)	In a hydraulic press, the diameters of ram and plunger are 100 mm and 15 mm, respectively. Determine the weight lifted by the press when the force applied on the plunger is 300 N.	7	1	3
	b)	Derive the hydrostatic law starting from the equilibrium of a fluid element at rest.	7	1	2
		UNIT-II			
3.	a)	Give the assumptions, limitations and practical applications of Bernoulli's equation	6	2	2
	b)	An orificemeter of diameter 0.1 m in a 0.2 m diameter pipe carrying oil (specific gravity = 0.78) has a coefficient of discharge equal to 0.67. If the pressure difference on the two sides of the orifice plate measured by a mercury oil differential manometer is 0.6 m Hg, then determine the discharge through the pipe. Take specific gravity of mercury as 13.6.	8	2	3
		(OR)			
4.		A 30 cm diameter pipe, conveying water, branches into two pipes (shown in Fig. 2) of diameters 20 cm and 15 cm respectively. If the average velocity in the 30 cm diameter pipe is 2.5 m/s. find the discharge in this pipe. Also determine the velocity in 15 cm pipe if the average velocity in 20 cm diameter pipe is 2 m/sec.	14	2	3



UNIT-III

5.	a)	Define major and minor energy losses in pipes	5	3	1
	b)	Three pipes connected in series have diameters of 0.6 m, 0.5 m and 0.4 m and are of lengths 400 m, 250 m and 200 m, respectively. If these pipes are to be replaced by an equivalent pipe of length 850 m, then determine its diameter.	9	3	3

(OR)

6.	a)	Compare the performance of a jet striking a stationary curved vane vs. a movable curved vane in terms of force exerted, work done, and efficiency.	6	3	2
	b)	A jet of water with diameter 50 mm moving with a velocity of 35 m/s strikes a curved fixed vane tangentially at one end at an angle of 30° to the horizontal. The jet leaves the vane at an angle of 20° to the horizontal. Find the force exerted by the jet on the plate in the horizontal and vertical directions	8	3	3

UNIT-IV

7.	a)	Define the hydraulic efficiency, mechanical efficiency, volumetric efficiency and overall efficiency of a hydraulic turbine.	5	4	1
	b)	What is a draft tube? Also derive an expression for its efficiency.	9	4	1

(OR)

8.		A Pelton wheel has to be designed for the following data: Power to be developed=8000 hp; Net head available=300 m; Speed=550 r.p.m.; Ratio of jet diameter to wheel diameter=1/10 and overall efficiency=85%. Find the number of jets; diameter of the jet; diameter of the wheel and the quantity of water required.	14	4	3

UNIT-V

9.	a)	Explain the importance of volute casing in centrifugal pump	5	5	1
	b)	The external and internal diameters of the impeller of a centrifugal pump are 0.4 m and 0.2 m, respectively. The centrifugal pump runs at 1200 rpm and its vanes at the exit are set back at an angle of 25°. If a constant radial flow through the impeller is maintained at 2.5 m/s, then determine (i) the inlet vane angle, (ii) angle made by absolute velocity at the outlet and (iii) work done by the impeller per unit weight of water.	9	5	3

(OR)

10.		A single acting reciprocating pump delivers 9 litres per second of water against a suction head of 4 m and a delivery head of 16 m while running at a speed of 60 rpm. The diameter and stroke of the piston are 200 mm and 300 mm, respectively. Determine (i) the theoretical discharge, (ii) coefficient of discharge, (iii) slip, (iv) percentage slip and (v) power required to drive the pump.	14	5	6

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AR23

CODE: 23EET204 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March – 2026

ELECTROMAGNETIC FIELD THEORY

(ELECTRICAL AND ELECTRONICS ENGINEERING)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	Derive the concept of electric field intensity from Coulomb's law?	7	1	1
	b)	State and explain Gauss law.	7	1	3
		(OR)			
2.	a)	Define work done and obtain the line integral to calculate the work done in moving a point charge Q in an electric field E?	7	1	2
	b)	Show that the force on a point charge anywhere within a circular ring of uniform charge density is zero provided that the charge remains in the plane of the ring?	7	1	3
		UNIT-II			
3.	a)	Show that the torque on a physical dipole with moment P in an uniform electric field E is given by P X E.	7	2	2
	b)	Calculate the capacitance of a parallel plate capacitor with following details: Plate area = 150 sr.cm Dielectric ϵ_{r1}= 3, d1 = 4mm Dielectric ϵ_{r2}= 5, d2 = 6mm If 200 V is applied across the plates what will be the voltage gradient across each dielectric.	7	2	3
		(OR)			
4.	a)	Explain and derive the boundary conditions for a dielectric-dielectric interface?	8	2	2
	b)	Derive the capacitance of a parallel plate capacitor.	6	2	2

UNIT-III

5.	a)	Using Biot-Savart law, find Magnetic field intensity at the centre of a circular conductor?	7	3	3
	b)	State and explain Ampere's circuital law.	7	3	2

(OR)

6.	a)	Using Ampere's circuital law, find Magnetic field intensity due to a co-axial cable carrying current I.	7	3	3
	b)	Derive an expression for the force between two current carrying conductors in the same direction?	7	3	2

UNIT-IV

7.	a)	Derive expression for Mutual inductance using Neumann's formula?	7	4	2
	b)	Two straight parallel conductors are infinitely long. The distance of separation is 1 m between the conductors. The radius of each conductor is 1 cm with medium as air. Compute approximate inductance of each conductor per Km length.	7	4	3

(OR)

8.	a)	Derive the expression for the inductance of Solenoid?	7	4	2
	b)	Find the self inductance of a Solenoid having 500 turns, mean diameter equal to 10 cm and length equal to 5 cm. Assume medium to be air.	7	4	2

UNIT-V

9.	a)	Explain Faraday's law of electromagnetic induction and derive the expression for induced e.m.f.	7	5	2
	b)	State Poynting's theorem. What is pointing vector?	7	5	2

(OR)

10.	a)	State Maxwell's equations for static fields. Explain how they are modified for time varying electric and magnetic fields.	7	5	2
	b)	The displacement current density is 5 $\cos(2x10^8t - kz)\, a_x$ $\mu A/m^2$ in a material for which $\sigma = 0$, $\epsilon = 5\epsilon_0$, $\mu = 4\mu_0$. Find the values of D and E.	7	5	3

AR23

CODE: 23ECT205 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March- 2026

SIGNALS AND SYSTEMS

(ELECTRONICS AND COMMUNICATION ENGINEERING)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	BTL
		UNIT-I			
1.	a)	Represent the following signals with neat sketch (i) δ(t-2) (ii) u(t+2) (iii) signum function (iv) Sinusoidal	10M	1	Understanding
	b)	Sketch the signal, $x(t) = u(t+2) - u(t-1) + 5u(t-2)$	4M	1	Applying
		(OR)			
2.	a)	For following system, determine whether the system is , causal, linear and time-invariant . i) $y[n] = x^2[n]$ (ii) $y[n] = x[-n-2]$	7M	1	Understanding
	b)	Represent the following sequences graphically (a)u[n-4] (b) u[n+2] (c) u[-n-3] (d) u[-n+3]	7M	1	Applying
		UNIT-II			
3.	a)	Explain the classification of following systems. (i) Random and Dynamic Systems. (ii) Causal and Non-Causal Systems. (iii) Time Variant and Invariant Systems. (IV)Liner and Non-Linear Systems.	8M	2	Understanding
	b)	Explain the properties of convolution	6M	2	Understanding
		(OR)			
4.	a)	Find the convolution of {1,2,3,-3,-2,-1}, {1,-1,1,-1}	7M	2	Applying
	b)	Find the step response whose impulse response is $h(t) = u(t+1) - u(t-1)$	7M	2	Applying

UNIT-III

5.	a)	State and prove the properties of discrete time Fourier series (i) Time Reversal (ii) Time Shifting (iii) Time Scaling	9M	3	Understanding
	b)	Find the Hilbert Transform of a signal m(t)= coswt.	5M	3	Apply

(OR)

6.	a)	State and prove any two properties Fourier Transform.	6M	3	Understanding
	b)	Find the Fourier Transform of the signal $x(t)=[u(t+2)-u(t-2)]$ using the Fourier integral	8M	3	Applying

UNIT-IV

7.	a)	Prove the properties of LT i) Conjugation property ii) Frequency shifting iii) Frequency scaling	9M	4	Understanding
	b)	Find the relation between Fourier and Laplace transform	5M	4	Understanding

(OR)

8.	a)	Use the convolution theorem of Laplace Transforms to find y(t) = x(t)*h(t) where x(t)=cos(5t)u(t) and h(t)=sin(4t)u(t)	7M	4	Understanding
	b)	State and Prove Time Shifting Property in Laplace Transforms. Find the Laplace transform of the signal $x(t)=u(t-3)$ using time shifting property	7M	4	Applying

UNIT-V

9.		State and Prove Sampling Theorem with graphical and mathematical approach.	14M	5	Understanding

(OR)

10.	a)	Find the Z-Transform of the function $x[n]=n\,a^n u[n]$	4M	5	Applying
	b)	Determine the inverse ZT of $X[z]=\frac{1}{1-2z^{-1}+0.96z^{-2}}$ If (i) ROC $\lvert z\rvert>\lvert 1.2\rvert$ (ii) ROC $\lvert z\rvert<\lvert 0.8\rvert$ (iii) ROC $\lvert 0.8\rvert<\lvert z\rvert<\lvert 1.2\rvert$	10M	5	Applying

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AR23

CODE: 23CST204 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March – 2026

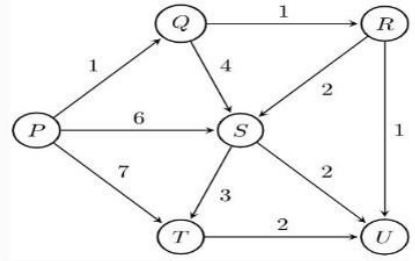
Design and Analysis of Algorithms

(Common to CSE & IT Branches)

Time: 3 Hours **Max Marks: 70**

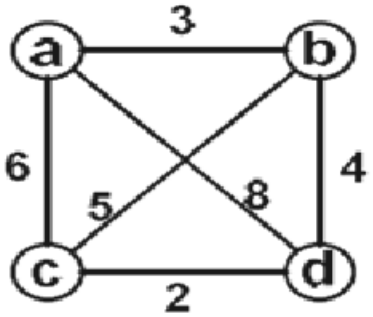
Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	BTL
		UNIT-I			
1.	a)	Explain the importance of algorithm specification. Illustrate with an example how preconditions and post conditions are used in algorithm specification.	7	CO1	L2
	b)	Write an algorithm to compute the factorial of a number using recursion. Analyze its time and space complexities.	7	CO1	L3
		(OR)			
2.	a)	Define Big-O, Omega, and Theta notations. Prove that n^2+100n+logn=O(n^2).	7	CO1	L2
	b)	Define an Algorithm. Explain the characteristics of an Algorithm.	7	CO1	L2
		UNIT-II			
3.	a)	Write an algorithm for quick sort based on divide-and-conquer strategy	7	CO2	L2
	b)	Explain the Merge Sort algorithm. Apply Merge Sort algorithm to sort thegiven characters. UNIVERSITY	7	CO2	L3
		(OR)			
4.	a)	Solve the following job sequencing with deadlines problem: (D1, D2, D3, D4,D5) = (2, 1, 2, 3,3) and (P1, P2, P3, P4,P5) = (5, 8, 6, 5,6)	7	CO2	L3
	b)	Apply single source shortest path algorithm to the given graph byconsidering 'P' as source vertex.	7	CO2	L3



			Marks	CO	BTL
		UNIT-III			
5.	a)	Using Dynamic Programming, solve the given instance of 0/1 Knapsackproblem. Consider the capacity of Knapsack (m) = 5.	7	CO3	L3

Item	1	2	3	4
Weight	2	1	3	2
Value	12	10	20	1

	b)	Obtain reduced cost matrix for travelling sales person problem. Consider the instance define by the cost matrix: $\begin{bmatrix} \infty & 6 & 1 & 10 & 6 \\ 1 & \infty & 4 & 12 & 7 \\ 3 & 6 & \infty & 4 & 16 \\ 7 & 1 & 3 & \infty & 9 \\ 6 & 9 & 7 & 6 & \infty \end{bmatrix}$	7	CO3	L3
		(OR)			
6.	a)	What are the difference between greedy and dynamic programming method of problem solving methods?	7	CO3	L3
	b)	Show the computing time of algorithm OBST is $O(n^3)$ with example.	7	CO3	L3
		UNIT-IV			
7.	a)	Apply the Branch and Bound algorithm to solve the travelling salesperson problem for the given graph. 	7	CO4	L3
	b)	What are the principles of branch and bound algorithms?	7	CO4	L2
		(OR)			
8.	a)	Explain how branch and bound technique is used to solve 0/1 knapsack problem.	7	CO4	L3
	b)	Draw the portion of the state space tree generated by FIFO-Branch and Bound for the given knapsack problem m=5 (p1..p5)=(w1..w5)=(3,6,5,7,9) and m=15.	7	CO4	L3
		UNIT-V			
9.	a)	Write and explain the iterative back tracking algorithm. Draw the state space tree for 4-queens problem and give the solution tuples	7	CO5	L3
	b)	Using backtracking technique solve the following instance for the subset problem s=(1,3,4,5) and d=11.	7	CO5	L3
		(OR)			
10.	a)	Explain the basic principle of Backtracking and list the applications of backtracking	7	CO5	L2
	b)	Solve the 0/1 Knapsack problem using backtracking: Knapsack capacity = 10 Items: (Weight, Profit) I1 = (2, 40), I2 = (5, 30), I3 = (6, 50), I4 = (4, 10) Show the search tree and explain how bounding helps prune unnecessary branches.	7	CO5	L3

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AR23

CODE: 23CET204 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March -2026

FLUID MECHANICS AND HYDRAULIC MACHINES

(CIVIL ENGINEERING)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	BTL
		UNIT-I			
1.	a)	State and Prove Pascal's law.	7	1	evaluate
	b)	A plate has an area of 1 m^2. It slides down an inclined plane, having angle of inclination 45° to the horizontal, with a velocity of 0.5 m/s. The thickness of oil film between the plane and the plate is 1 mm. Find the viscosity of the fluid if the weight of the plate is 70.72 N	7	1	apply
		(OR)			
2.	a)	Define absolute, atmospheric and gauge pressures with a neat sketch.	7	1	remember
	b)	A simple U-tube manometer containing mercury is connected to a pipe in which an oil of specific gravity 0.8 is flowing. The pressure in the pipe is vacuum. The other end of the manometer is open to atmosphere. Find the vacuum pressure in pipe, if the difference of mercury level in the two limbs is 200mm and height of oil in the left limb from the centre of the pipe is 150mm below.	7	1	apply
		UNIT-II			
3.	a)	What is meant by stability of a floating body? Explain the stability of a floating body with reference to its metacentric height. Give neat sketches.	7	2	understand
	b)	The velocity components in a two dimensional flow field for an incompressible fluid are as follows: $u = \frac{y^3}{3} + 2x - x^2y$, $v = xy^2 - 2y - \frac{x^3}{3}$. Obtain an expression for stream function?	7	2	apply
		(OR)			
4.	a)	Explain steady and unsteady flow, uniform and non-uniform flow, rotational and irrotational flow.	7	2	understand
	b)	A stream function in two-dimensional flow is $\psi = 2xy$. Show that the flow is irrotational and determine the corresponding velocity potential ϕ.	7	2	apply
		UNIT-III			
5.	a)	Derive Darcy- weisbach equation.	7	3	
	b)	A 45^0 reducing bend is connected in a pipe line, the diameters at the inlet and outlet of the bend being 600mm and 300mm respectively. Find the force exerted by water on the bend if the intensity of pressure at inlet to bend is 8.829 N/cm^2 and rate of flow of water is 600 liters/s.	7	3	apply
		(OR)			

6.	a)	Derive Bernoulli's equation from Euler's equations of motion.	7	3	analyze
	b)	Define the terms Hydraulic Gradient Line and Total Energy Line.	7	3	remember

UNIT-IV

7.	a)	Briefly explain the classification of turbines.	7	4	understand
	b)	Design a Francis turbine runner with the following data. Net head = 68m, speed = 750 rpm, output power = 330 kW, hydraulic efficiency = 94%, overall efficiency = 85%, flow ratio = 0.15, breadth ratio = 0.1, inner dia of runner is 0.5 outer dia. Also assume 6% of circumferential area of the runner to be occupied by the thickness of the vanes. Velocity of flow remains constant throughout the flow and is radial at exit.	7	4	apply

(OR)

8.	a)	Explain the working of a Kaplan turbine with a neat sketch.	7	4	understand
	b)	A Jet of water moving at 20 m/s impinges on a symmetrical curved vane shaped to deflect the jet through 120^0 when stationary. If the vane is moving at 5 m/s, find the angle of jet so that there is no shock at inlet. Also compute the absolute velocity of jet at exit both in magnitude and direction, and the work done per second per N of water. Assume the vane is smooth.	7	4	apply

UNIT-V

9.	a)	Explain the working of a reciprocating pump with a neat sketch.	7	5	understand
	b)	A centrifugal pump has the following characteristics: outer diameter of impeller=800mm, width of impeller vane at outlet=100mm, angle of impeller vanes at outlet = 40^0. The impeller runs at 550 rpm and delivers 0.98 m^3/s of water under an effective head of 35m. A 500 kW motor is used to drive the pump. Determine the manometric, mechanical and overall efficiencies of the pump. Assume water enters the impeller vanes radially at inlet.	7	5	apply

(OR)

10.	a)	What is specific speed of a pump? Derive the expression for specific speed of a pump.	7	5	analyze
	b)	Define 'Cavitation' and discuss the effects and precautions against Cavitation.	7	5	remember

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AR23

CODE: 23CAT202 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March – 2026

DIGITAL LOGIC AND COMPUTER ORGANIZATION

(Common to CSE(AIML) & CSE (DS))

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	(i) $(765.12)_{10}=(?)_8$ (ii) $(111010010101)_8=(?)_{16}$	7M	1	K3
	b)	Define Boolean theorem and explain the concept with suitable examples.	7M	1	K2
		(OR)			
2.	a)	Subtract two 8 bit binary number $(11110000)_2-(00111100)_2$ and verify using 2's complement method.	7M	1	K3
	b)	Minimize the Boolean functions using theorems $F(A,B,C,D)=\bar{A}\bar{B}C+\bar{A}BC+A\bar{B}C+ABC+A\bar{B}D$	7M	1	K3
		UNIT-II			
3.	a)	$\Sigma(1,3,5,7,9,11)+\phi(8,13,14,15)$ Simplify using K-Map.	7M	2	K3
	b)	Design and explain 4-Bit Binary Adder and Subtractor.	7M	2	K3
		(OR)			
4.	a)	Given $F(A,B,C,D)=\Sigma(1,3,4,6,9,11,12,14)$. Write the canonical SOP and canonical POS forms. Convert the canonical forms to minimal expressions using Boolean algebra.	7M	2	K3
	b)	Design and explain a 2-bit magnitude comparator circuit.	7M	2	K3
		UNIT-III			
5.	a)	(i) Explain about RS-Flip Flop. (ii) Explain about JK-Flip Flop.	7M	3	K3
	b)	Design mod-10 counter.	7M	3	K3
		(OR)			
6.	a)	Design **a** T flip-flop using JK flip-flop, and a D flip-flop.	7M	3	K3
	b)	Design a 4-bit bi-directional shift register.	7M	3	K3
		UNIT-IV			
7.	a)	Explain Computer Architecture with neat Sketch.	7M	4	K2
	b)	Explain about Instruction pipeline.	7M	4	K2
		(OR)			
8.	a)	Explain the difference between computer architecture and computer organization. Provide two practical examples where changes in organization improve performance without changing architecture.	7M	4	K2
	b)	Explain the difference between register transfer, bus transfer, and memory transfer with RTL examples.	7M	4	K2
		UNIT-V			
9.	a)	Explain about different Memories.	7M	5	K2
	b)	Explain about Modes of Transfer with programmed I/O.	7M	5	K2
		(OR)			
10.	a)	Explain direct mapping, fully associative mapping, and set-associative mapping in cache memory with examples.	7M	5	K2
	b)	Explain asynchronous data transfer with ready and acknowledge signals. Draw a simple timing diagram.	7M	5	K2

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AR20

CODE: 20MET204 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March – 2026

APPLIED THERMO FLUIDS - I

(MECHANICAL ENGINEERING)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

		UNIT-I	Marks	CO	Blooms Level
1.	a)	Explain the working of 2 stroke Petrol engine with the help of a neat sketch.	5m	CO1	Understanding
	b)	Compare SI and CI engines based on at least 5 considerations..	5m	CO1	Understanding
		(OR)			
2.	a)	Explain the working of 4 stroke SI engine with the help of simplified sketches.	5m	CO1	Understanding
	b)	List out the important components of an IC engine by drawing a simplified sketch.	5m	CO1	Understanding
		UNIT-II	Marks	CO	Blooms Level
3.	a)	Explain about the Octane and Cetane number rating of IC engine fuels.	5m	CO2	Understanding
	b)	Discuss the importance and define following terms i) Fire point ii) Flash point iii) calorific value	5m	CO2	Understanding
		(OR)			
4.	a)	Define and write the expressions for the following efficiencies i) Indicated thermal efficiency ii) Break thermal efficiency iii) Mechanical efficiency.	5m	CO2	Understanding
	b)	A six-cylinder gasoline engine operates on a 4 stroke cycle. The bore of each cylinder is 80mm and the stroke is 100mm. The clearance volume per cylinder is 70cc at a speed of 4000rpm. The fuel consumption is 20 kg/h and the torque developed is 150 Nm. Calculate i) Brake Power ii) Brake Mean Effective Pressure iii) Brake Thermal Efficiency if th calorific value of fuel is 43000 kJ/kg.	5m	CO2	Applying

UNIT-III

			Marks	CO	Blooms Level
5.	a)	What is meant by Detonation? Discuss the factors affecting detonation in SI engines.	5m	CO3	Understanding
	b)	Sketch the Pressure Vs Crank angle diagram for SI engine undergoing normal combustion and discuss the effect of combustion rate on it.	5m	CO3	Understanding
		(OR)			
6.	a)	Explain about the normal combustion in CI engines by showing various stages in it.	5m	CO3	Understanding
	b)	Discuss the variables affecting ignition delay in CI engines	5m	CO3	Understanding

UNIT-IV

			Marks	CO	Blooms Level
7.	a)	Derive an expression for the force excreted by a jet of water in the direction of jet on a fixed vertical plate.	5m	CO4	Applying
	b)	A jet of water of diameter 10 cm strikes a flat plate normally with a velocity of 15 m/s. The plate is moving with a velocity of 6 m/s in the direction of the jet and away from the jet. Find (i) the force exerted by the jet on the plate (ii) work done by the jet on the plate per second.	5m	CO4	Applying
		(OR)			
8.	a)	Explain the working of Pelton wheel with the help of a simplified sketch.	5m	CO4	Understanding
	b)	A Kaplan turbine runner is to be designed to develop 7357.5 kW shaft power. The net available head is 5.5m. Assume that the speed ratio is 2.09 and flow ratio is 0.68 and the overall efficiency is 60%. The diameter of the boss is 1/3rd of the diameter of the runner. Find the diameter of the runner, its speed.	5m	CO4	Applying

UNIT-V

			Marks	CO	Blooms Level
9.	a)	Develop an expression for minimum starting speed of centrifugal pump.	5m	CO5	Understanding
	b)	The diameters of an impeller of a centrifugal pump at inlet and outlet are 30cm and 60 cm respectively. Determine the minimum starting speed of the pump of it works against a head of 30 m.	5m	CO5	Applying
		(OR)			
10.	a)	List out the important components of a centrifugal pump and give their functions.	5m	CO5	Understanding
	b)	Discuss the features of multistage centrifugal pumps for (i) High heads (ii) High discharge.	5m	CO5	Understanding

UNIT-VI

			Marks	CO	Blooms Level
11.	a)	Develop the condition for minimum work required in the case of two stage reciprocating air compressor and hence deduce the expression for work required for two stage compressor.	5m	CO6	Understanding
	b)	Define the terms (i) isothermal efficiency and (ii) Volumetric efficiency as applied to reciprocating compressors and discuss some of the important applications of compressors.	5m	CO6	Understanding
		(OR)			
12.	a)	Sketch the ideal indicator diagram for a reciprocating pump and show that work done by pump is proportional to the area of indicator diagram.	5m	CO6	Understanding
	b)	Distinguish between Reciprocating and Centrifugal pumps.	5m	CO6	Understanding

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CODE: 20EET205 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B. Tech I Semester Supplementary Examinations, March- 2026

ELECTRICAL POWER GENERATION & DISTRIBUTION

(ELECTRICAL AND ELECTRONICS ENGINEERING)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit.
All Questions Carry Equal Marks
All parts of the Question must be answered at one place.

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	List the factors to be considered for the selection of site of Thermal power plant?	5M	CO1	Remember
	b)	Describe the function of ESP and condenser in thermal power plants?	5M	CO1	Understand
		(OR)			
2.		Draw the layout of Hydro Power station and explain its parts	10M	CO1	Remember
		UNIT-II			
3.	a)	Explain the working of a gas power plant with schematic diagram?	5M	CO2	Understand
	b)	What are the merits and demerits of a gas power plant?	5M	CO2	Understand
		(OR)			
4.	a)	List the advantages and disadvantages of Nuclear power station.	5M	CO2	Remember
	b)	Explain the working principle of fast breeder reactor with neat diagram	5M	CO2	Understand
		UNIT-III			
5.	a)	Derive an expression for the voltage drop for a uniformly loaded distributor fed at one end.	5M	CO3	Analyse
	b)	A two-wire distributor is fed at F_1 and F_2 at 230 V and 220 V, respectively. Loads of 150 A and 100 A are taken at points P and Q. Resistance of both the conductors between F_1 P is 0.03 Ω, between PQ is 0.05 Ω and between QF_2 is 0.02 Ω. Determine the current in each section of the distributor and voltage at each load point	5M	CO3	Analyse
		(OR)			
6.	a)	Classify the distribution systems	5M	CO3	Analyse
	b)	A 2-wire d.c. ring distributor is 300 m long and is fed at 240 V at point A. At point B, 150 m from A, a load of 120 A is taken and at C, 100 m in the opposite direction, a load of80 A is taken. If the resistance per 100 m of single conductor is 0·03 ohm find current in each section of distributor	5M	CO3	Analyse

UNIT-IV

7.	a)	Explain the factors to be considered when selecting a location for a substation	5M	CO4	Understand
	b)	Give the Comparison of Indoor and Outdoor Sub-Station in detail?	5M	CO4	Remember
		(OR)			
8.	a)	List the advantages of Gas insulated substation?	5M	CO4	Remember
	b)	Draw the single diagram of gas insulated substation?	5M	CO4	

UNIT-V

9.	a)	Define the following with respect to the economic aspects of power generation. i) Demand factor ii) connected load iii) plant capacity factor with formulas	5M	CO5	Remember
	b)	A generating station has a maximum demand of 500MW. The annual load factor is 50% and the capacity factor is 40 %. Find the reserve capacity of the plant	5M	CO5	Analyse
		(OR)			
10.	a)	Explain the terms load factor and diversity factor and discuss their effect on the cost of generation of electrical energy.	5M	CO5	Understand
	b)	A generating station supplied the following loads: 175MW, 100MW, 80MW, 50MW and 4 MW. The station has a maximum demand of 225MW. The annual load factor of the station is 45%, Calculate (i) the number of units supplied annually (ii) the diversity factor and (iii) the demand factor	5M	CO5	Analyse

UNIT-VI

11.	a)	Explain the desirable characteristics of a Tariff Methods.	5M	CO6	Understand
	b)	Calculate annual bill of a consumer whose maximum demand is 100 kW,p. f =0·8 lagging and load factor = 60%. The tariff used is Rs75 per kVA of maximum demand plus 15 paise per kWh consumed	5M	CO6	Understand
		(OR)			
12.		What is meant by electric tariff and explain the following terms (i) simple tariff (ii) Flat rate tariff (iii) Block rate tariff (iv) Power factor tariff (v) Three-part tariff	10M	CO6	Understand

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CODE: 20ECT204 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March – 2026

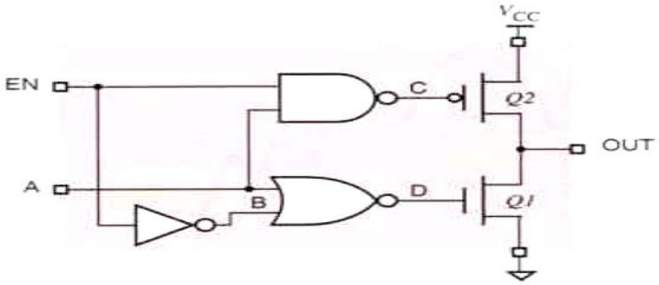
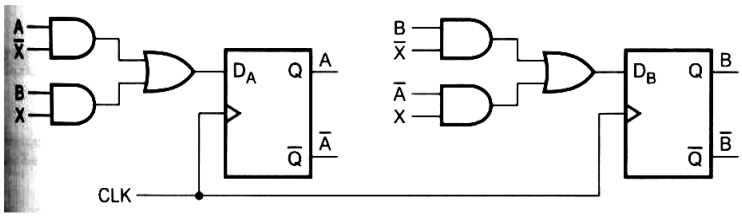
DIGITAL ELECTRONICS

(ELECTRONICS AND COMMUNICATION ENGINEERING)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	i) Convert the hexadecimal number (1CD.2A) to binary ii) Add 110101 and 100100 iii) Find 1's complement of the binary number 101100	5M	CO1	Remembering
	b)	Derive the hamming code for the sequence 101011	5M	CO1	Understanding
		(OR)			
2.	a)	Subtract 11100 from 10011 using the 1's and 2's complement methods	5M	CO1	Apply
	b)	Obtain the 1's and 2's complements of the following binary numbers: (i) 00010000 ii) 00000000 (iii) 11011010 (iv) 10101010 (v) 10000101	5M	CO1	Apply
		UNIT-II			
3.	a)	Show that if all the gate in a two level OR-AND gate network are replaced by NOR gate, the output function does not change.	5M	CO2	Understanding
	b)	Using Quine McClusky method, simplify the function F(A,B,C,D) = ∑ m(0,2,3,5,7,9,11,13,14)	5M	CO2	Analyse
		(OR)			
4.	a)	Minimise the logic function using K-map and realize using NAND and NOR gates F(A,B,C,D) = ∑ m(1,3,5,8,9,11,15)+d(2,13)	5M	CO2	Analyse
	b)	Draw the multiple level two input NAND circuit for the expression F = (AB' + CD')E + BC(A'+B)	5M	CO2	Apply
		UNIT-III			
5.	a)	Design half adder circuit and explain.	5M	CO3	Create
	b)	Explain about BCD adder.	5M	CO3	Create
		(OR)			
6	a)	Design full adder circuit using the half adder	5M	CO3	Create
	b)	Design full subtractor using half subtractor	5M	CO3	Create

			Marks	CO	Blooms Level
		UNIT-IV			
7.	a)	Explain the operation of a 8x1 MUX and implement the following using a suitable MUX $F(A,B,C,D) = \sum m\ (0,1,3,5,6,7,8,9,11,13,14)$	5M	CO4	Understand
	b)	Write truth table of given circuit and give your comment on the functionality of the circuit 	5M	CO4	Analyze
		(OR)			
8.	a)	Design an 8x3 encoder circuit and explain	5M	CO4	Create
	b)	Design the 3x8 decoder and explain.	5M	CO4	Create
		UNIT-V			
9.	a)	With logic diagram, characteristic equation and table explain about JK flip flop	5M	CO5	Understanding
	b)	Design and explain the 4 bit Johnson counter	5M	CO5	Create
		(OR)			
10.	a)	Analyse the following circuit 	5M	CO5	Analyse
	b)	Design the 4 bit ring counter and explain with suitable example	5M	CO5	Create
		UNIT-VI			
11.	a)	VHDL code to realise full subtractor aiding structural model	5M	CO6	Understanding
	b)	Write the VHDL code for encoder in any one of the modelling	5M	CO6	Understanding
		(OR)			
12.	a)	VHDL code for 1x8 demux through data flow model	5M	CO6	Understanding
	b)	Write the VHDL code for all logic gates in data flow model.	5M	CO6	Understanding

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CODE: 20CST204 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March – 2026

Object Oriented Programming

(Common to CSE & IT Branches)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	Briefly explain about the key elements of Object Oriented Programming	5	CO1	K2
	b)	Explain briefly class, public, static, void, main, string[] and system.out.println() key words.	5	CO1	K3
		(OR)			
2.	a)	Define Abstract Class. Explain different types of Access controls available in java	5	CO1	K2
	b)	Explain the arrays and its types in detail with example program	5	CO1	K2
		UNIT-II			
3.	a)	What are the difference between static variable and instance variable?	5	CO2	K4
	b)	What is the purpose of constructor in Java programming?	5	CO2	K2
		(OR)			
4.	a)	What is the need of garbage collection in Java? Explain	5	CO2	K2
	b)	Explain method overloading with example	5	CO2	K2
		UNIT-III			
5.	a)	Compare and contrast an Interface and abstract class?	5	CO3	K4
	b)	"Interface variables are static and final by default in Java" - Support this statement with proper explanation.	5	CO3	K3
		(OR)			
6.	a)	How does polymorphism promote extensibility? Explain with example.	5	CO3	K2
	b)	Give an example where interface can be used to support multiple inheritance.	5	CO3	K2
		UNIT-IV			
7.	a)	What is an Exception? List out the keywords for exception handing	5	CO4	K2
	b)	Write the benefits of packages and interfaces	5	CO4	K2
		(OR)			
8.	a)	What are the different ways to handle exceptions? Explain.	5	CO4	K3
	b)	Describe the process of importing and accessing a package with suitable examples.	5	CO4	K3
		UNIT-V			
9.	a)	Explain multi-threading. Write the purpose of isAlive() and join() functions in java.	5	CO5	K3
	b)	With an example, demonstrate the concept of thread synchronization	5	CO5	K3
		(OR)			
10.	a)	How many ways are possible in java to create multiple threaded programs? Discuss the differences between them.	5	CO5	K3
	b)	What is thread scheduling? How to perform this by setting priorities to threads.	5	CO5	K3
		UNIT-VI			
11.	a)	What is an applet? Explain the life cycle of Applet with a neat sketch.	5	CO6	K2
	b)	Discuss about different applet display methods in brief.	5	CO6	K3
		(OR)			
12.	a)	Explain about the various Applet parameters with their effects.	5	CO6	K2
	b)	Create a simple applet to display a smiley picture using Graphics class methods.	5	CO6	K5

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CODE: 20CET205 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

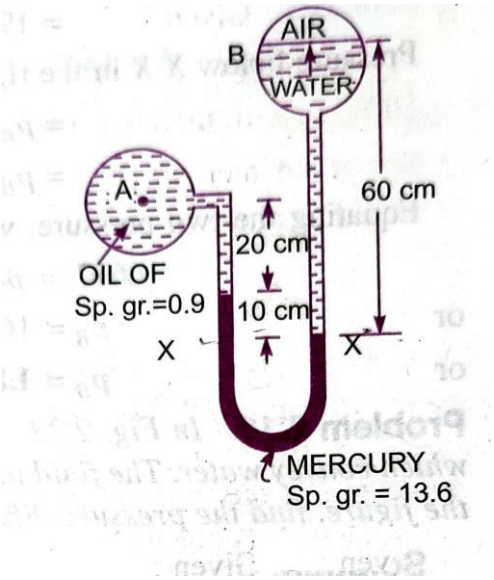
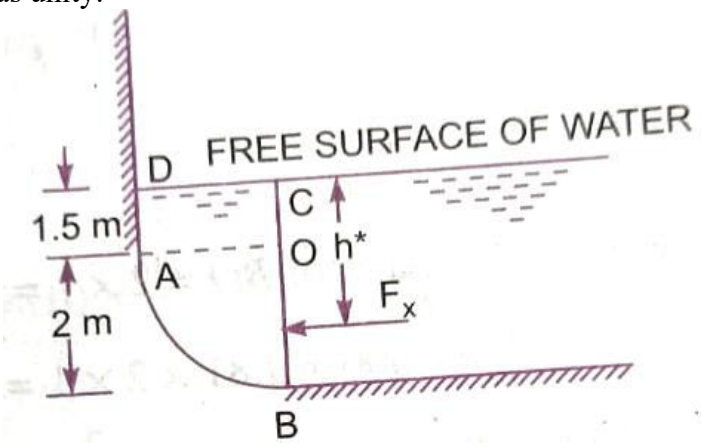
II B.Tech I Semester Supplementary Examinations, March – 2026

Fluid Mechanics and Hydraulic Machines

(CIVIL ENGINEERING)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	Explain Pascal's law with derivation.	6	CO1	Apply
	b)	Explain in detail about the vapour pressure	4	CO1	Remember
		(OR)			
2.	a)	A differential manometer is connected at the two points A and B as shown in figure. At B air is 9.0 N/cm^2 (abs), find the absolute Pressure at A. 	5	CO1	Apply
	b)	Compute the horizontal and vertical components of a total force acting on a curved surface AB, which is in the form of a quadrant of a circle of radius 2 m as shown in figure. Take the width of the gate as unity. 	5	CO1	Apply

			Marks	CO	Blooms Level
		UNIT-II			
3.	a)	A uniform body of size 3 m long x 2 m wide x 1 m deep floats in water. What is the weight of the body if depth of immersion is 0.8 m? determine the meta centric height also.	5	CO2	Apply
	b)	The velocity of potential function is given by $\Phi = 5(x^2 - y^2)$. Calculate the velocity components at the point (4,5).	5	CO2	Apply
		(OR)			
4.	a)	The following cases represents the two velocity components, determine the third component of velocity such that they satisfy the continuity equation. $v = 2y^2$; $w = 2xyz$	5	CO2	Apply
	b)	The diameter of a pipe at the sections 1 and 2 are 10 cm and 15 cm respectively. Find the discharge through the pipe if the velocity of water flowing through the pipe at section 1 is 5 m/s. Determine also the velocity at section 2.	5	CO2	Apply
		UNIT-III			
5.	a)	Water is flowing through pipe of 5 cm diameter under a pressure of 29. 43 N/cm^2 (gauge) and with mean velocity of 2.0 m/s. Find the total head or total energy per unit weight of the water at a cross section, which is 5 m above the datum line.	5	CO3	Apply
	b)	A 30 cm x 15 cm venturimeter is inserted in a vertical pipe carrying water, flowing in the upward direction. A differential mercury manometer connected to the inlet and throat gives a reading of 20 cm. Find the discharge. Take $C_d = 0.98$.	5	CO3	Apply
		(OR)			
6.	a)	A 45^o reducing bent is connected in a pipeline, the diameters at the inlet and outlet of bend being 600 mm and 300 mm respectively. Find the force exerted by water on the bend if the intensity of pressure at inlet to bend is 8.829 N/cm^2 and rate of flow of water is 600 litres/s.	6	CO3	Apply
	b)	Explain Reynold's experiment with neat sketch.	4	CO3	Remember
		UNIT-IV			
7.	a)	Find the discharge through a trapezoidal channel of width 8 m and side slope of 1 horizontal to 3 verticals. The depth of flow of water is 2.4 m and value of Chezy's constant C = 50. The slope of the bed of the channel is given 1 in 4000.	5	CO4	Apply
	b)	The rate of flow of water through a circular channel of diameter 0.6 m is 150 litres/s. Find the slope of bed of the channel for maximum velocity. Take C = 60.	5	CO4	Apply
		(OR)			
8.	a)	Derive the conditions for most economical section of trapezoidal channel.	4	CO4	Remember
	b)	A rectangular channel carries water at the rate of 400 litres/s when bed slope is 1 in 2000. Find the most economical dimensions of the channel is C = 50.	6	CO4	Apply

UNIT-V

9.	a)	Explain the main components of Kalpan turbine with neat sketch.	4	CO5	Remember
	b)	A reaction turbine works at 400 rpm under a head of 120m. Its diameter at inlet is 120 cm and the flow area is 0.4 m^2. The angles made by absolute and relative velocities at inlet are 20^0 and 60^0 respectively with the tangential velocity. Determine (i) the volume flow rate (ii) The power developed and (iii) Hydraulic efficiency. Assume whirl at outlet is zero.	6	CO5	Apply
		(OR)			
10.	a)	Explain about classification of hydraulic turbines.	4	CO5	Remember
	b)	A jet of water having a velocity of 30 m/s strikes a curved vane, which is moving with a velocity of 20 m/s. the jet makes an angle of 30° with the direction of motion of vane at inlet and leaves at an angle of 90° to the direction of motion of motion of vane at outlet. Draw the velocity triangles at inlet and outlet and determine the vane angles at inlet and outlet so that the water enters and leaves the vane without shock.	6	CO5	Apply

UNIT-VI

11.	a)	Explain work done by the centrifugal pump on water with neat sketch.	4	CO6	Remember
	b)	A centrifugal pump is to discharge 0.2 m^3/s at a speed of 2000 r. p. m, against a head of 25 m. The impeller diameter is 250 mm, its width at outlet is 50mm and manometric efficiency is 75%. Determine the vane angle at the outer periphery of the impeller.	6	CO6	Apply
		(OR)			
12.	a)	Explain about characteristic curves of centrifugal pumps.	4	CO6	Remember
	b)	A four-stage centrifugal pump has four identical impellers, keyed to the same shaft. The shaft is running at 400 r.p.m and the total manometric head developed by the multistage pump is 40 m. The discharge through the pump is 0.2 m^3/s. The vanes of each impeller are having outlet angle as 45°. If the width and diameter of each impeller at outlet is 5 cm and 60 cm respectively. Find the manometer efficiency.	6	CO6	Apply