AR18

CODE: 18CET207 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, January-2022

FLUID MECHANICS-II

(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

UNIT-I

1. a) What is meant by a most economical channel section? Derive the conditions under which the rectangular section of an open channel will be most economical. 6 M

   b) An open channel of most economical section, having the form of a half hexagon with horizontal bottom is required to give a maximum discharge of 20.2 m^3/sec of water. The slope of the channel bottom is 1 in 2500. Determine the dimensions of the cross-section. Take C = 60. 6 M

(OR)

2. a) Derive the differential equation for steady gradually varied flow in Open Channels and list all assumptions 6 M

   b) The specific energy for a 5 m wide rectangular channel is to be 4m. If the rate of flow of water through the channel is 20 m^3/sec, determine the alternate depths. 6 M

UNIT-II

3. a) Show that for a series of flat vanes mounted on wheel, the maximum efficiency that can be obtained when the jet strikes the vanes is 50% 6 M

   b) A jet of water having a velocity of 20 m/sec strikes a curved vane, which is moving with a velocity of 10 m/sec. The jet makes and angle of 20^0 with the direction of motion of vane at inlet and leaves at an angle of 130^0 to the direction of motion of vane at outlet, determine, i) vane angles at the inlet and outlet, ii) workdone/sec per unit weight of water and iii) efficiency of the jet 6 M

(OR)

4. a) Derive an expression for the force exerted by the jet of water on a moving flat plate inclined to the jet. 6 M

   b) A jet having a velocity 'V' strikes a single curved vane moving in the jet direction with a velocity 'u' so the velocity of jet relative to the vane is (V-u). The vane causes the jet to be reversed in direction. Show that maximum efficiency is obtained when V=3u and determine resultant efficiency 6 M

UNIT-III

5. a) Describe briefly the function of various components of Pelton turbine with neat sketches — 6 M

   b) Design a Francis Turbine runner with the following data: — 6 M

   Net Head, H = 68 m ; Speed, N = 750 r.p.m.

   Output, P = 450 H.P.; $\eta_h = 94\%$; $\eta_o = 85\%$

   Flow ratio, φ = 0.15 ; Breadth ratio, n = 0.1

   Inner diameter of the runner is 0.5 times the outer diameter. It may be assumed that 6% of the circumferential area of the runner is occupied by the thickness of the vanes. The velocity of flow remains constant throughout, and the flow at the exit is radial.

(OR)

6. Define 'Turbine'. What are the different types of turbines? Explain briefly any one of them with neat sketch. — 12M

UNIT-IV

7. a) Explain the principle and working of a Centrifugal Pump with the help of a neat sketch. — 6 M

   b) Find the power required to drive a centrifugal pump which delivers 0.04 m^3/sec of water to a height of 20 m through 150 mm diameter and 100 long pipe. The overall efficiency of the pump is 70% and coefficient of friction 'f' = 0.035 — 6 M

(OR)

8. Define 'Pump'. What are the different types of pumps? Explain briefly any one of them with neat sketch. — 12M

UNIT-V

9. a) What are the different laws on which models are designed for dynamic similarity? Where are they used?. — 6 M

   b) Using Buckingham's theorem, show that the frictional torque 'T' of a disc of diameter 'D' rotating at a speed 'N' in a fluid of viscosity 'μ' and density 'ρ' in a turbulent flow is given by, $T = D^5N^2\rho\ \phi\ [\mu / \rho N D^2]$ — 6 M

(OR)

10. What is dimensionless number? Explain briefly about the four dimensionless numbers. — 12M

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AR18

CODE: 18EET207 SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, January-2022

ELECTRICAL MACHINES-II

(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

UNIT-I

1.	a)	Prove that Power input to Rotor: Gross rotor output power: Rotor copper loss is equal to 1:(1-s):s	6M
	b)	A 3-phase, 50 Hz induction motor has a starting torque which is 1.25 times full load torque and a maximum torque which is 2.5 times full load torque. Neglecting stator resistance and rotational losses and assuming constant rotor resistance, find (i) Slip at full-load (ii) Slip at Maximum torque and (iii) Rotor current at starting in per unit of full load rotor current.	6 M

(OR)

2.	a)	Explain how rotating magnetic field is produced in 3-phase induction motor	6M
	b)	A 1100V, 50 Hz, delta connected induction motor has a star connected slip ring rotor with a transformation ratio of 3:8. Rotor resistance and standstill leakage reactance are 0.012 Ω and 0.25Ω per phase respectively. Neglecting stator impedance and magnetizing current, determine (i) rotor current at start with slip rings shorted (ii) rotor current at 4% slip with slip rings shorted (iii) External rotor resistance per phase required to obtain starting current of 100 A in stator supply lines.	6 M

UNIT-II

3.	Explain in detail the procedure to construction circle diagram, after conducting No-load and Blocked rotor test on 3-phase induction motor.	12 M

(OR)

4.	Explain in detail any 2 starting methods used for 3-phase induction motors, with the help of circuit diagram. Also mention their advantages and disadvantages.	12 M

UNIT-III

5.	Explain in detail with the help of neat sketches about Integral slot winding, fractional slot winding, Full pitched coil winding and Fractional pitched coil winding	12 M

(OR)

6.	A 10-pole, 50 Hz , 600 r.p.m star connected alternator has flux density distribution given by following expression B=sin θ+0.4 sin 3θ+0.2 sin 5θ. The alternator has 180 slots wound with 2-layer 3-turn coils having a span of 15 slots. The coils are connected in 60º groups. If armature diameter is 1.2 m and core length is 0.4m , the calculate (i) Expression for instantaneous EMF/conductor (ii) Expression for instantaneous EMF/coil (iii)RMS, value of phase and line voltage	12 M

UNIT-IV

7. Two alternators , working in parallel , supply following loads 12 M
   (i) Lighting load of 500 kW (iii) 1000kW at 0.9 p.f lagging
   (ii) 800 kW at 0.8 pf lagging (iv) 500kW at 0.9 pf leading
   One alternator is supplying 1500kW at p.f lagging. Calculate kW output and p.f of other machine.

(OR)

8. a) Differentiate between EMF and MMF methods of finding voltage regulation of Alternator. 6 M
   b) Explain in detail two-reaction theory 6 M

UNIT-V

9. a) Explain the concept of V and Λ curves 6 M
   b) Explain how power factor is improved using Synchronous condenser. Mention advantages and disadvantages of synchronous condenser. 6 M

(OR)

10. Explain in detail with the help of phasor diagram, the effect of changing field excitation at constant load under the following conditions 12 M
    (i)Under-excited (ii) Normal excited
    (iii) Over excited

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AR18

CODE: 18MET205 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, January-2022

IC ENGINES

(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

1.	a)	Explain the working of a 4 stroke petrol engine with a neat sketch.	6M
	b)	Write the difference between spark ignition and compression ignition engines.	6M
		(OR)	
2.	a)	Compare Otto diesel and dual cycle for same compression ratio and same maximum pressure.	6M
	b)	Classify IC engines.	6M

UNIT-II

3.	a)	Explain the stages of combustion in SI engines	6M
	b)	Explain the phenomenon of pre-ignition in SI engine. Discuss how pre-ignition leads to detonation and vice-versa	6M
		(OR)	
4.	a)	Explain the factors that affect the knock in CI engine.	6M
	b)	Compare knock in SI and CI engines.	6M

UNIT-III

5.		A single cylinder 4 stroke diesel engine has following observations while running on full load : area of the indicator diagram= 300mm^2 , length of the diagram=40mm, spring constant= 1 bar/mm, speed of the engine= 400rpm, load on the brake= 400 N, spring balance reading= 50 N, diameter of the drum= 1.2m, fuel consumption= 3 kg/h, calorific value = 42 MJ/kg, bore= 160mm and stroke= 200mm. Calculate i) imep, ii)bp, iii) bmep, iv) bsfc and v) indicated and brake thermal efficiencies.	12M
		(OR)	
6.	a)	Explain rope brake dynamometer with a neat sketch and expression for BP.	6M
	b)	A 4 cylinder 4 stroke SI engine develops a maximum brake torque of 200 Nm at 4000 rpm. Calculate the engine displacement, bore and stroke. The bmep at maximum engine torque is 960 kPa. Assume engine is a square engine.	6M

UNIT-IV

7.	a)	Explain a 3 way catalytic convertor in detail.	6M
	b)	List the emission values as per BS IV and Euro VI norms.	6M
		(OR)	
8.	a)	Discuss briefly the usage of alcohols and biodiesels in an IC engine.	6M
	b)	Compare conventional gasoline to Hydrogen as an IC engine fuel.	6M

UNIT-V

9	a)	Explain the effect of inter cooling in multistage reciprocating compressor	**6M**
	b)	An air compressor takes in air at 1 bar and 200^0 C and compresses it according to law $pv^{1.2}$= c It is then delivered to a receiver at a constant pressure of 10 bar. R = 0.287kJ/kg K. Determine: i) Temperature at the end of compression ii) Work done and heat transferred during compression per kg of air	**6M**

(OR)

10	a)	Explain with neat sketch vane type blower compressor.	**6M**
	b)	A 3 stage compressor is used to compress air from 1 bar to 36 bar. The compression in all stages follows the law $PV^{1.25}$= constant. The temperature at the inlet of the compressor is 300 K. Neglecting the clearance and assuming perfect inter cooling, find out the indicated power in kW to deliver 15 m^3 of air per minute measured at inlet conditions and intermediate pressures also. Take R = 0.287 kJ/Kg K.	**6M**

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AR18

CODE: 18ECT209 SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, January-2022

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

UNIT-I

1.	a)	Realise AND, OR, NOT using NAND Gate?	6M
	b)	Perform Binary Subtraction using ones complement for (i) 01000-01001 (ii) 0011.1001-0001.1110?	6M
		(OR)	
2.	a)	Convert $(346.12)_8$= (-----)$_2$; $(A8F9.E7F6)_{16}$ = (----)$_{10}$; $(ECE)_{16}$ = (----)$_2$?	6M
	b)	Explain in detail about error detecting and correcting codes with examples?	6M

UNIT-II

3.	a)	Design a 4 Bit Binary to Excess 3 code convertors?	6M
	b)	Simplify F= π (4, 6, 10, 12, 13, 15) and write the simplified expression, Prime Implicants and Essential Prime Implicants?	6M
		(OR)	
4.	a)	Simplify F= $\sum$ (1, 2, 5, 6, 8, 10, 12, 14) using four variable K Map and obtain the expression in SOP and POS forms?	6M
	b)	Simplify F= $\sum$ (0, 1, 4, 5, 6, 7, 9, 11, 13) + d (10, 14) using Tabulation Method and obtain the simplified expression?	6M

UNIT-III

5.	a)	Design Full subtractor using Half Subtractors?	6M
	b)	Design a 4 Bit binary parallel subtractor and explain its operation?	6M
		(OR)	
6.	a)	Design Full Adder using basic gates and write the output expressions for sum and carry?	6M
	b)	Design a 4 Bit carry look ahead adder and write expressions for sum and carry?	6M

UNIT-IV

7.	a)	Implement 4×16 decoder using 3×8 Decoders?	6M
	b)	Design a BCD to seven segment Decoder?	6M
		(OR)	
8.	a)	Design an 8×3 Encoder and write the output expressions and draw the logic diagram?	6M
	b)	Implement F= $\sum$ (0, 1, 2, 4, 6, 9, 12, 14) using (i) 16×1 (ii) 8×1 (iii) 4×1 Multiplexers?	6M

UNIT-V

9.	a)	What is race around condition? Explain in detail the principle of operation of Master Slave JK Flip flop with neat diagrams?	6M
	b)	Illustrate the working principle of universal Shift Register with neat diagram?	6M
		(OR)	
10.	a)	Convert SR to JK and D Flip flops?	6M
	b)	Design a Decade synchronous counter using D Flipflops?	6M

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AR18

CODE: 18CST206 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, January-2022

OPERATING SYSTEMS

(Common to CSE AND IT)

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

1. a) Define System call? Explain at least four types of System calls with examples. 6M
   b) Consider the following set of processes, assumed to have arrived at time '0' in the order given with the length of the CPU burst time in milliseconds. 6M

Process	Burst Time
P1	10
P2	1
P3	2
P4	1
P5	5

Draw gnatt chart for illustrating the execution of these processes using FCFS and SJF scheduling and calculate the waiting time for both FCFS and SJF scheduling.

(OR)

2. a) List and explain different services provided by the Operating Systems 6M

   b) Explain the significance of Process Control Block and describe its typical elements. 6M

UNIT-II

3. a) What is critical section? Write and explain Peterson's solution for it. 6M

   b) Discuss Readers-Writers problem using semaphores. 6M

(OR)

4. a) Define deadlock ? Describe the necessary conditions for deadlock 6M
   b) Explain Banker's algorithm with example. 6M

UNIT-III

5. a) What is paging? Describe in detail about general method with hardware implementation of paging. 6M
   b) What is demand paging? Discuss in detail the steps in handling a page fault. 6M

(OR)

6. a) Define Thrashing. Explain Working-set model in detail 6M
   b) Assume that there are 3 page frames which are initially empty. If the page reference string is 1, 2, 3, 4, 2, 1, 5, 3, 2, 4, 6. Calculate the number of page faults using the optimal replacement policy and Least recently used policy. 6M

UNIT-IV

7.	a)	Define File. Describe indexed file and indexed sequential file organization.	6M
	b)	Explain various File allocation methods in detail.	6M

(OR)

8.	a)	Explain Single level and Two level directories and also mention the advantages of Two level directories over Single level directories	6M
	b)	How protection can be provided for file system?	6M

UNIT-V

9.	a)	Explain the performance characteristics of mass-storage devices.	6M
	b)	Discuss briefly about disk attachment.	6M

(OR)

10.	a)	Evaluate SSTF and LOOK for the following data. Given the following queue: 95, 180, 34, 119, 11, 123, 62, 64 with the Read-write head initially at the track 50 and the last track being at 199.	6M
	b)	Explain the following in detail with respect to magnetic disk: i). Seek time ii). Latency iii). Transfer time.	6M

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AR16

CODE: 16CE2007 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, January-2022

HYDRAULICS AND HYDRAULIC MACHINERY

(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

UNIT-I

1.	a)	What do you mean by a dimensionally homogeneous equation? Determine the dimensions of the quantities given below: (i) Angular Velocity, (ii) Discharge, (iii) Specific weight and (iv) Dynamic viscosity.	6M
	b)	The time period (t) of a simple pendulum depends on length (L) and acceleration due to gravity (g). Establish a relation for the time period using Rayleigh's method.	8M

(OR)

2.	a)	What are the methods of dimensional analysis? Describe the Rayleigh's method of dimensional analysis.	6M
	b)	The frictional torque T of a disc of diameter D rotating at a speed N in a fluid of viscosity and density in a turbulent flow is given by $T = D^5N^2\rho\varphi[\mu / (D^2N\rho)]$.	8M

UNIT-II

3.	a)	What is the essential difference between gradually varied flow and rapidly varied flow? Illustrate with neat sketches.	6M
	b)	Derive the maximum velocity condition for most economical circular section channel.	8M

(OR)

4.	a)	Write about different types of flows in channels.	6M
	b)	Design an earthen trapezoidal channel for a slope of 1 in 1000 for water having a velocity of 0.5 m/s. Side slopes of the cannel is 1:1.5 and quantity of water flowing is 10 m^3/s. Assume Manning's coefficient is 0.015	8M

UNIT-III

5.	a)	Obtain an expression for the force exerted by a jet of water on a fixed vertical plate in the direction of jet.	6M
	b)	A jet of water of diameter 100mm strikes a curved plate at its centre with a velocity of 15 m/s. The curved plate is moving with a velocity of 7 m/s in the direction of the jet. The jet is deflected through an angle of 150^o. Assume the plate is smooth and find (i) the force exerted on the plate in the direction of the jet, (ii) the power of the jet and (iii) efficiency.	8M

(OR)

6.	a)	Differentiate between the force exerted by a jet on a single curved moving plate and a series of curved moving plates.	6M
	b)	A 50mm diameter jet having a velocity 25 m/s strikes a flat plate, the normal of which is inclined at an angle 30^o to the axis of the jet. Calculate the normal force exerted on the plate (i) when plate is stationary and (ii) when plate is moving with a velocity 10 m/s in the direction of the jet. Also, find the work done and efficiency of the jet when plate is moving.	8M

UNIT-IV

7. a) What is a draft tube? Describe different types of draft tubes with neat sketches. 6M
   b) A Pelton wheel has a mean bucket speed of 10 m/s with a jet of water flowing at the rate of 700 liters/s under a head of 30 meters. The buckets deflect the jet through an angle of 160^{o}. Calculate the power given by water to the runner and the hydraulic efficiency of the turbine. Assume coefficient of velocity as 0.9. 8M

(OR)

8. a) Briefly explain the principle on which a Kaplan turbine works. 6M
   b) A Francis turbine working under a head of 5 m at a speed of 210 rpm develops 75 kW, when the rate of flow of water is 1.8 m^3/s. If the head is increased to 16 m, determine the speed, discharge, and power. 8M

UNIT-V

9. a) Draw and discuss the operating characteristics of a centrifugal pump. 6M
   b) The centrifugal pump having outer diameter equal to two times inner diameter is running at 1000 rpm with working head of 40 m. Velocity of flow is constant and equal to2.5 m/s. The vanes are set back at an angle of 400 at outlet. If outer diameter of Impellar is 50 cm and the width at outlet is 5 cm. Then determine vane angle at inlet, Impeller power and manometric efficiency. Assume waters enter radially at inlet. 8M

(OR)

10. a) What do you mean by manometric efficiency, mechanical efficiency and overall efficiency of a centrifugal pump? 6M
    b) A centrifugal pump works against a head of 30 m and discharges 0.25 m^3/s while running at 1000 rpm. The velocity of flow at the outlet is 3 m/s and the vane angle at outlet is 300. Determine the diameter and width of impeller at outlet if the hydraulic efficiency is 80 per cent. 8M

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AR16

CODE: 16EE2012 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, January-2022

ELECTRICAL MACHINES-II

(Electrical & 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

UNIT-I

1.	a)	Explain the working principle of three phase slip ring induction motor with neat sketch.	7M
	b)	A three phase 50 Hz, 400 V induction motor has 4 pole star connected stator winding. Rotor resistance and reactance per phase are 0.15 Ω and 1 Ω respectively. Full load slip is 5 %. Calculate a) Torque developed b) Maximum torque c) Speed at maximum torque. Assume stator to rotor ratio 2:1	7M
		(OR)	
2.	a)	Derive the equivalent circuit of three phase induction motor with appropriate expressions.	8M
	b)	Explain the concept of crawling in induction motor.	6M

UNIT-II

3.		Draw the circle diagram of a 20 HP, 400 V, 50 Hz, 3 Φ star connected induction motor from the following test data (Line Values). **No load test:** 400 V, 9 A, P.F = 0.2 **Blocked rotor test:** 200 V, 50 A, P.F = 0.4 From the circle diagram find, a) Line current, P.F and efficiency at full load b) Full load slip. The stator and rotor copper losses are divided equally in the blocked rotor test.	14M
		(OR)	
4.	a)	Explain the cascaded method to control the speed of an induction motor.	7M
	b)	A squirrel cage induction motor has a full load slip of 5 %. The motor starting current at the rated voltage is 6 times its full load current. Find the tapping on the autotransformer starter which would give full load torque at start. What would then be the supply starting current.	7M

UNIT-III

5.	a)	Derive the EMF equation of the alternator.	7M
	b)	Explain the phasor diagram of an alternator connected to a lagging P.F load.	7M
		(OR)	
6.	a)	What is armature reaction in alternators? Explain it for various P.F conditions.	9M
	b)	Calculate the pitch factor for the given armature winding. 36 slots, 4 poles, coil span 1 to 8.	5M

UNIT-IV

7. a) Explain the procedure to determine the voltage regulation by synchronous impedance method. 9M

   b) Discuss the advantages and limitations of synchronous impedance method. 5M

(OR)

8. A 10 kVA, 440 V, 50 Hz, 3 Φ star connected alternator has the open circuit characteristics as given. 14M

Field current	1.5	3	5	8	11	15
Line voltage	150	300	440	550	600	635

With full load Zero P.F., the applied excitation required is 14 A to produce 500 V of terminal voltage. On short circuit, 4 A excitation is required to give full load current. Determine the voltage regulation for full load, 0.8 P.F lagging.

UNIT-V

9. a) Explain the various starting methods of synchronous motor. 8M

   b) A 3300 V, delta connected synchronous motor has a synchronous resistance per phase of 18 Ω. It operates at a leading P.F load of 0.707 when drawing 800 kW from the mains. Calculate the excitation EMF. 6M

(OR)

10. a) Explain the concept of V curves with appropriate sketch. 9M

    b) How to prevent hunting in synchronous motor? 5M

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AR16

CODE: 16ME2010 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, January-2022

THERMAL ENGINEERING - I

(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

UNIT-I

1.	a)	What is time loss factor? Discuss the effect of time losses in an actual cycle and explain the reasons for reduction in efficiency.	10 M
	b)	Discuss the various characteristics of an efficient cooling system.	4 M
		(OR)	
2.	a)	What is valve timing of 4 stroke engine? Explain its significance through a diagram	10 M
	b)	What are the requirements of good ignition system?	4 M

UNIT-II

3.	a)	Briefly explain the stages of combustion in SI engine elaborating the flame front propagation.	10 M
	b)	Draw the schematic diagram of simple carburettor and explain its working principle	4 M
		(OR)	
4.	a)	Explain briefly the effect of different factors on knock in SI engines?	10 M
	b)	List out the additives added for the gasoline fuel to improve the anti-knock quality.	4 M

UNIT-III

5.	a)	Explain detonation in C.I. Engine with a suitable diagram?	4 M
	b)	Bring out clearly the process of combustion in CI engines and also explain the various stages of combustion.	10 M
		(OR)	
6.	a)	Explain the influence of compression ratio and speed on delay period in C.I. Engine combustion.	10 M
	b)	Discuss air flow movements in CI engines	4 M

UNIT-IV

7. A four-stroke gas engine has a cylinder diameter of 25 cm and stroke 45 cm. The effective diameter of the brake is 1.6 m. The observations made in a test of the engine were as follows: 14 M
Duration of test = 40 min
Total number of revolutions = 8080
Total number of explosions = 3230
Net load on the brake = 90 kg
Mean effective pressure = 5.8 bar
Volume of gas used = 7.5 m3
Pressure of gas indicated in meter = 136 mm water of gauge
Atmospheric temperature = 17 ◦C
Calorific value of gas = 19 MJ/m3 at NTP
Rise in temperature of jacket = 45 ◦C
Cooling water supplied = 180 kg
Draw up a heat balance sheet and estimate the indicated thermal efficiency and brake thermal efficiency. Assume atmospheric pressure as 760 mm of Hg.

(OR)

8. a) What is heat balance sheet of an engine? Discuss the various items to be determined to complete the heat balance sheet. 8 M
   b) Explain Willan's line method of determination of frictional power 6 M

UNIT-V

9. a) Derive the expression for work done when compression is isentropic for a single stage reciprocating air compressor. 6 M
   b) Describe with a neat sketch, the working of a vane blower compressor and show its p-v diagram. 8 M

(OR)

10. a) What is degree of reaction? Draw the velocity diagram and derive the expression for degree of reaction for axial flow compressor. 8 M
    b) Find the difference in the amount of work required to compress and discharge 1 kg of air at 15 ^{O}C and 1 bar to 7 bar abs. when the compression is isothermal and when it is adiabatic. 6 M

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AR16

CODE: 16EC2010 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, January-2022

DIGITAL ELECTRONICS

(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

UNIT-I

1. a) Each of the following arithmetic operations is correct in at least one number system. Determine the possible bases of the numbers in each operation. 8M
   (a) 1234 + 5432 = 6666
   (b) 41/3 = 13
   (c) 33/3 = 11
   (d)√41 = 5
   b) Construct a seven-bit error-correcting code to represent the decimal digits by augmenting the Excess-3 code and by using an odd-1 parity check. 6M

(OR)

2. a) Given binary numbers a = 1010.1, b = 101.01, and c = 1001.1, perform the following binary operations: 8M
   (a) $a + c$
   (b) $a - b$
   (c) $a \cdot c$
   (d) a/b
   b) Convert $(346.12)_8$= (-----)$_2$; $(A8F9.E7F6)_{16}$ = (----)$_{10}$; $(ECE)_{16}$ = (----)$_2$? 6M

UNIT-II

3. a) Reduce the following Boolean expression to the indicated number of literals. 8M
   (a) A'C' + ABC + AC' {3} (b) (x'y'+z)' +z+xy+wz {3}
   (c) A'B(D'+C'D)+B(A+A'CD) {1}
   (d) (A'+C)(A'+C')(A+B+C'D) {4}
   b) Implement the following Boolean function F, together with the don't—care conditions, using no more than two NOR gates: 6M
   F(A,B.C.D)=∑ (2.4,6,10.12) d(A, 8, C, D) = ∑ (0,8, 9.13)
   Assume that both the normal and complement inputs are available.

(OR)

4. a) Simplify the following functions, and implement them with two level NOR gate circuits: 8M
   (a) F = wx' + y'z' + w'yz' (b) F(w, x, y, z) = ∑ (1,2,13,14)
   c) F(x,y,z) = ((x + y)(x' + z))'
   b) Simplify the following Boolean functions by first finding the essential prime implicants. 6M
   (a) F(w,x,y,z)= ∑(0,2,4,5,6,7,8,10,13,15)
   (b) F(A,B,C,D)= ∑(0,2,3,5,7,8,10,11,14,15)

UNIT-III

5. a) A half adder is a device capable of performing the addition of two bits. It has two binary inputs, A and B, and two outputs, S and C0. (Note that there is no carry into the half adder.) (a) Write truth tables that define the half adder and derive logic expressions for S and C0. (b) Assuming that only uncomplemented inputs are available, show an implementation of the half adder that requires only three two-input AND or OR gates and one NOT gate. 8M

   b) Design Full subtractor using basic gates and write the output expressions for sum and carry? 6M

(OR)

6. a) Design a 6 bit excess – 3 adder with neat sketches and truth table. 8M

   b) Design a 4 bit full subtractor with neat sketches and truth table. 6M

UNIT-IV

7. a) Explain and Design 8x3 priority encoder. 8M

   b) Implement $f(a,b,c)= \overline{A}\,B + \overline{C}$ using Suitable Decoder. 6M

(OR)

8. a) Design a 7 segment display to display "9876" with a select line to select the digits. 8M

   b) Differentiate priority encoder and encoder with a real-time example 6M

UNIT-V

9. a) Design a sequential circuit with two D flip-flops, A and B, and one input, x. When x = 0, the state of the circuit remains the same. When x = 1, the circuit goes through the state transitions from 00 to 01 to 11 to 10 back to 00, and repeats. 8M

   b) Draw the logic diagram of a 4-bit register with four D flip-flops and four 2 x 1 multiplexers with mode-selection input S0. The register operates according to the following function table: 6M

S0	Register Operation
0	Left shift
1	Right shift

(OR)

10. a) Design a module – 10 counter. 8M

    b) Convert SR flip-flop to T & D flip-flop 6M

AR16

CODE: 16CS2009 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, January-2022

OPERATING SYSTEMS

(Common to CSE & IT)

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

UNIT-I

1. a) Explain in detail about System Call and its types. 10
   b) Write Short notes on PCB. 4

(OR)

2. Consider the set of following processes 14

Process_ID	Arrival Time	Burst Time
P1	0	8
P2	1	4
P3	2	9
P4	3	5
P5	4	6

Compare the scheduling criteria for the following scheduling algorithm
a. Shortest Job First (with and without preemption)
b. Round Robin with q = 4

UNIT-II

3. a) Write about Peterson solution to the critical section problem. Explain how Peterson solution is satisfying all required conditions of critical section problem. 10
   b) Write Short notes on monitors. 4

(OR)

4. Explain the characteristics of deadlock and Explain the deadlock avoidance algorithm in detail. 14

UNIT-III

5. a) Explain in detail about paging with neat sketck. 10
   b) Write Short notes on Swapping. 4

(OR)

6. Demonstrate the behavior of FIFO, LRU and Optimal page replacement algorithms on the given reference string 14
   7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1

UNIT-IV

7. a) Explain in detail about Free Space Management. 10
   b) Write Short notes on File Operations. 4

(OR)

8. Explain in detail about the different types of directory structure. 14

UNIT-V

9. a) Explain in Detail about Disk Structures. 10
   b) Write Short Notes on Solid State Drives. 4

(OR)

10. Discuss the following disk scheduling algorithms with the given disk queue as 98,183,37,122,14,124,65 and 67. Assume that disk head starts at 53. 14
    i)scan ii)c-scan iii) LOOK

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AR13

CODE: 13EE2011 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, January-2022

ELECTRICAL MACHINES – II
(Electrical and Electronics Engineering)

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

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

1. a) Why transformer rating in kVA?
   b) What is the condition for maximum efficiency of a transformer?
   c) Write the expressions for power transferred conductively and inductively in an auto-transformer?
   d) What do mean by Scott connected transformer?
   e) Define transformation ratio?
   f) Why OC test of a transformer is conducted on LV Side?
   g) Write the expression for rotor speed of an induction motor?
   h) What is crawling of an induction motor?
   i) List any two applications of induction motor.
   j) List any two speed control methods w.r.t. rotor side.

PART-B

Answer one question from each unit **[5x12=60M]**

UNIT-I

2. a) Explain how the primary current increase as the current on the secondary side of the transformer is increased? 6M
   b) A 1-phase transformer has 400 primary and 100 secondary turns. The net cross-sectional area of the core is 60 cm^2. If the primary winding is connected to a 50 Hz supply at 520V. Calculate (i) Peak value of flux density in the core, (ii) Voltage induced in the secondary winding, and (iii) Transformation ratio 6M

(OR)

3. A 5kVA, single phase transformer has a core loss of 40W and full load copper loss of 100W. The load cycle of a transformer is given below: 12M
   7AM to 1PM - 3kW at 0.6 p.f. lagging
   1PM to 6PM - 2kW at 0.8p.f. lagging
   6PM to 1AM - 6kW at 0.9 p.f. lagging
   1AM to 7AM - no load
   Determine the all-day efficiency of the transformer.

UNIT-II

4. a) A 10kVA, 450/120V, 50Hz transformer gave the follow test results 6M
   O.C Test: 120V, 4.2A, 80W (on LV side)
   S.C Test: 9·65V, 22.2A, 120W (LV side short circuited)
   Calculate the efficiency and voltage regulation for 0·8 p.f lagging at full-load.
   b) Two 1-phase transformers with equal voltage ratios are running in parallel and supply a load of 1000A at 0.8p.f. lagging. The total impedances of the two transformers in terms of secondary are $(2+j3)\Omega$ and $(2.5+j5)\Omega$ respectively. Calculate the current supplied by each transformer 6M

(OR)

5. a) Derive an expression for the saving of copper effected by using an auto-transformer instead of two winding transformer? 6M

b) What is the three winding transformer? Explain the equivalent circuit of a three winding transformer? 6M

UNIT-III

6. a) A 746kW, 3-phase, 50Hz, 16-pole induction motor has a rotor impedance of (0·02+j0·15) Ω at standstill. Full load torque is obtained at 360rpm. Calculate the (i) ratio of maximum, to full load torque, (ii) the speed of the maximum torque, and (iii) the rotor resistance to be added to get maximum starting torque 8M

b) A 12-pole, 3-phase induction motor is fed from 100Hz supply. If the frequency of rotor emf at full load is 5Hz, find the full load speed and % slip. 4M

(OR)

7. a) Sketch and explain the torque-slip characteristics of a 3-phase induction motor. 6M

b) A 3-phase, 6 pole, 400V, 50Hz induction motor takes a power input of 35kW at its full load speed of 890rpm. The total stator losses are 1kW and the friction and windage losses are 1·5kW. Calculate (i) slip, (ii) rotor ohmic losses and (iii) shaft power 6M

UNIT-IV

8. Why starter is necessary for starting a 3-phase Induction motor. Discuss any two types of AC motor starters? 12M

(OR)

9. Explain the procedure of drawing the circle diagram of an induction motor. What information can be obtained from the circle diagram? 12M

UNIT-V

10. Explain the following schemes of speed control with neat sketches 12M
i) Cascade method ii) Frequency control method

(OR)

11. a) Determine approximately the ratio of starting torque to full load torque of a three phase induction motor with
(i) star-delta starter, and
(ii) an auto-transformer starter with 50% tapping used. The short circuit current of the motor at normal voltage is 5 times the full load current and the full load slip is 5%. 6M

b) What is an induction generator? Explain the operating principle. 6M

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