AR18

CODE: 18CET316 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

GEOTECHNICAL ENGINEERING-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) Write the experimental procedure of seismic refraction method with neat sketch. 6m
   b) Describe split spoon sampler with neat sketch. 6m

(OR)

2. a) Briefly explain the stages involved in sub-surface exploration. 6m
   b) Discuss in detail about standard penetration test and what are the corrections to be applied for blow count number? 6m

UNIT-II

3. a) Derive an equation for factor of safety of infinite slopes in cohesion less soils for (i) Dry condition(ii) submerged condition and (iii) steady seepage condition. 6m
   b) A canal having side slopes 1 to 2 is proposed to construct in a cohesive soil to a depth of 4 m below ground surface .The soil having properties porosity n = 60%, $G_S = 2.65$, $c_u = 20$ kN/m^2, $\phi_u = 28°$.Find the factor of safety with respect to cohesion (a) when the canal is full of water take $s_n = 0.014$ (b) when there is a sudden drawn down of water in the canal take $s_n = 0.07$. 6m

(OR)

4. a) Explain with neat sketch different types of slope failures. 6m
   b) An infinite slope is made of clay with the following properties bulk unit weight of soil is 24 kN/m^3 and submerged unit weight = 11 kN/m^3, cohesion = 36 kN/m^2, angle of internal friction = 34°. If the slope has an inclination of 40° and height equal to 14 m, determine the stability of slope when (i) slope is submerged (ii) there is seepage to the slope. 6m

UNIT-III

5. a) List out the assumptions in Rankine's earth pressure theory. Derive an expression to determine the coefficient of active earth pressure. 6m
   b) A retaining wall with a smooth vertical back is 11 m high and retains a two layer backfill with following properties 6m
   From 0 – 4 m depth: c' = 20 kN/m^2, ϕ' = 14°, γ = 21 kN/m^3.
   Below 4 m – 11 m: c' = 0, ϕ' = 21°, γ = 25 kN/m^3.Show the active pressure distribution when water table is at a depth of 6 m below ground level take γ_{sat} = 29 kN/m^3 .

(OR)

6. a) Explain Culmann's graphical method and also its advantages. 6m

b) A retaining wall 8 m high with a smooth vertical back is pushed against a soil mass having c' = 38 kN/m^2, ϕ' = 17°, γ = 24 kN/m^3 . What is the Rankine's passive pressure, if the horizontal soil surface carries a uniform load of 45 kN/m^2? What is the point of application of retaining wall? 6m

UNIT-IV

7. a) What are the assumptions made in the Terzaghi's bearing capacity theory? Write the expression to calculate ultimate bearing capacity for strip footing in General and Local shear failure. 6m

b) A rectangular footing 2.5 m x 4 m rests on c – ϕ soil, with its base at 2 m below the ground surface. Calculate the safe bearing capacity, using a factor of safety of 2.5 on (i) net ultimate bearing capacity, and (ii) ultimate bearing capacity. The soil has following parameters: c = 14 kN/m^2, ϕ' = 22°, γ = 20 kN/m^3, take N_c= 38.2, N_q= 23 and $N\gamma$ = 20 6m

(OR)

8. a) What are the different types of settlements which occur in foundation? How are these estimated? 6m

b) A strip footing 2.5 m wide carries a load intensity of 360 kN/m^2 at a depth of 1.5 m in sand. The saturated unit weight of sand is 21 kN/m^2 and unit weight of soil is 16 kN/m^2. The shear strength parameters are ϕ = 25°. Determine the factor of safety with respect to shear failure when the ground water table is 1 m below ground level, take N_q= 39 and $N\gamma$ = 41. 6m

UNIT-V

9. a) Classify piles based on mode of load transfer and method of construction. 6m

b) A 450 mm dia and 8 m long pile was driven by double acting hammer having mass 21.60 kN and height of fall 1.5 m the driving was done with 2.5 cm cushion only the average penetration in the last 5 blows was7 mm per blow. Determine the safe pile load using ENR formula .Take unit weight of concrete is 24 kN/m^3.,e = 0.7 η_h = 0.85 6m

(OR)

10. a) Explain the procedure to determine ultimate load carrying capacity of pile in cohesion less soils. 6m

b) A group of 16 piles arranged in square pattern with diameter and length of each pile as 40 cm and 6 m respectively is used as a foundation in soft clay deposit. Taking the unconfined compressive strength of clay as 170 kN/m^2 and the pile spacing as 105 cm centre to centre, find the load carrying capacity of the group. Assume the bearing capacity factor N_C = 9 and adhesion factor = 0.5 and facor of safety as 3. 6m

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AR18

CODE: 18EET316 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

INDUSTRIAL AUTOMATION

(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)	What is Automation? Describe the need of industrial automation.	6M
	b)	Explain sensing elements in industrial automation briefly	6M
		(OR)	
2.	a)	Give the structure of Industrial Automation and Explain.	6M
	b)	Describe the basic components of Automation with their function.	6M

UNIT-II

3.		Give the block diagram of PLC system and explain the function of various components of PLC. Also give the advantages of PLC.	12M
		(OR)	
4.	a)	Give I/O selection criteria for PLC.	6M
	b)	List various applications of PLC.	6M

UNIT-III

5.	a)	Write logic diagram, functional block diagram, ladder diagram for the logic functions NAND and NOR.	6M
	b)	Write a ladder diagram program for tank level control.	6M
		(OR)	
6.	a)	Draw and explain the construction of PLC ladder diagrams.	6M
	b)	How the ladder diagrams used for process control? Explain.	6M

UNIT-IV

7.		Explain on-delay timer and off-delay timer with an example	12M
		(OR)	
8.	a)	Write short note on latching.	6M
	b)	Explain up-counter with an example.	6M

UNIT-V

9.	a)	What is SCADA? Draw and explain functional architecture of SCADA.	8M
	b)	Give advantages and disadvantages of SCADA systems.	4M
		(OR)	
10.	a)	Discuss about SCADA interface.	6M
	b)	Compare discrete and analog control SCADA systems.	6M

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AR18

CODE: 18MET315 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

DYNAMIC SYSTEMS & MECHANICAL VIBRATIONS

(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 cam is to be designed for a knife edge follower with the following data: 12M
   1. Cam lift = 40 mm during 90° of cam rotation with simple harmonic motion.
   2. Dwell for the next 30°.
   3. During the next 60° of cam rotation, the follower returns to its original position with simple harmonic motion.
   4. Dwell during the remaining 180°.

   Draw the profile of the cam when the line of stroke is offset 20 mm from the axis of the cam shaft. The radius of the base circle of the cam is 40 mm. Determine the maximum velocity and acceleration of the follower during its ascent and descent, if the cam rotates at 240 r.p.m

(OR)

2. Construct the profile of a cam to suit the following specifications: 12M
   Cam shaft diameter = 40 mm;
   Least radius of cam = 25 mm;
   Diameter of roller = 25 mm;
   Angle of lift = 120°;
   Angle of fall = 150°;
   Lift of the follower = 40 mm;
   Number of pauses are two of equal interval between motions. During the lift, the motion is S.H.M. During the fall the motion is uniform acceleration and deceleration. The speed of the cam shaft is uniform. The line of stroke of the follower is off-set 12.5 mm from the centre of the cam

UNIT-II

3. A shaft carries four masses in parallel planes A, B, C and D in this order along its length. The masses at B and C are 18 kg and 12.5 kg respectively, and each has an eccentricity of 60 mm. The masses at A and D have an eccentricity of 80 mm. The angle between the masses at B and C is 100° and that between the masses at B and A is 190°, both being measured in the same direction. The axial distance between the planes A and B is 100 mm and that between B and C is 200 mm. If the shaft is in complete dynamic balance, determine: 12M
   i. The magnitude of the masses at A and D;
   ii. The distance between planes A and D; and
   iii. The angular position of the mass at D.

(OR)

4. a) Define Static and Dynamic Balancing 2M

b) A single cylinder reciprocating engine has speed 240 rpm stroke 300mm, mass of reciprocating parts 50kg, mass of revolving parts at 150mm radius 37kg. If two third of the reciprocating parts and all the revolving parts are to be balanced, find 10M

i. the balance mass required at a radius of 400mm, and

ii. the residual unbalanced force when the crank has rotated 60^0 from top dead centre

UNIT-III

5. a) Define logarithmic Decrement? 2M

b) The measurements on a mechanical vibrating system show that it has a mass of 8 kg and that the springs can be combined to give an equivalent spring of stiffness 5.4 N/mm. If the vibrating system have a dashpot attached which exerts a force of 40 N when the mass has a velocity of 1 m/s, find: 10M

(i) critical damping coefficient,

(ii) damping factor,

(iii)logarithmic decrement, and iv) ratio of two consecutive amplitudes..

(OR)

6. a) Explain briefly 6M

i) under damping ii) Critical damping iii) over damping

b) A mass of 1 kg is to be supported on a spring having a stiffness of 9800 N/m. The damping coefficient is 5.9 N-sec/m. Determine 6M

i. the Natural frequency of the system,

ii. the logarithmic decrement and

iii. the amplitude after three cycles, if the initial displacement is 0.5cm.

UNIT-IV

7. a) The mass of an electric motor is 120 kg and it runs at 1500 r.p.m. The armature mass is 35 kg and its C.G. lies 0.5 mm from the axis of rotation. The motor is mounted on five springs of negligible damping so that the force transmitted is one-eleventh of the impressed force. Assume that the mass of the motor is equally distributed among the five springs. Determine: 6M

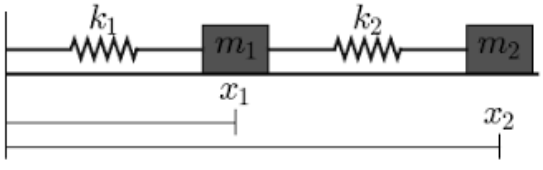
i. stiffness of each spring;

ii. dynamic force transmitted to the base at the operating speed;

b) Calculate the whirling speed of a shaft 20 mm diameter and 0.6 m long carrying a mass of 1 kg at its mid-point. The density of the shaft material is 40 kg/m^3, and Young's modulus is 200 GN/m^2. Assume the shaft to be freely supported. 6M

(OR)

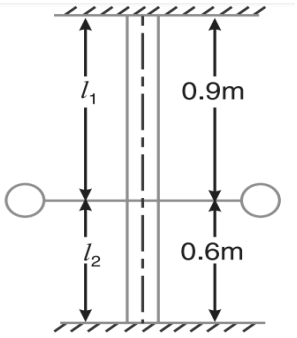
8. Find the mass and stiffness matrix for the figure shown assume no friction. K_1=100 N/m, K_2 =200 N/m. m_1=100kg. m_2 =200kg. 12M



UNIT-V

9. a) Define torsional vibrations and derive the Natural Frequency of Free Torsional vibration a shaft of negligible mass whose one end is fixed and the other end carrying a disc of mass 'm' 4M

   b) A flywheel is mounted on a vertical shaft as shown in Fig. The both ends of the shaft are fixed and its diameter is 50 mm. The flywheel has a mass of 500 kg. Find the natural frequencies of longitudinal and transverse vibrations. Take E=200 GN/m^2 . 8M



(OR)

10. a) Define the term radius of gyration 2M

    b) A 4-cylinder engine coupled to a propeller are approximated to a three rotor system in which the engine is equivalent to a rotor of moment of inertia 800 kgm^2, the flywheel second rotor 320 kgm2 and the propeller to a 3-rd rotor 20 kgm^2. The first and second rotors being connected by 50 mm diameter 2-meter-long shaft and the second and third rotors connected by 25 mm diameter and 2-meter-long shaft. Neglecting the inertia of the shaft taking the modulus of rigidity 80 GN/m^2, determine 10M

    i. Natural frequency of torsional oscillations, and
    ii. The position of nodes.

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AR18

CODE: 18ECT316 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

DIGITAL SIGNAL PROCESSING

(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) Find the response of a system described by the difference equation $y(n) + 2\,y(n-1) + y(n-2) = x(n) + x(n-1)$ for input $x(n)= (0.5)^n\,u(n)$ with initial conditions $y(-1) = y(-2) = 1$. 6M

   b) Given the sequence $x(n)=(6-n)[u(n)-u(n-6)]$ make a sketch of 6M
   i) $Y(n)=x(4-n)$
   ii) $Y(n)=x(n^2-2n+1)$.

(OR)

2. a) State and prove the following of Z-Transform 6M
   i) Final value theorem
   ii) Time Shifting Property.

   b) Check whether the corresponding LTI system with system function 6M

$$H(Z) = \frac{-1-0.4Z^{-1}}{1-2.8Z^{-1}+1.6Z^{-2}}$$ is stable and causal, if the ROC is
   (i) $|Z|>2$
   (ii) $|Z|<0.8$
   (iii) $0.8<|Z|<2$

UNIT-II

3. a) A length 8 sequence is given by $x(n)=\{-4,5,2,-3,0,-2,3,4\}$, $0\le n\le 7$, with an 8 point DFT given by X(K). without computing the IDFT determine the sequence y(n) whose 8-point DFT is given by $Y(K) = W_4^{3K}\,X(K)$ 6M

   b) State and Prove Frequency shifting and time shifting properties of Discrete Fourier Series 6M

(OR)

4. a) State and prove following properties of DFT 6M
   a) Time reversal
   b) Linearity

   b) Given $x(n)= \{0,1,2,3,-4,-5,6,7\}$, Find 8-point DFT X(K) using DIT-FFT algorithm. Show all intermediate results. 6M

UNIT-III

5. a) Design a low pass filter using rectangular window by taking 9 samples of w(n) and with a cut-off frequency of 1.2radians/sec. 8M

   b) Compare FIR and IIR filters 4M

(OR)

6.		Obtain the direct form I , direct form-II ,cascade and parallel form realization for the system $y(n)= -0.1y(n-1)+0.2y(n-2)+3x(n)+3.6x(n-1)+0.6x(n-2)$	12M

UNIT-IV

7.	a)	Explain about the LMS adaptive algorithm in detail	8M
	b)	Write the properties of LMS adaptive filter.	4M
		(OR)	
8.	a)	What is Linear Prediction Filtering? What are the different Methods in Linear Prediction Filtering? Explain about them in detail.	8M
	b)	What are the applications of Wiener smoothing to noise cancelling.	4M

UNIT-V

9.		Draw the architecture of TMS320C54XX DSP processor and explain the function of each block in detail.	12M
		(OR)	
10.	a)	What is meant by bit reversal address mode? Write the applications for which this addressing mode is preferred.	6M
	b)	Explain about the importance of pipelining with an example.	6M

AR18

CODE: 18CST314 SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

DATA MINING

(Common to CSE & 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)	Compare KDD and Data Mining	4M
	b)	Discuss in detail about Data Mining tasks.	8M
		(OR)	
2.	a)	Discuss the measures of similarity for simple attributes.	6M
	b)	What is data pre-processing? Explain why it is essential to pre-process the data before mining.	6M

UNIT-II

3.	a)	Draw and explain the components of Data Warehouse Architecture.	6M
	b)	Differentiate OLTP and OLAP.	6M
		(OR)	
4.	a)	What is multi-dimensional data model? Explain its concept.	4M
	b)	Discuss briefly about various schemas used in Data Warehouse Design with an example.	8M

UNIT-III

5.	a)	Mention and explain the metrics used in Association rule mining.	6M
	b)	Write and explain FP-Growth algorithm with a suitable example.	6M
		(OR)	
6.	a)	Explain how to improve the performance of Apriori algorithm.	6M
	b)	Describe the concept of constraint based association mining.	6M

UNIT-IV

7.	a)	How the classification is different from Prediction? Describe various prediction techniques	8M
	b)	What is tree pruning? Explain various pruning techniques.	4M
		(OR)	
8.	a)	Explain about the methods used to measure the performance of the classifier.	6M
	b)	Explain feed forward neural network with suitable example.	6M

UNIT-V

9.	a)	Describe dissimilarity matrix. Give an example	6M
	b)	Write and explain k-means algorithm with example.	6M
		(OR)	
10.	Write short notes on		12M
	i) Agglomerative clustering ii) BIRCH		

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AR16

CODE: 16CE3018 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

GEOTECHNICAL ENGINEERING-II

(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)	Write the experimental procedure of seismic refraction method with neat sketch.	7M
	b)	Describe split spoon sampler with neat sketch.	7M

(OR)

2.	a)	Briefly explain the stages involved in sub-surface exploration.	7M
	b)	Discuss in detail about standard penetration test and what are the corrections to be applied for blow count number?	7M

UNIT-II

3.	a)	With neat sketches explain about different types of slope failures.	7M
	b)	An embankment is to be made of a soil which has the following shear strength parameters under the existing conditions $c' = 35$ kN/m^2 and $\Phi' = 15^o$. It is assumed that different margins of safety are available for cohesion and friction are $C_m = 25$ kN/m^2 and $\Phi_m = 10^o$, If the average value of normal effective stress on the failure surface is 130 kN/m^2. What is the factor of safety with respect to (a) cohesion and (b) friction?	7M

(OR)

4.	a)	Derive formula for factor of safety of slope stability using method of slices?	10M
	b)	Determine the factor of safety with respect to cohesion for a submerged embankment 20 m high and having a slope of i = 35^o,c = 40 kN/m^2, $\Phi = 35^o$ and $\gamma_{sat} = 20$ kN/m^3.Take $S_n = 0.097$	4M

UNIT-III

5.	a)	Discuss in details on the method of estimating the active earth pressure on a retaining wall by using the Culmann's method.	7M
	b)	A retaining wall 8m height with a smooth vertical back retains the following materials. (a) Top 2m: clay, $\gamma_s = 1.75$g/cc, $\Phi = 0$, and c = 10kN/m^2, (b) Bottom 6m, saturated sand, $\gamma_s = 1.95$g/cc and $\Phi = 30^0$, if the water level is on top of the sand layer, draw the diagram of lateral pressure on the wall assuming that no tension crack develops on the top layer.	7M

(OR)

6.	a)	Explain the factors affecting the lateral earth pressure	6M
	b)	A retaining wall of 4.5 m high with a smooth vertical back. The backfill has a horizontal surface in level with top of the wall and carries a uniformly distributed surcharge load of 20t/m^2. The density, angle of internal friction and -cohesive value of soil is 1.9 t/m^3,30° and zero respectively. Estimate the magnitude and point of application of the total active pressure per meter length of the wall.	8M

UNIT-IV

7. a) A continuous footing of width 2.5m rests 1.5m below and ground surface in clay. The unconfined compressive strength of the clay is 150 KN/m^2. Calculate the ultimate bearing capacity of the footing, when there is no effect of water table and when water reaches ground surface. Take γ =18 KN/m^3, γ_{sat} = 20 KN/m^3. 7M

   b) A 3 m X 4 m rectangular footing is eccentrically loaded. The resultant is 0.2 m outside of centroid width wise, and 0.3 m outside of centroid length wise. If c = 10kPa, $\phi = 25^o$, γ=16kN/m^3, find the safe load carried by footing. What would have been the increase in load carried, if the load was concentric? Take Nc=25.1,Nq =12.7, Nγ = 9.7. 7M

(OR)

8. a) What are the different types of settlements which occur in foundation? How are these estimated? 4M

   b) A strip footing 2.5 m wide carries a load intensity of 360 kN/m^2 at a depth of 1.5 m in sand. The saturated unit weight of sand is 21 kN/m^2 and unit weight of soil is 16 kN/m^2. The shear strength parameters are $\phi = 25°$. Determine the factor of safety with respect to shear failure when the ground water table is 1 m below ground level, take N_q= 39 and Nγ = 41. 10M

UNIT-V

9. a) Classify piles based on mode of load transfer and method of construction. 7M

   b) A 450 mm dia and 8 m long pile was driven by double acting hammer having mass 21.60 kN and height of fall 1.5 m the driving was done with 2.5 cm cushion only the average penetration in the last 5 blows was7 mm per blow. Determine the safe pile load using ENR formula .Take unit weight of concrete is 24 kN/m^3.,e = 0.7 η_h = 0.85 7M

(OR)

10. a) Explain about negative skin friction of pile foundation. 7M

    b) A group of 16 piles arranged in square pattern with diameter and length of each pile as 40 cm and 6 m respectively is used as a foundation in soft clay deposit. Taking the unconfined compressive strength of clay as 170 kN/m^2 and the pile spacing as 105 cm centre to centre, find the load carrying capacity of the group. Assume the bearing capacity factor N_C = 9 and adhesion factor = 0.5 and facor of safety as 3. 7M

AR16

CODE: 16EC3016 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

ANALOG AND DIGITAL ELECTRONIC CIRCUITS

(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

UNIT-I

1.	a)	Obtain the response of high pass RC circuit for step input. Draw its output response For different time constants.	7M
	b)	State and prove the sampling circuit theorem.	7M
		(OR)	
2.	a)	Explain working of slicer circuit (Two negative reference levels) with transfer characteristics.	7M
	b)	Design a diode clamper to restore the positive peaks (negative peaks) of the input signal to zero level. Use a silicon diode with R_f= 50 ohms ad R_r =400K ohms. The frequency of the input voltage is5KHz.	7M

UNIT-II

3.		Write a short notes on	4M
		a. Diode forward recovery time.	4M
		b. Diode reverse recovery time.	6M
		c. Storage and transition times.	
		(OR)	
4.	a)	Draw the circuit diagram for Schmitt trigger circuit and explain its operation.	7M
	b)	Explain the operation of Astable multivibrator	7M

UNIT-III

5.	a)	Explain various building blocks of Operational Amplifier.	7M
	b)	Explain how the op-amp is used as differentiator with necessary equations and draw the input and output waveforms by considering the square wave as input.	7M
		(OR)	
6.	a)	Explain in detail all the AC characteristics of ideal op-amp with relevant expressions.	7M
	b)	Draw the diagram of a First order low pass filter and obtain the expression for transfer function, write the expression for cut-off frequency.	7M

UNIT-IV

7. a) Explain the operation of 555 timer in monostable mode and derive the expression for pulse width. 7M

   b) Define the following terms of PLL (i) Lock-in range (ii) Capture range (iii) pull-in time. 7M

(OR)

8. a) Explain the operation of R-2R ladder DAC with the help of relevant diagrams 7M

   b) With the help of circuit diagram and necessary waveform, discuss about dual slope integrating A/D converter using OP-AMP. 7M

UNIT-V

9. a) Design AND logic gate using diode logic and explain its functionality with truth table. 7M

   b) Design two input NOR Gate using CMOS technology and explain its operation with the help of truth table. 7M

(OR)

10. a) Explain the operation of OR gate using diode logic with the help of truth table. 7M

    b) What are the advantages and disadvantages of CMOS technology? With neat diagram explain the working of CMOS inverter. 7M

AR16

CODE: 16ME3019 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

MECHANICAL VIBRATIONS

(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. Draw the cam profile for following conditions: 14M
Follower type = roller follower, off-set to the right by 5mm; lift = 30mm; base circle radius = 25mm; roller radius = 5mm; out stroke with SHM, for 120^0 cam rotation; dwell for 60^0 cam rotation; return stroke during 120^0 cam rotation; first half of return stroke with Uniform velocity and second half with UARM; dwell for the remaining period.

(OR)

2. a) What are the classifications of cams and followers? 4M
b) Cam with 25 mm as minimum diameter is rotating clockwise at a uniform speed of 1000 rpm and has to give the motion to the roller follower 10mm diameter as defined below: 10M
- •Follower to complete outward stroke of 30mm during 1200 of cam rotation with equal uniform velocity
- •Follower to dwell for 600 of cam rotation.
- •Follower to return to its initial position during 1200 of cam rotation with SHM.
- •Follower to dwell for the remaining 900 of cam rotation.

Layout the cam profile when the roller follower axis passes through the axis of the cam.

UNIT-II

3. a) Why Reciprocating Engines are partially balanced? 4
b) A single cylinder engine runs at 250 rpm and has stroke of 180mm. the reciprocating part has a mass of 120kg and revolving parts are equivalent to mass of 70kg at a radius of 90mm. A mass is placed opposite to the crank at a radius of 150mm to balance the whole of the revolving mass and 2/3 of the reciprocating mass. Determine the magnitude of the balancing mass and the resultant residual unbalance force when crank has turned 300 from the inner dead centre; neglect the obliquity of the connecting rod. 10

(OR)

4 A rotating shaft carried four masses A, B, C and D which are readily attached to it. The mass centres are 30 mm, 38 mm, 40 mm and 35 mm respectively from the axis of rotation. The masses A, B and D are 7.5 kg, 5 kg and 4 kg respectively. The axial distance between the planes of rotation of rotation of A and B is 600 mm and between B and C is 500 mm. the masses A and C are right angle to each other, find for a compete balance. 14
- i) The angle between the masses B and D from mass A.
- ii) The axial distance between the planes of rotation of C and D.
- iii) The magnitude of mass B.

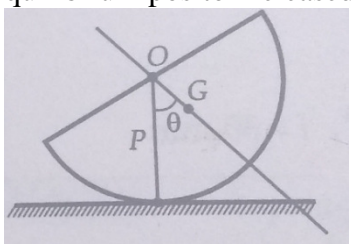
UNIT-III

5. a) Write about whirling of shafts? 4

   b) The measurements on a mechanical vibrating system show that it has a mass of 8 kg and that the springs can be combined to give an equivalent spring of stiffness 5.4 N/mm. If the vibrating system have a dashpot attached which exerts a force of 40 N when the mass has a velocity of 1 m/s, 10
   Find :a) critical damping coefficient, b) damping factor,
   c) Logarithmic decrement, and d) ratio of two consecutive amplitudes.

(OR)

6. a) Find the natural frequency of vibration of half solid cylinder shown in figure when slightly displaced from the equilibrium positon released. 7



   b) A shaft of length of 0.75 m supported freely at the ends. Is carrying a body mass 90 kg at 0.25 m from its one end. Find the natural frequency of transverse vibration. Assume E 200 GPa and shaft diameter 50 mm. 7

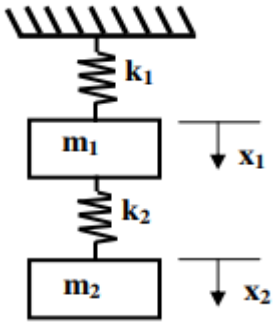
UNIT-IV

7. a) A machine runs at 5000 rpm. Its forcing frequency is very near to its natural frequency. If the nearest frequency of the machine is to be at least 20% from the forced frequency, design a suitable vibration absorber for the system. Assume the mass of the machine as 30 kg. 10

   b) What is vibration Isolation and Transmissibility 4

(OR)

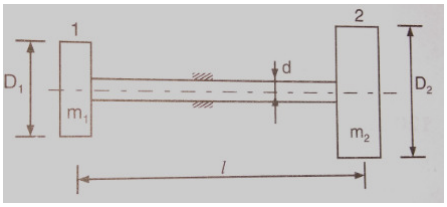
8. Obtain the frequency equation for the system shown in Figure. Also determine the natural frequencies and mode shapes when $k_1 = 2k$, $k_2 = k$, $m_1 = m$ and $m_2 = 2m$. 14M



UNIT-V

9. a) Derive an expression for the natural frequency of free torsional vibrations. 6

   b) Calculate the natural frequency of torsional vibration of a shaft of 10 cm diameter and 300 cm long carrying two circular disks of uniform thickness at the ends. The disks have mass of 500 kg and diameter of 125 cm and 190 cm respectively. Take $G=0.83X10^{11}$ N/m^2. 8



(OR)

10. a) Define torsional vibrations. 2

    b) A shaft of 100 mm diameter and 1 meter long has one of its end fixed and the other end carries a disc of mass 500 kg at a radius of gyration of 450mm. The modulus of rigidity of the shaft material is 80 GN/m2. Determine the frequency of torsional vibrations 12

AR16

CODE: 16EC3021 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

DIGITALSIGNALPROCESSING

(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) The system having impulse responses given below, determine whether they are stable and causal. (i) $h(n) = \delta(n) + \sin(\pi n)$, (ii). $h(n) = e^{2n}u(n-1)$ 8 M

   b) Determine the z-transform and ROC of the following signals: 6 M
   (i) $x(n) = \left(\frac{1}{2}\right)^n u(n)$, and (ii). $x(n) = \left(\frac{1}{3}\right)^n u(-n-1)$

(OR)

2. a) Determine the Fourier transform of the system whose unit impulse response 8 M
   $h(n) = \begin{cases} 1 & for\ 0 \le n \le N-1 \\ 0 & elsewhere \end{cases}$

   b) State and prove any two properties of the Z-transform 6 M

UNIT-II

3. a) Find the relationship between Discrete Fourier Transform and z-Transform 6 M

   b) Find the 8-point DFT of the given sequence x(n) = {0,1,2,3,4,5,6,7} using DIF, radix-2, FFT algorithm 8 M

(OR)

4. a) State and prove any four properties of Discrete Fourier Transform 8 M

   b) Compute the DFT of a sequence x(n) = {1,-1,1,-1} using DIT algorithm 6M

UNIT-III

5. a) Realize the system with difference equation $y(n) = \frac{3}{4}y(n-1) - \frac{1}{8}y(n-2) + x(n) + \frac{1}{3}x(n-1)$ in cascade form 7 M

   b) Design an analog Butterworth filter that has a -2dB passband attenuation at a frequency of 20 rad/sec and atleast -10 dB stopband attenuation at 30 rad/sec 7 M

(OR)

6. a) Determine H(z) that results when the bilinear transformation is applied to $H_a(s) = \frac{s^2+4.525}{s^2+0.692s+0.504}$ 7 M

   b) Obtain direct form I realization of the LTI system described by the following equation $y(n) = -\frac{3}{8}y(n-1) + \frac{3}{32}y(n-2) + \frac{1}{64}y(n-3) + x(n) + 3x(n-1) + 2x(n-2)$ 7 M

UNIT-IV

7. Design an ideal lowpass filter with a frequency response 14 M

$$H_d(e^{jw}) = \begin{cases} 0 & for\ \frac{\pi}{4} \le |w| \le \pi \\ 1 & for\ |w| \le \frac{\pi}{4} \end{cases}$$

Find the value of h(n) for N=11 using Hanning window

(OR)

8. a) Compare IIR and FIR Filters 7M
   b) Determine the direct form realization of system function $H(z) = (1 + 2z^{-1} - 2z^{-2})(1 + z^{-1} - z^{-2})$ 7M

UNIT-V

9. a) Explain addressing modes of DSP processor. 7 M
   b) Write a short note on Pipeline Programmingmodels 7 M

(OR)

10. a) Describe basicarchitectural features of digitalsignal-processing system 7M
    b) Explain Von-Neumann and Harvard architectures with neat diagrams 7M

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AR16

CODE: 16CS3020 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

DATA WAREHOUSING AND DATA MINING

(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)	Discuss in detail about the steps of knowledge discovery?	7M
	b)	Write a note on subset selection in attributes for data reduction.	7M
		(OR)	
2.	a)	Explain various data mining tasks.	7M
	b)	Discuss briefly about data cleaning techniques.	7M

UNIT-II

3.	a)	With a neat sketch, Explain three tier architecture of data ware housing.	8M
	b)	Explain various data warehouse models.	6M
		(OR)	
4.	a)	Make a comparisons between the MOLAP and HOLAP.	6M
	b)	Discuss the star and snowflake schema in detail with suitable example.	8M

UNIT-III

5.	a)	Write FP-growth algorithm.	8M
	b)	Explain how association rules are generated from frequent item sets.	6M
		(OR)	
6.	a)	Explain the procedure to mining closed frequent data item sets.	6M
	b)	Explain how can you improve the performance of Apriori algorithm	8M

UNIT-IV

7.	a)	Describe the data classification process with a neat diagram. How does the Naïve Bayesian classification works? Explain	7M
	b)	What are the advantages and disadvantages of decision trees over other classification methods?	7M
		(OR)	
8.	a)	What is misclassification rate of a classifier ? Describe sensitivity and specificity measures of a classifier.	7M
	b)	Explain Bayes theorem. Develop an algorithm for classification using Bayesian classification.	7M

UNIT-V

9.	a)	Write DBSCAN clustering algorithm and estimate time and space complexity.	8M
	b)	Explain different types data in cluster analysis.	6M
		(OR)	
10.	a)	Describe K means clustering with an example	8M
	b)	Describe any one Hierarchical clustering algorithm.	6M