AR18

CODE: 18EET316 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech II Semester Supplementary Examinations, September-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)	Explain the need for Industrial Automation in the present scenario.	6M
	b)	Explain the classification of Automation systems based on the hardware configurations.	6M
		(OR)	
2.	a)	List the Application of Industrial Automation.	6M
	b)	Explain the components of industrial automation.	6M

UNIT-II

3.	a)	With a neat block diagram, explain the function of PLC components.	6M
	b)	Explain various data files in PLC programming.	6M
		(OR)	
4.	a)	Define Programmable Logic Controller. List few applications of PLC.	6M
	b)	Explain output module in detail.	6M

UNIT-III

5.	a)	Implement the PLC ladder diagram for the Boolean algebra expression $(A+B+C).(D+E+E).G.\overline{H} = M$. Also show their gate diagram	6M
	b)	Write a PLC program used to implement control of water level in a storage tank and explain the sequence of operation.	6M
		(OR)	
6.	a)	Explain the different digital logic gates.	6M
	b)	Explain the need for analog output for PLC control applications.	6M

UNIT-IV

7.	a)	Consider a system where there has to be no output when any one of four sensors gives an output, otherwise there is to be an output. Develop and explain the PLC ladder diagram for the above system.	6M
	b)	Draw the symbol and explain the operation of on delay and off delay timers contacts of mechanical timings relay.	6M
		(OR)	
8.	a)	Develop a simple ladder logic program that will turn on an output X if inputs A and B, or input C is on.	6M
	b)	Explain the counter function neatly and mention its industrial applications.	6M

UNIT-V

9.	a)	Explain SCADA generations.	6M
	b)	Explain the various communication technologies used in SCADA systems.	6M
		(OR)	
10.	a)	Explain SCADA systems components and its properties	6M
	b)	With a neat diagram, explain signal sources and o/p loads of SCADA.	6M

AR18

CODE: 18MET315 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech II Semester Supplementary Examinations, September-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 give the following motion to a knife-edged follower: 12M
   1. Outstroke during 60° of cam rotation;
   2. Dwell for the next 30° of cam rotation;
   3. Return stroke during next 60° of cam rotation, and
   4. Dwell for the remaining 210° of cam rotation.

   The stroke of the follower is 40 mm and the minimum radius of the cam is 50 mm. The follower moves with uniform velocity during both the outstroke and return strokes. Draw the profile of the cam when the axis of the follower is coincides the axis of the cam shaft.

(OR)

2. A cam rotating clockwise at a uniform speed of 1000 r.p.m. is required to give a roller follower the motion defined below: 12M
   1. Follower to move outwards through 50 mm during 120° of cam rotation,
   2. Follower to dwell for next 60° of cam rotation,
   3. Follower to return to its starting position during next 90° of cam rotation,
   4. Follower to dwell for the rest of the cam rotation.

   The minimum radius of the cam is 50 mm and the diameter of roller is 10 mm. The line of stroke of the follower is off-set by 20 mm from the axis of the cam shaft. If the displacement of the follower takes place with uniform and equal acceleration and retardation on both the outward and return strokes, draw profile of the cam and find the maximum velocity and acceleration during out stroke and return stroke.

UNIT-II

3. A, B, C and D are four masses carried by a rotating shaft at radii 100, 125, 200 and 150 mm respectively. The planes in which the masses revolve are spaced 600 mm apart and the mass of B, C and D are 10 kg, 5 kg, and 4 kg respectively. Find the required mass A and the relative angular settings of the four masses so that the shaft shall be in complete balance. 12M

(OR)

4. An inside cylinder locomotive has its cylinder centre lines 0.7 m apart and has a stroke of 0.6 m. The rotating masses per cylinder are equivalent to 150 kg at the crank pin, and the reciprocating masses per cylinder to 180 kg. The wheel centre lines are 1.5 m apart. The cranks are at right angles. The whole of the rotating and 2/3 of the reciprocating masses are to be balanced by masses placed at a radius of 0.6 m. Find the magnitude and direction of the balancing masses. Find variation of tractive effort and the magnitude of swaying couple at a crank speed of 300 r.p.m. 12M

UNIT-III

5. a) Define logarithmic Decrement & deduce an expression for it? 8M
   b) A vibrating system consists of a mass of 200 kg, a spring of stiffness 80 N/mm and a damper with damping coefficient of 800 N/m/s. Determine the frequency of vibration of the system. 4M

(OR)

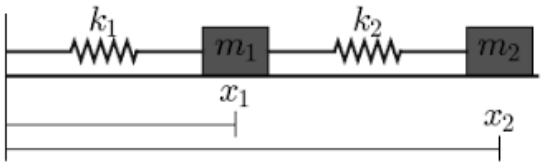
6. a) Explain briefly 6M
   i) under damping ii) Critical damping iii) over damping
   b) A mass of 1 kg is to be supported on a spring having a stiffness of 9800 N/m. The damping coefficient is 5.9 N-sec/m. Determine 6M
      i. the Natural frequency of the system,
      ii. the logarithmic decrement and
      iii. the amplitude after three cycles, if the initial displacement is 0.5cm.

UNIT-IV

7. a) Define the terms 6M
   i. Isolation ii. Transmissibility iii. Whirling of shafts
   b) A shaft 50 mm diameter and 3 metres long is simply supported at the ends and carries three loads of 1000 N, 1500 N and 750 N at 1 m, 2 m and 2.5 m from the left support. The Young's modulus for shaft material is 200 GN/m^2. Find the frequency of transverse vibration. 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

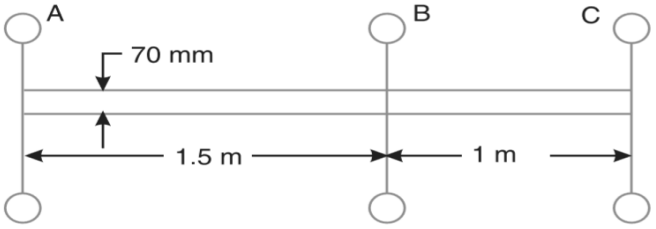


UNIT-V

9. 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' 12M

(OR)

10. a) Explain importance of multi degree of freedom system 2M
    b) A single cylinder oil engine drives directly a centrifugal Pump. The rotating mass of the engine, the flywheel and the pump with the shaft is equivalent to a 3 rotor system as shown in the figure. The mass MI of the rotors A, B and C are 0.15,0.3 and 0.09 kg-m^2. Find the natural frequency of the torsional vibration and position of the nodes. The modulus of rigidity for the shaft material is 84 KN/m^2. 10M



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AR18

CODE: 18ECT316 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

DIGITAL SIGNALPROCESSING

(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) Determine the even and odd components of the following signals. 6M

(i). $x(n)=\left\{3,2,\underset{\uparrow}{1},4,5\right\}$ (ii). $x(n)=\cos n+\sin n$

b) Explain the various classification of signals with examples. 6M

(OR)

2. a) State and prove any three properties of z-transform. 6M
b) Find the z-transform of the signal $x(n)=na^{n}u(n)$ 6M

UNIT-II

3. a) State and prove the convolution property of DFT. 6M
b) Find the 4-point DFT of the signal $x(n)=\{1,2,3,4\}$ 6M

(OR)

4. Draw the butterfly diagram of 8-point radix-2 DIT algorithm and explain. 12M

UNIT-III

5. a) Explain the parallel form realization of IIR filters with suitable example. 4M
b) Obtain the cascade form realization of the filter 8M

$$y(n)+\frac{1}{16}y(n-1)+\frac{1}{6}y(n-2)-\frac{1}{24}y(n-3)-\frac{1}{16}y(n-4)$$

$$=x(n)+\frac{5}{6}x(n-1)+x(n-2)+\frac{13}{36}x(n-3)+\frac{1}{6}x(n-4)$$

(OR)

6. a) Derive the frequency response of FIR filter with impulse response is odd and symmetric. 6M
b) Write a matlab program to design a butterworth digital band pass filter with pass band and stop band attenuation of -3 dB and -10 dB respectively. The passband cutoff frequencies are 600 Hz and 1000 Hz and the stop band cut off frequencies are 300 Hz and 1600 Hz. The sampling frequency is 5000 hz. 6M

UNIT-IV

7. a) Explain LMS algorithm with suitable mathematical equations. 6M
b) Explain the characteristics of adaptive filters. 6M

(OR)

8. a) Explain direct form linear prediction filtering. 6M
b) Write the properties of LMS adaptive filters. 6M

UNIT-V

9. Draw the architecture of TMS320C54X processor and explain briefly. 12M

(OR)

10. Explain the different addressing modes of TMS320C5X processors. 12M

AR18

CODE: 18CST314 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech II Semester Supplementary Examinations, September-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)	What is data mining? Explain the steps in data mining process.	6M
	b)	Explain major requirements and challenges in data mining.	6M
		(OR)	
2.	a)	Explain the steps for data preprocessing with an example	6M
	b)	What are different types of data? Explain unstructured data with suitable example.	6M

UNIT-II

3.	a)	Define data warehouse. Draw the architecture of data warehouse and explain the three tiers in detail.	6M
	b)	List out the OLAP operations and explain the same with an example.	6M
		(OR)	
4.	a)	Explain in detail Data Generalization.	6M
	b)	Explain in detail On-Line Analytical Mining.	6M

UNIT-III

5.	a)	Explain FP-Growth algorithm for suitability of mining frequent patterns.	6M
	b)	State and explain Apriori Algorithm with an example Consider the following data set to generate Association rules {M,O,N,K,E,Y} {D,O,N,K,E,Y} {M,A,K,E} {M,U,C,K,Y} {C,O,O,K,I,E}, Support= 60 %, Confidence = 80 %	6M
		(OR)	
6.	a)	Write short notes on Closed Frequent Item Set.	6M
	b)	Explain in detail about Multidimensional association rule.	6M

UNIT-IV

7.	a)	Explain about Attribute Subset Selection Measures with an example.	6M
	b)	Write short notes on Bayesian Belief Networks?	6M
		(OR)	
8.	a)	Discuss Back propagation algorithm for classification with an example.	6M
	b)	Discuss briefly various error measures with respect to computation of classification accuracy.	6M

UNIT-V

9.	a)	Explain in detail about Clustering methods with an example.	6M
	b)	Explain in detail about partitional Clustering method.	6M
		(OR)	
10.	a)	Explain Agglomerative hierarchical clustering.	6M
	b)	Discuss divisive hierarchical clustering.	6M

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AR13

CODE: 13EC3020 SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

DIGITAL SIGNAL PROCESSING

(Electronics & Communication Engineering)

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

PART-A

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

1. a) Calculate the energy of the signal $x(n)= (1/2)^n u(n)$
   b) What is the condition for stability of any discrete time system?
   c) What is the relationship between DFT and Z-Transform
   d) What is ROC in Z-Transforms?
   e) What is the relation between analog and digital frequencies in bilinear transformation method?
   f) How transposed form structure is realised in an IIR system?
   g) Find the DFT of the sequence x(n)={1,1,0,0}
   h) What is Gibbs phenomenon?
   i) What is anti-aliasing filter and where is it employed?
   j) Explain about direct addressing mode in DSP processors

PART-B

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

UNIT-I

2. a) Define the terms: linearity, time invariance and causality for a discrete time system with suitable examples for each. 6M
   b) Determine the free response of the system described by the differential equation given below with initial conditions y(-1) =1 and y(-2) =0 6M
   y(n)- 5/6 y(n-1) + 1/6 y(n-2)= x(n)

(OR)

3. a) Determine whether each of the following systems defined below is 8M
   (i) casual (ii) linear (iii) dynamic (iv) time invariant
   (i) $y(n) = \log_{10}[\{x(n)\}]$ (ii) $y(n) = x^2(n) + \frac{1}{x^2(n-1)}$
   b) Give the frequency domain representation of discrete time signals. 4M

UNIT-II

4. a) State and prove any two properties of Z-Transforms 6M
   b) Determine the 8 point DFT of the sequence x(n)={1,2,3,4,4,3,2,1} using radix-2 DIT FFT Algorithm 6M

(OR)

5. a) Derive the equation to implement a butterfly structure In DIFFFT algorithm. 8M
   b) Compute the IDFT of the sequence X(k)={4,-2j,0,2j}using radix 2 FFT algorithm 4M

UNIT-III

6. Realize the following IIR system functions in the direct form I and II and also parallel form $H(z)=\frac{3z^3-5z^2+9z-3}{[z-\frac{1}{2}][z^2-z+\frac{1}{3}]}$ 12M

(OR)

7. Design a digital Butterworth filter that satisfies the following constraint using bilinear transformation. Assume T=1sec. 12M

$$0.9 \le /H(w)/ \le 1; 0 \le w \le \frac{\pi}{2}$$

$$/H(w)/ \le 0.2; \frac{3\pi}{4} \le w \le \pi$$

UNIT-IV

8. a) Prove that FIR filter has linear phase if the unit impulse response satisfies the condition h(n)=h(N-1-n), n=0,1,…N-1. Also discuss symmetric and antisymmetric cases of FIR filter. 8M
   b) Compare FIR and IIR Digital filters. 4M

(OR)

9. With necessary derivations explain the operation of sampling rate conversion by a factor of I/D in both frequency and time domains. 12M

UNIT-V

10. a) Describe any three data addressing modes of programmable DSP's 6M
    b) Explain the concept of On chip memory in TMS320C5X processors 6M

(OR)

11. Draw and explain the internal architecture of the TMS320C5X Processor. 12M

AR18

CODE: 18CET316 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech II Semester Supplementary Examinations, September-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) Describe, in brief, various geophysical methods. Discuss their limitations and uses. 6M
   b) Discuss the various methods for determining the level of the ground water table 6M

(OR)

2. a) How would you conduct an in-situ vane shear test? What is it uses? 6M
   b) What do you understand by site investigation? What are the different purposes for which the site investigations are done? 6M

UNIT-II

3. a) List out the various important assumptions involved in Coulomb's and Rankine's earth pressure theories. 6M
   b) Derive the equation for FS of infinite slope in a purely cohesive soil. 6M

(OR)

4. a) Discuss different types of failure surfaces that can be considered in slope stability Analyses. 6M
   b) What are the different types of Factor of safeties considered in slope stability analyses? And explain. 6M

UNIT-III

5. a) Define lateral earth pressure, explain culmann's graphical construction for active pressure and write the steps involved in construction of culmann's graphical method. 6M
   b) A retaining wall of 8 m high retains cohesionless soil (backfill) with an angle of internal friction 30^0. The backfill surface is level with the top of the wall. The unit weight of the top 3 m of the fill is 19 kN/m^3 and that of the rest is 20 kN/m^3. Water table is at the surface level of the backfill. Find the magnitude and point of application of the active thrust. 6M

(OR)

6. a) Determine the distribution of active earth pressure and total active force acting on a 6 m high smooth wall with sand as backfill. The sand properties are $\phi = 32°$, $\gamma = 18$ kN/m^3; $\gamma_{sat} = 21$ kN/m3. Water level behind the wall is at 3 m below the Sand surface. 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 1.9t/m^3, 30° and zero respectively. Estimate the magnitude and point of application of the total active pressure per meter length of the wall. 6M

UNIT-IV

7. a) Bring out clearly the effect of ground water table on the safe bearing capacity 5M

b) Determine the safe bearing capacity of a square footing 2.1 m X 2.1 m placed at a depth of 1.5 m in a soil with a moist unit weight of 17.5kN/m^3, c = 15kPa and ø = 20°. Take Nc=11.8, Nq = 3.9 and Nγ = 1.7. What is the change in safe bearing capacity if the water table rises to 0.5 m above footing base if FS = 3. a).1.5 m wide strip foundation 7M

(OR)

8. a) Explain the Terzaghi's bearing capacity theory with assumptions 4M

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 lengthwise. If c = 10 kPa, ø= 25°, γ=16kN/m3, 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. 8M

UNIT-V

9. a) A reinforced concrete pile 9 m long and 0.38 m in diameter is embedded in saturated clay of very stiff consistency. Laboratory tests on samples of undisturbed soil gave an average undrained cohesive strength c_u = 120 kN/m^2. Determine the allowable axial capacity with Fs=3. α= 0.9. 6M

b) Explain briefly about various types of piles. 6M

(OR)

10. a) A group of 16 piles of 50 cm diameter is arranged with a centre to centre spacing of 1.0 m. The piles are 9 m long and are embedded in soft clay with cohesion 30 kN/m^2.Bearing resistance may be neglected for the piles. Adhesion factor is 0.6. Determine the ultimate load capacity of the pile group. 6M

b) A rectangular pile group consisting of 12 piles of 400mm diameter and 4.5m length is installed in a saturated clay deposit (C_u= 50kN/m^2, γ =20kN/m^3) the piles are space at 1.3m C/C. Estimate allowable load capacity of pile group?. 6M

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