AR20

CODE: 20MET312 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech II Semester Supplementary Examinations, August, 2023

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

		Marks	CO	Blooms Level
	UNIT-I			
1.	A cam rotating clockwise at a uniform speed of 1000 r.p.m. is required to give a roller follower the motion defined below: 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.	10M	CO1	L3
	(OR)			
2.	A cam is to be designed for a knife edge follower with the following data: 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. if the cam rotates at 240 r.p.m	10M	CO1	L3
	UNIT-II			
3.	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.	10M	CO2	L3
	(OR)			

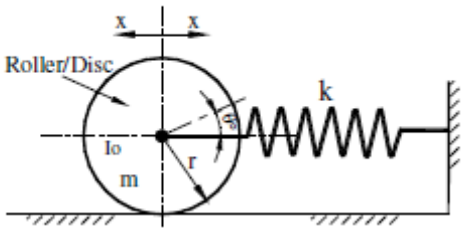
4.		A four crank engine has the two outer cranks set at 120° to each other, and their reciprocating masses are each 400 kg. The distance between the planes of rotation of adjacent cranks are 450 mm, 750 mm and 600 mm. If the engine is to be in complete primary balance, find the reciprocating mass and the relative angular position for each of the inner cranks. If the length of each crank is 300 mm, the length of each connecting rod is 1.2 m and the speed of rotation is 240 r.p.m., what is the maximum secondary unbalanced force ?	10M	CO2	L3

UNIT-III

5.	a)	Deter mine the equation of vibration of the water column in a U-Tube	5M	CO3	L5
	b)	Derive the formula for natural frequency of undamped Free Vibration of mass attached to vertical	5M	CO3	L3

(OR)

6.	a)	Determine the natural frequency of the system shown in figure	5M	CO3	L5



	b)	Discuss about various types of free vibrations.	5M	CO3	L1

UNIT-IV

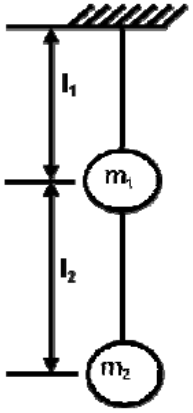
7.	a)	Derive the equation of motion for Natural Frequency of Free Transverse Vibrations	5M	CO4	L3
	b)	A shaft 40 mm diameter and 2.5 m long has a mass of 15 kg per meter length. It is simply supported at the ends and carries three masses 90 kg, 140 kg and 60 kg at 0.8 m, 1.5 m and 2 m respectively from the left support. Taking E = 200 GN/m^2, find the frequency of the transverse vibrations.	5M	CO4	L3

(OR)

8.	a)	A rotor has a mass of 12 kg and mounted midway on a 24 mm diameter horizontal shaft supported at the ends by two bearings. The bearings are 1 m apart. The shaft rotates at 2400 rpm. If the centre of mass of the rotor is 0.11 mm away from the geometric centre of the rotor due to certain manufacturing defect, find the amplitude of the steady-state vibration and the dynamic force transmitted to the bearing.	5M	CO4	L3
	b)	A shaft of length 0.75 m, supported freely at the ends, is carrying a body of mass 90 kg at 0.25 m from one end. Find the natural frequency of transverse vibration. Assume E = 200 GN/m^2 and shaft diameter = 50 mm.	5M	CO4	L5

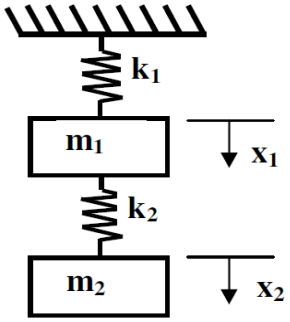
UNIT-V

9.	Derive the frequency equation for a double pendulum shown in figure.6. frequency and mode shapes of the double pendulum $m_1 = m_2 = m$ and $l_1 = l_2 = l_3 = l$.	10M	CO5	L5



(OR)

10.	Obtain the frequency equation for the system shown in Fig. Also determine the natural frequencies and mode shapes when $k_1 = 2k$, $k_2 = k$, $m_1 = m$ and $m_2 = 2m$.	10M	CO5	L5



UNIT-VI

11.	A single cylinder oil engine drives directly a centrifugal pump. The rotating mass of the engine, flywheel and the pump with the shaft is equivalent to a three rotor system. The mass moment of inertia of the rotors is 0.15, 0.3 and 0.09 kg-m^2 respectively. Find the natural frequency of the torsional vibration. The modulus of rigidity for the shaft material is 84 KN/mm^2. The diameter of the uniform shaft is 70mm and the total length of the shaft is 2.5 and the distance between the rotors is 1.5 and 1m.	10M	CO6	L5

(OR)

12.	a)	Discuss about Vibration Isolation & Transmissibility	5M	CO6	L6
	b)	Write in brief about various Vibration controlling strategies	5M	CO6	L1

AR20

CODE: 20HST303 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech II Semester Supplementary Examinations, August, 2023

Managerial Economics and Management Science

(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)	Define demand forecasting. Explain the statistical methods of demand forecasting.	5	CO1	Remember
	b)	Explain the exceptions of law of demand.	5	CO1	Understand
		(OR)			
2.	a)	List out the factors governing the demand forecasting. Discuss.	5	CO1	Remember
	b)	Explain the different types of income elasticity of demand.	5	CO1	Understand
		UNIT-II			
3.	a)	Discuss the difference types of production functions	5	CO2	Analysis
	b)	Write a short note on: i) Actual cost Vs Opportunity cost ii) Explicit cost Vs Implicit cost iii) Incremental cost Vs Sunk cost	5	CO2	Remember
		(OR)			
4.	a)	Write a meaning of law of return to scale and describe with suitable examples.	5	CO2	Remember
	b)	The following information related to a manufacturing firm. Sales Rs.3,00,000/-, Variable Cost Rs.1,20,000/- and Profit Rs.60,000/- Calculate a) P/V ratio b) Break-Even Sales c) Margin of Safety.	5	CO2	Analysis
		UNIT-III			
5.	a)	Define monopolistic competition and its characteristics.	5	CO3	Understand
	b)	Determination of short-run equilibrium price under perfect competition.	5	CO3	Analysis
		(OR)			
6.	a)	What is meant by price discrimination? Explain the condition for price discrimination.	5	CO3	Understand
	b)	Compare difference between market price and normal price.	5	CO3	Analysis
		UNIT-IV			
7.		Explain the 14's principles of management.	10	CO4	Understand
		(OR)			
8.	a)	Explain the importance of management.	5	CO4	Understand
	b)	Explain Maslow's need – Hierarchy Theory of motivation.	5	CO4	Understand
		UNIT-V			
9.	a)	Describe the marketing mix with its basic elements.	5	CO5	Understand
	b)	Outline the basic objectives of making.	5	CO5	Understand
		(OR)			
10.	a)	Classify the various factors effecting the selection of distribution channel.	5	CO5	Understand
	b)	Describe the various phases in product life cycle.	5	CO5	Understand
		UNIT-VI			
11.	a)	Distinguish Managerial functions and Operative functions of personal management.	5	CO6	Apply
	b)	Identify the different techniques in performance appraisal.	5	CO6	Apply
		(OR)			
12.	a)	Select the characteristics of personal management.	5	CO6	Apply
	b)	Differentiate the job evaluation and merit rating	5	CO6	Apply

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CODE: 20EET313 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech II Semester Supplementary Examinations, August,2023

SWITCHGEAR AND PROTECTION

(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)	Discuss the principle of arc interruption in an oil circuit breaker.	5	CO1	Understand
	(b)	Compare the performance and characteristics of minimum oil circuit breaker and air blast circuit breaker.	5	CO1	Analyze
		(OR)			
2.	(a)	Explain the process of 'current chopping' in SF6 breakers.	5	CO1	Remember
	(b)	A CB is rated at 1500 A, 2000 MVA, 33 kV, 3 sec, 3-phase, oil circuit breaker. Determine the rated normal current, breaking current, making current, and short time rating.	5	CO1	Apply
		UNIT-II			
3.	(a)	Describe the characteristics of distance relays and compare their performance.	5	CO2	Understand
	(b)	What are the advantages of static relays over electromagnetic relays, and where are they commonly used?	5	CO2	Remember
		(OR)			
4.	(a)	Explain the principle of operation of an attracted armature relay and its construction.	5	CO2	Understand
	(b)	Compare and contrast Instantaneous, DMT, and IDMT relays in terms of their characteristics and applications.	5	CO2	Analyze
		UNIT-III			
5.	(a)	What are the different types of stator faults that can occur in a generator, and how can they be protected against?	5	CO3	Understand
	(b)	Explain the principle of operation of Restricted Earth Fault (REF) protection and Inter-turn Fault (ITF) protection in generators.	5	CO3	Remember
		(OR)			
6.	(a)	How can transformer protection be improved by using a combination of different protection schemes?	5	CO3	Understand
	(b)	A 6.6 kV, 5 MVA star connected alternator has a reactance of 1.5 ohm per phase and negligible resistance. Merz-Price protection scheme is used which operates when the out of balance current exceeds 25% of the full load current. The neutral of the generator is grounded through a resistance of 8 ohms. Determine the proportion of the winding which remains unprotected against earth fault.	5	CO3	Apply

UNIT-IV

7.	(a)	What is the principle of operation of carrier current protection in a feeder, and how is it implemented?	5	CO4	Understand
	(b)	What is the principle of operation of differential protection in a bus bar, and how is it implemented?	5	CO4	Remember
		(OR)			
8.	(a)	How does overcurrent protection work in a feeder, and what are the different types of overcurrent relays used?	5	CO4	Understand
	(b)	What are the advantages and limitations of using impedance relays for feeder protection?	5	CO4	Remember

UNIT-V

9.	(a)	What is the principle of operation of overvoltage protection, and what are the different types of overvoltage protection devices used in power systems?	5	CO5	Understand
	(b)	Explain the concept of basic impulse level (BIL), and how is it used in insulation coordination?	5	CO5	Understand
		(OR)			
10.	(a)	Explain the principle of operation of valve-type and zinc-oxide lightning arresters, and how do they protect against lightning over voltages?	5	CO5	Analyze
	(b)	What are the different types of voltage-time characteristics, and how do they affect the performance of insulation systems?	5	CO5	Remember

UNIT-VI

11.	(a)	Discuss the advantages and limitations of ungrounded neutral systems, and how do they affect the performance of electrical systems?	5	CO6	Remember
	(b)	Explain the concept of resonant grounding, and how does it differ from other methods of neutral grounding?	5	CO6	Understand
		(OR)			
12.	(a)	How can the effects of ungrounded neutral systems on system performance be mitigated through the use of special protective devices?	5	CO6	Analyze
	(b)	Explain the principle of operation of solid grounding, and how is it implemented in electrical systems?	5	CO6	Understand

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CODE: 20ECT313 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech II Semester Supplementary Examinations, August,2023

MICROPROCESSORS AND MICROCONTROLLERS

(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.		Draw the architecture of 8086 and explain about each block in detail. Also calculate the address of actual data if the data segment starts at location 2500H and the offset address is 25H?	10M	1	Understand
		(OR)			
2.	a.	Explain how data is read from memory in 8086 using timing diagrams?	5M	1	Understand
	b.	Draw the flag register of 8086 and explain about any 3 flags in flag register?	5M	1	Understand
		UNIT-II			
3.	a.	Discuss about any three addressing modes in 8086 with examples?	5M	2	Understand
	b.	Write an ALP to find the largest among the given numbers 50H, 65H, 87H, 98H, 72H using 8086 Instruction Set.	5M	2	Apply
		(OR)			
4.	a.	Discuss about the following instructions with examples i. XCHG ii. LEA	5M	2	Understand
	b.	Write an ALP to find the length of the String "BTECHECE" using 8086 Instruction Set.	5M	2	Apply
		UNIT-III			
5.	a.	Draw the block diagram of 8257 and explain the operation of each block?	5M	3	Understand
	b.	Explain about various modes of 8255?	5M	3	Apply
		(OR)			
6.	a.	Write an ALP to interface 4x4 Keyboard to 8086 using 8255.	5M	3	Understand
	b.	Draw the diagram to interface 8259A to 8086 and explain its operation?	5M	3	Apply
		UNIT-IV			
7.	a.	Explain the operation of 80386 in virtual mode?	5M	4	Understand
	b.	Discuss about Control Registers and System Address Registers in 80386?	5M	4	Understand
		(OR)			
8.	a.	What is paging and explain how paging mechanism is done in 80386.	5M	4	Understand
	b.	Mention any three differences between Pentium processors and 80486?	5M	4	Understand
		UNIT-V			
9.	a.	With the help of Block diagram, explain the working of ARM core data flow model?	5M	5	understand
	b.	Draw the CPSR of ARM and explain about each bit in CPSR?	5M	5	Understand
		(OR)			
10.	a.	Mention the features of ARM processor?	5M	5	Understand
	b.	Explain about three Stage Pipeline in ARM architecture?	5M	5	Understand
		UNIT-VI			
11.		Draw the pin diagram of 8051 and explain the importance of each pin?	10M	6	Understand
		(OR)			
12.	a.	Explain the Internal RAM organization of 8051 Microcontroller	5M	6	Understand
	b.	Write an ALP to multiply the numbers 054H,16H using using 8051 Instruction Set?	5M	6	Understand

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CODE: 20CET313 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech II Semester Supplementary Examinations, August, 2023

FOUNDATION ENGINEERING

(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)	Write the design aspects of a good sampler?	5M	1	2
	b)	Write differences between undisturbed and disturbed soil samples.	5M	1	2
		(OR)			
2.	a)	Write a short note on different samplers.	5M	1	2
	b)	Discuss about methods of Boring.	5M	1	2
		UNIT-II			
3.	a)	Derive the formula for factor safety of c- φ soils for finite slopes using 'Method of slices'.	5M	2	2
	b)	An embankment is inclined at an angle of 35° and its height is 15 m. The angle of shearing resistance is 15° and the cohesion is 20 kN/m^2. The unit weight of soil is 18 kN/m^3. If Taylor's stability number is 0.06, find the factor of safety with respect to cohesion.	5M	2	3
		(OR)			
4.		Explain different types of slope failures and also state its causes?	10M	2	3
		UNIT-III			
5.		A retaining wall with a smooth vertical back is 10m high and retains a two layer sand backfill with the following properties: 0 - 3m depth : c = 0; ø = 20°; bulk unit weight = 17 kN/m^3. Below 3m depth : c = 0; ø = 30°; bulk unit weight = 18 kN/m^3. Show the active earth pressure diagram and determine total active earth pressure and point of application.	10M	3	3
		(OR)			
6.	a)	Explain assumptions in Coulomb's theory of earth pressure.	5M	3	2
	b)	Compute the intensities of active and passive earth pressure at depth of 8 meters in dry cohesionless sand with an angle of internal friction of 30° and unit weight of 18kN/m^3. What will be the intensities of active and passive earth pressure if the water level rises to the ground level? Take γsat= 22kN/m^3.	5M	3	3
		UNIT-IV			
7.		With the help of neat sketches, explain different types of shallow foundation.	10M	4	2
		(OR)			

8.	a)	A strip footing, 1m wide at its base, is located at a depth of 0.8m below the ground surface. The properties of the foundation soil are: γ= 18kN/m^3, c=30kN/m^2 and φ=20°. Determine safe bearing capacity using Terzaghi's analysis. Assume that soil fails by local shear. (Take F.S=3.0, Nc=11.8, Nq=3.9 and Nγ=1.7).	5M	4	3
	b)	Explain in detail the methods for determining safe bearing pressure based on N-value.	5M	4	2
		UNIT-V			
9.	a)	Explain Indian standard method of conducting a pile load test with a sketch. How do you estimate safe load carrying capacity from the results of the pile load test?	5M	5	2
	b)	Illustrate Hiley's formula to determine allowable load on the pile and explain the terms in it.	5M	5	2
		(OR)			
10.		A group of 9 piles with 3 piles in a row was driven into soft clay extending from ground level to a great depth. The diameter and length of piles were 30cm and 10m respectively. The unconfined compressive strength of the clay is 70kN/m^2. If the piles were spaced at 90cm center to center, compute the allowable load of the pile group on the basis of shear failure. Neglect bearing at tip of piles. Take F.S=2.5 and m=0.6.	10M	5	3
		UNIT-VI			
11.		Explain in detail construction and Sinking of wells and shapes of wells.	10M	6	2
		(OR)			
12.	a)	Explain the various components of a well foundation with help of a neat sketch.	5M	6	2
	b)	Write a brief note on tilts and shifts. Discuss the remedial measures to control tilts and shifts.	5M	6	2

AR18

CODE: 18MET315 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech II Semester Supplementary Examinations, August, 2023

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 operating a knife-edged follower has the following data : 12M
(*a*) Follower moves outwards through 40 mm during 60° of cam rotation.
(*b*) Follower dwells for the next 45°.
(*c*) Follower returns to its original position during next 90°.
(*d*) Follower dwells for the rest of the rotation.
The displacement of the follower is to take place with simple harmonic motion during both the outward and return strokes. The least radius of the cam is 50 mm. Draw the profile of the cam when the axis of the follower passes through the cam axis,If the cam rotates at 300 r.p.m., determine maximum velocity and acceleration of the follower during the outward stroke and the return stroke.

(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. Four masses *A*, *B*, *C* and *D* revolve at equal radii and are equally spaced along a shaft. 12M
The mass *B* is 7 kg and the radii of *C* and *D* make angles of 90° and 240° respectively with the radius of *B*. Find the magnitude of the masses *A*, *C* and *D* and the angular position of *A* so that the system may be completely balanced.

(OR)

4. An inside cylinder locomotive has its cylinder centre lines 0.7 m apart and has a stroke 12M
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 the fluctuation in rail pressure under one wheel, variation of tractive effort and the magnitude of swaying couple at a crank speed of 300 r.p.m.

UNIT-III

5. a) A spring-mass system with mass *m* kg and stiffness *k* N/m has a natural frequency of 1Hz. Determine the value of stiffness *k*1 of another spring which when arranged in conjunction with spring of stiffness *k* in series will lower the natural frequency by 20% and in parallel will raise the natural frequency by 20%. 6M

   b) Determine the value of 'c' for the system described by the following equation to be critically damped. $5\ddot{x}+c\dot{x}+2000x=0$ 6M

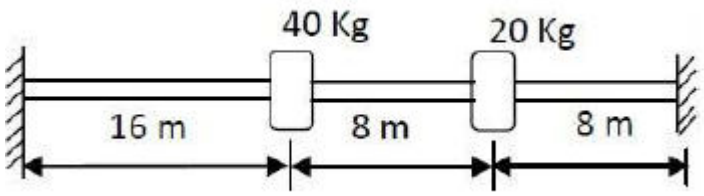
(OR)

6. a) An undamped single-degree-of-freedom system has a mass of 1 kg and a stiffness of 2500 N/m. Find the magnitude and the phase of the response of the system when the initial displacement is -2 mm and initial velocity of 100 mm/s. 6M

   b) A spring-mass-dashpot system consists of a spring of stiffness 343 N/m. The mass is 3.43 kg. The mass is displaced 2 cm beyond the equilibrium position and released. Formulate the equation of motion for the system, if the damping coefficient of the dash pot is equal to 137.2 N-sec/m 6M

UNIT-IV

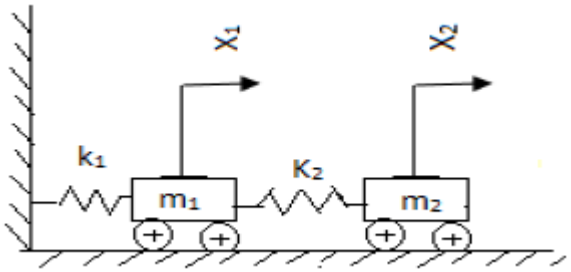
7. a) Find the natural frequency of transverse vibrations for the system shown below by Rayleigh method. Take E=1.96 x 10^{11} N/m2, I=10^{-6} m4 7 M



   b) Explain with a neat sketch the working of vibrometer. 5M

(OR)

8 Find the natural frequencies and first two principal mode shapes of the system shown. Assume k1=k2=k and m1=m2=m. 12M

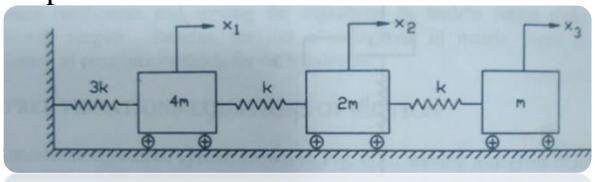


UNIT-V

9 Derive the natural frequency of a torsional vibration of a shaft attached with disk at its end having a mass 'm' . 12M

(OR)

10. For three degree of freedom system shown, obtain three natural frequencies and corresponding mode shapes. 12M



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AR18

CODE: 18EET314 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech II Semester Supplementary Examinations, August, 2023

SWITCHGEAR AND PROTECTION

(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 various methods of arc extinction in a circuit breaker. 6M
   b) Briefly explain the following 6M
   (i). Circuit Breaker Ratings (ii). Circuit interruption problems

(OR)

2. a) Discuss the operation of SF6 circuit breaker. 4M
   b) In a power system the r.m.s voltage is 38.1kV, inductance is 10mH and capacitance is 0.02μF. Determine (i) restrikining voltage across the circuit breaker (ii) frequency of restriking voltage transient (iii) average rate of restriking voltage up to peak restriking voltage and (iv) maximum RRRV. 8M

UNIT-II

3. a) Explain the principal of operation of Differential relays with neat sketch. 6M
   b) Distinguish between directional relays and differential relays. 6M

(OR)

4. a) A relay is connected to 400/5 ratio current transformer with current setting of 150%. Calculate the plug setting multiplier when circuit carries a fault current of 4000A. 4M
   b) Explain different types of electromagnetic relays and their field of applications 8M

UNIT-III

5. a) Suggest the protective device used for the protection of an alternator against overheating of its (i) Stator (ii) rotor? Explain them briefly. 7M
   b) Explain “Earth fault protection for transformer”. 5M

(OR)

6. a) Describe protection scheme of an alternator against inter-turn fault. 5M

   b) A star connected, 3 phase 10MVA, 6.6kV alternator is protected by Merz-price circulating current principle using 1000/5 amperes current transformers. The star point of the alternator is earthed through a resistance of 7.5Ω. If the minimum operating current for the relay is 0.5A, calculate the percentage of each phase of the stator winding which is unprotected against earth-faults when the machine is operating at normal voltage. 7M

UNIT-IV

7. a) Explain the different bus-bar arrangements possible in a substation? 6M

   b) Explain the principle of operation of duplicate bus-bar system in a substation with single line diagram. 6M

(OR)

8. a) What is the necessity of bus-bar protection? How bus-bar protection scheme is stabilized? 6M

   b) Explain the three zone distance relay protection. 6M

UNIT-V

9. a) Explain the phenomenon of "arcing grounds" on overhead transmission lines. How does neutral earthling oppose arcing ground currents? 6M

   b) A 220kV,3phase, 50Hz, 250Km transmission line has a capacitance to earth of 0.04 μF/phase. Find the inductance and KVA rating of the Peterson coil used for earthling the above system. 6M

(OR)

10. a) What are the merits and demerits of reactance earthling compared to solid earthling? 4M

    b) Explain the following briefly 8M
    (i) Causes of over voltages
    (ii) Function of surge arresters
    (iii) Requirements of a ground wire for efficient protection.
    (iv) valve type arrester

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AR18

CODE: 18ECT315 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech II Semester Supplementary Examinations, August,2023

MICROPROCESSORS AND MICROCONTROLLERS

(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)	Draw and explain 8086 Internal Architecture.	6 M
	b)	Explain about Various Addressing modes.	6 M
		(OR)	
2.	a)	Draw and Explain Interrupt Vector Table.	6 M
	b)	Draw and Explain Timing Diagram of 8086 Minimum Mode.	6 M

UNIT-II

3.	a)	Explain about Different Data Transfer Instructions.	6 M
	b)	Write an Assembly Language Program for i) 8-Bit Addition ii) 16- Bit Addition using 8086 instruction set.	6 M
		(OR)	
4.	a)	Define Procedure? Explain about Re entrant and Recursive Procedures	6 M
	b)	Explain about Different Branch Instructions	6 M

UNIT-III

5.		Draw and Explain 8255 PPI	12 M
		(OR)	
6.	a)	Explain about 8251 USART	6 M
	b)	Draw and explain 8259A PIC	6 M

UNIT-IV

7.		Explain 80386 Microprocessor a) real mode b) protected mode c) segmentation d) paging concepts.	12 M
		(OR)	
8.	a)	Explain Register organization of ARM Processor	6 M
	b)	Explain about Interrupts in ARM Processor	6 M

UNIT-V

9.		Draw and Explain 8051 Microcontroller	12 M
		(OR)	
10.	a)	Explain Memory Organization of 8051 Microcontroller.	6 M
	b)	Explain about Interrupts in 8051 Microcontroller.	6 M

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AR18

CODE: 18CET316 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech II Semester Supplementary Examinations, August, 2023

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) Discuss with neat sketches any two boring methods used in soil exploration. 6 M
   b) Sketch a split-spoon sampler and explain its parts. 6 M

(OR)

2. a) Explain methods of soil exploration? 6 M
   b) Write a brief note on wash borings. 6 M

UNIT-II

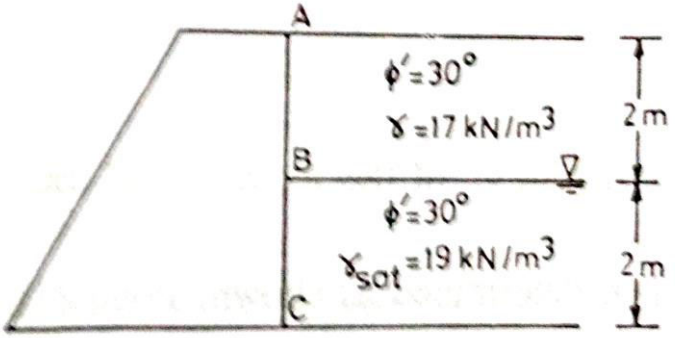
3. a) Explain factors of safety with respect to cohesion and friction. 6 M
   b) Explain Causes of slope failure. 6 M

(OR)

4. a) Discuss the uses of stability charts. 6 M
   b) Swedish Circle Method For Analyzing The Slope Stability 6 M

UNIT-III

5. a) Explain Culmann's graphical method and also it's advantage. 6 M
   b) Determine earth pressure at rest per unit length of the wall as show in figure. Also determine the location of the resultant earth pressure. Take $K_0 = 1 - \sin\phi$ and $\Upsilon_w = 10\ kN/m^3$. 6 M



(OR)

6. a) Explain different types of lateral earth pressure. 6 M
   b) Explain in detail earth pressure at rest. 6 M

UNIT-IV

7. a) Explain IS code method for determining soil bearing capacity 6 M
   b) Design a reinforced cement concrete footing for a 1m wide concrete wall carring a load of 800 KN/m. The allowable soil pressure is 200 KN/m^2. 6 M

(OR)

8. a) Explain the differences between local and general shear failures and factors considered for their identification. 6 M
   b) Explain types of shallow foundations. 6 M

UNIT-V

9. a) What are the different shapes of well sketch neatly? 6 M
   b) How do you determine the group efficiency of piles? 6 M

(OR)

10. a) A square concrete file (35cm x 35 cm) is driven in to a homogeneous sand layer ($\phi = 30^0$, $\Upsilon = 17$ KN/m^3) for depth of 10 m. Calculate ultimate load. Use Meyerhof's method. Take k= 1.3 and $\delta = 18^0$. 6 M
    b) Explain the concept of negative skin friction. 6 M

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AR16

CODE: 16CE3018 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech II Semester Supplementary Examinations, August, 2023

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) Explain in brief about the following types of sampling methods. [7M]
   i. Piston sampler
   ii. Rotary sampler
   b) With an aid of neat sketch, explain the procedure for conducting plate load test. [7M]

(OR)

2. a) Explain in brief about standard penetration test. What are the corrections to be applied for N value? [7M]
   b) Discuss about the site investigation report. [7M]

UNIT-II

3. a) Derive an equation for determining the stability of an infinite slope in cohesion-less soil under dry condition. [7M]
   b) An infinite slope of 8 m high is inclined at an angle of 30^o. The slope was made with a soil having c' = 25 kN/m^2, $\phi = 15°$, γ_{sat} = 19 kN/m^3. Determine the critical height of the infinite slope for steady seepage condition and submerged condition. Write a comment on stability of embankment. [7M]

(OR)

4. a) Discuss about Bishop's method for stability of finite slopes with a neat sketch. [10M]
   b) An embankment constructed with an inclination of 35^0 and its height is 15 m. The angle of shearing resistance is 15^0, cohesion intercept is 20 kN/m^2 and saturated unit weight of soil is 18.0 kN/m^3. If the embankment was fully submerged, then find the factor of safety with respect to cohesion. [4M]
   For i = 35^0 and $\phi = 15^0$, take S_n = 0.06.

UNIT-III

5. a) Explain the Culmann's graphical method for determining the active thrust acting on a retaining wall. [7M]
   b) A retaining wall of 8 m high with a smooth vertical back used to retain an inclined backfill, which is making an angle of 12° with the top of retaining wall. The soil having c = 35 kN/m^2, $\phi = 20°$, γ = 17.5 kN/m^3. Determine the total passive earth pressure and point of application on the retaining wall. [7M]

(OR)

6. a) Explain in brief about Coulomb's wedge theory with a neat sketch. [7M]
   b) A vertical gravity retaining wall retains 10 m of a backfill, having ϕ = 25°, γ = 17.7 kN/m^3 and γ_{sat} = 19 kN/m^{3}with a uniform horizontal surface. The water table is at a depth of 6 m from the backfill surface. Determine the magnitude and point of application of the total active pressure. [7M]

UNIT-IV

7. a) What is a shallow foundation? Explain in brief about various types of shallow foundations. [8M]
   b) Determine the ultimate bearing capacity of a strip footing of 2 m width with its base at a depth of 1.5 m for the following conditions [6M]
      i) W.T is at a depth of 1 m from ground surface
      ii) W.T is at a depth of 3 m from ground surface.

   The properties of soil are c = 35 kN/m^2, ϕ = 15^o, γ = 16.5 kN/m^3 and γ_{sat} = 18 kN/m^3.
   (For ϕ= 15^o, N_c = 12.9, N_q = 4.4 and N_γ = 2.5)

(OR)

8. a) A square footing of size 1.5 m x 1.5 m was planned to construct in a sand deposit at a depth of 1.0 m from the ground surface. The soil is having c = 0, ϕ = 35^o, γ = 19 kN/m^3. Determine the net safe bearing capacity of soil. Also, determine the safe allowable load carried by the foundation. [8M]
   (For ϕ= 35^o, N_c = 57.8, N_q = 41.4 and N_γ = 42.4)
   b) Explain Terazghi's bearing capacity theory and state assumptions. [6M]

UNIT-V

9. a) Explain how load carrying capacity of pile foundations can be calculated from following dynamic pile formulae [7M]
      i. Engineering News formula
      ii. Modified Hiley formula
   b) A concrete pile, 30 cm diameter and is driven into sand (ϕ= 30^o and γ = 21 kN/m^3, k = 1 and tan δ = 0.70) up to a depth of 10 m. Estimate the safe load, taking a factor of safety of 2.5. (For ϕ= 30^o, D_c/B = 7.5 and N_q= 25). [7M]

(OR)

10. a) Explain briefly about group action of piles. How the load carrying capacity of pile group is estimated. [8M]
    b) Write a short note on following terms [6M]
       i. Negative skin friction
       ii. Routine pile load test

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AR16

CODE: 16ME3019 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech II Semester Supplementary Examinations, August, 2023

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. Cam with 30 mm as minimum diameter is rotating clockwise at a uniform speed of 900 rpm and has to give the motion to the roller follower 15mm diameter as defined below: 14M
   - Follower to complete outward stroke of 35mm during 900 of cam rotation with l uniform velocity
   - Follower to dwell for 900 of cam rotation.
   - Follower to return to its initial position during 600 of cam rotation with SHM.
   - Follower to dwell for the remaining of cam rotation.

   Layout the cam profile when the roller follower axis passes through the axis of the cam.
   Determine maximum velocity and acceleration of the follower during the outward stroke and the return stroke.

(OR)

2. Draw the profile of a cam to give the following motion to the reciprocating follower with a knife edge: 14M
   i) Follower to move outward through a distance of 30mm during 90^0 of cam rotation.
   ii) Follower to dwell for the next 60^0 of cam rotation.
   iii) Follower to return to its initial position during 90^0 of cam rotation.
   iv) Follower to dwell for the remaining 120^0 of cam rotation.

   The minimum radius of the cam is 30 mm and the knife edge of the follower is at right angle to the line of stroke of the follower. The outward and return strokes of the follower are to take place with Uniform velocity.

UNIT-II

3. a) Explain the method of balancing of different masses revolving in the same plane. 4 M

   b) A, B, C and D are four masses carried by a rotating shaft at radii 100 mm, 150 mm, 150 mm and 200 mm respectively. The planes in which the masses rotate are spaced at 500 mm apart and the magnitude of the masses B, C and D are 9 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. 10 M

(OR)

4. a) What is meant by Static and Dynamic balancing Out line its role in Machines 4 M

   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 M

UNIT-III

5. a) Determine the natural frequency of a vertical spring mass vibrating system 6 M

   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 i. critical damping coefficient, ii. damping factor, iii. Logarithmic decrement 8 M

(OR)

6. a) Explain the term ‘whirling speed’ or critical speed of a shaft. Prove that the whirling speed for a rotating shaft is the same as the frequency of natural transverse vibration 6 M

   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 8 M

UNIT-IV

7. a) Explain Free, Damped and Force Vibrations with examples. 6 M

b) A Machine runs at 4000 rpm. Its forcing frequency is very near to its natural frequency. If the nearest frequency of the machine is to be at least 15% from the forced frequency, design a suitable vibration absorber for the system. Assume the mass of the machine as 40 kg. 8 M

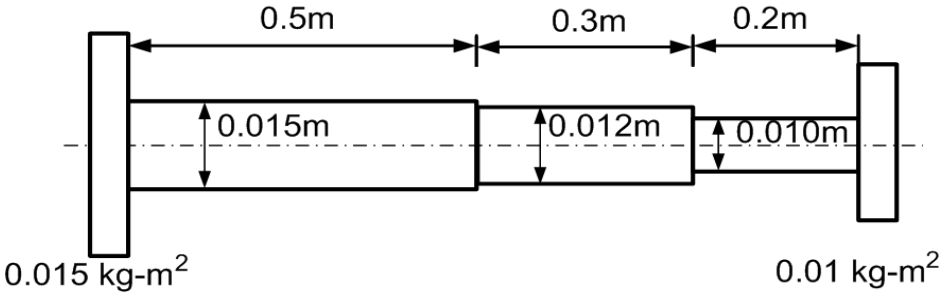
(OR)

8. A 75 kg machine is mounted on springs of stiffness $k=11.76\times10^6$ N/m with a damping factor of 0.2. A 2 kg piston within the machine has a reciprocating motion with a stroke of 0.08 m and a speed of 3000 rpm. Assuming the motion of the piston to be harmonic, determine the amplitude of vibration of machine and the vibratory force transmitted to the foundation 14 M

UNIT-V

9. a) Derive the equation to determine the natural frequency of single rotor system 4 M

b) Consider a stepped shaft with two discs as shown in Fig. The following shaft dimensions are to be taken: $l_1 = 0.5$m, $l_2 = 0.3$m, $l_3 = 0.2$m, $d_1 = 0.015$m, $d_2 = 0.012$m, $d_3 = 0.01$m. Take the modulus of rigidity of the shaft as 0.8×10^{11} N/m. Discs have polar mass moment of inertia as 0.015 kg-m^2 and 0.01 kg-m^2. Obtain natural frequencies and the location of the node. 10 M



(OR)

10. A Flywheel is mounted on a vertical shaft as shown in fig. The both ends of a shaft are fixed and its diameter is 50 mm. The flywheel has a mass of 500 Kg and its radius of gyration is 0.5m. Find the natural frequency of torsional vibrations, if the modulus of rigidity for the shaft material is 80 N/m^2. 14 M