

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

Answer ONE Question from each Unit

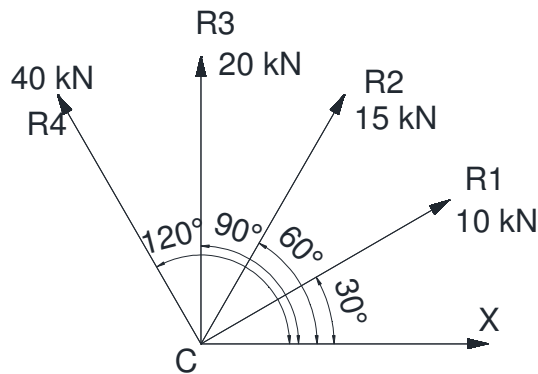
All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

Marks	CO	Blooms Level
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1. Four forces of magnitude 10 kN, 15 kN, 20 kN and 40 kN are acting at a point C as shown in figure. The angles made by forces 10 kN, 15 kN, 20 kN and 40 kN with X-axis are 30° , 60° , 90° and 120° respectively. Find the magnitude and direction of the resultant force.

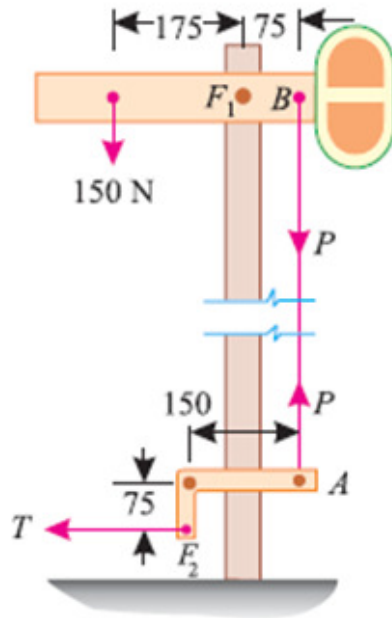
**(OR)**

2. Three forces of $2P$, $3P$ and $4P$ act along the three sides of an equilateral triangle of side 100 mm taken in order. Find the magnitude and direction of the resultant force.

UNIT-II

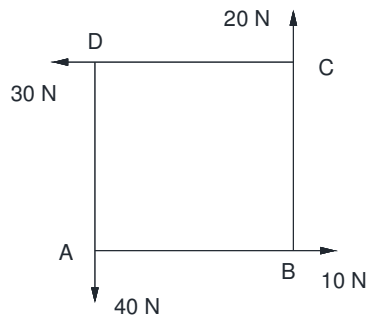
Marks	CO	Blooms Level
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3. Find the tension required in the operating wire to raise the signal through the system of levers as shown in Figure. All dimensions are in mm.



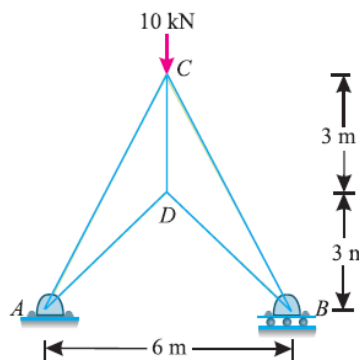
(OR)

4. Four forces of magnitudes 10 N, 20 N, 30 N and 40 N are acting respectively along the four sides of a square ABCD as shown in figure. Determine the magnitude, direction and position of the resultant force. 10M CO2 L1



UNIT-III

5. A frame of 6 m span is carrying a central load of 10 kN as shown in figure. Determine the magnitude and nature of forces in all the members of the structure and tabulate the results.



Marks	CO	Blooms
		Level
10M	CO3	L5

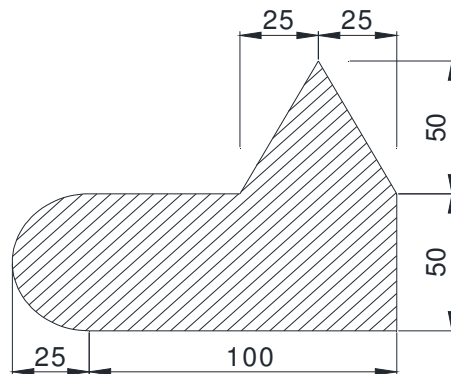
(OR)

6. An effort of 200 N is required just to move a certain body up an inclined plane of angle 15° the force acting parallel to the plane. If the angle of inclination of the plane is made 20° the effort required, again applied parallel to the plane, is found to be 230 N. Determine the weight of the body and the coefficient of friction. 10M CO3 L4

UNIT-IV

Marks CO Blooms
Level

7. A uniform lamina shown in figure consists of a rectangle, a semicircle and a triangle. Determine the centroid of the lamina. All dimensions are in mm. 10M CO4 L3



(OR)

8. Derive the expression for moment of inertia of a triangle whose base 'b' and height 'h' about centroidal X-X axis parallel to its base. 10M CO4 L6

UNIT-V

Marks CO Blooms
Level

9. The equation of motion of a particle moving in a straight line is given by : $s = 18t + 3t^2 - 2t^3$, where (s) is in metres and (t) in seconds. Find (1) velocity and acceleration at start (t=0), (2) time, when the particle reaches its maximum velocity and (3) maximum velocity of the particle. 10M CO5 L2

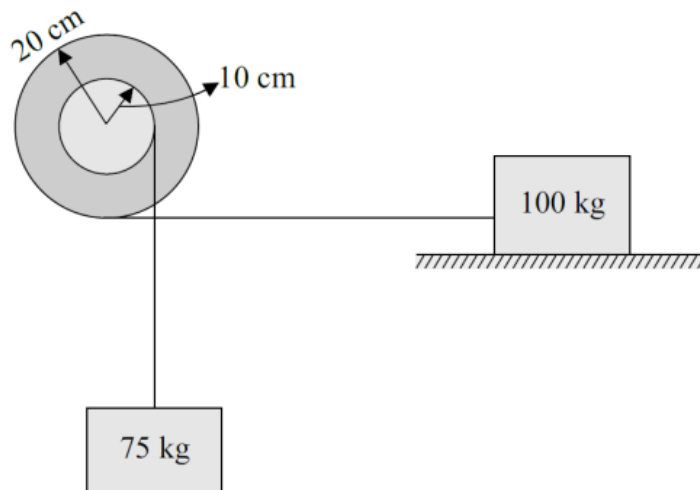
(OR)

10. A particle is thrown with a velocity of 5 m/s at an elevation of 60° to the horizontal. Find the velocity of another particle thrown at an elevation of 45° which will have (a) equal horizontal range, (b) equal maximum height, and (c) equal time of 10M CO5 L2

UNIT-VI

Marks	CO	Blooms Level
10M	CO6	L2

11. Determine the coefficient of friction between the 100 kg block and floor to maintain equilibrium of the system shown in Figure.

**(OR)**

- | | | | | |
|---------|---|----|-----|----|
| 12. (a) | State the Work – Energy principle. | 2M | CO6 | L1 |
| (b) | Derive the expression for Work – Energy principle | 8M | CO6 | L6 |

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

- | | | Marks | CO | Blooms Level |
|-------|---|-------|-----|---------------|
| 1. a) | Derive the EMF Equation in DC generator | 5 | CO1 | Understanding |
| b) | A 4 pole DC generator of armature is lap-wounded. The core length = 30 cm, Diameter = 40 cm, total conductor = 500, speed = 1200 rpm, maximum flux density of 0.5 T. Find the generated voltage | 5 | CO1 | Apply |

(OR)

- | | | | | |
|-------|--|---|-----|-------------|
| 2. a) | Classify the DC generator based on the Excitation with neat sketches | 6 | CO1 | Remembering |
| b) | Explain principle operation of DC generators | 4 | CO1 | Remembering |

UNIT-II

- | | | Marks | CO | Blooms Level |
|-------|---|-------|-----|---------------|
| 3. a) | Explain internal and external characteristics of series generator. | 5 | CO2 | Understanding |
| b) | A 2000 KW, 400 V, 14-pole d.c. machine has a lap –wounded armature with 1100 conductors. The pole arc to pole pitch is 0.7. Compute the number of pole face conductor of the compensating winding in each pole, so as to obtain the uniform air gap flux under pole faces | 5 | CO2 | Apply |

(OR)

- | | | | | |
|-------|--|---|-----|---------------|
| 4. a) | Obtain the open circuit characteristics of a DC shunt generator with neat circuit diagram | 5 | CO2 | Understanding |
| b) | The open circuit characteristics for a d.c shunt generator at 800 rpm is given by following data, find the critical field resistance | 5 | CO2 | Apply |

If amp	0	0.2	0.40	0.65	1.02	1.75	3.15	5.00
Ea volts	10	40	80	120	160	200	240	260

UNIT-III

- | | | Marks | CO | Blooms Level |
|-------|--|-------|-----|---------------|
| 5. a) | Explain speed – torque characteristics of a DC shunt motor | 5 | CO3 | Understanding |
| b) | A 220 V, 100A, 1500 rpm short shunt compound motor, the armature, series and shunt winding have resistance of 0.25, 0.15, and 50 respectively. Find the electromagnetic torque developed | 5 | CO3 | Apply |

(OR)

- | | | | | |
|-------|--|---|-----|-------------|
| 6. a) | Explain the applications of series, shunt, compound motors | 5 | CO3 | Remembering |
| b) | A 6 pole DC motor has 350 conductors and each conductor is capable of carrying a current of 50 A. the flux per pole per pole is 0.015 wb and it is drive at speed of 1500 rpm. Compute the Electromagnetic torque developed. If the winding is Lap winding | 5 | CO3 | Apply |

<u>UNIT-IV</u>		Marks	CO	Blooms Level
7.	a) Explain the efficiency calculation of the two identical DC series machines by conducting field test with neat circuit diagram	5	CO4	Understanding
	b) A DC shunt motor takes an armature current of 50 A at its rated voltage of 240 V. Its armature circuit resistance is 0.2 ohms, if an external resistance of 1 ohms is inserted in series with armature and the field flux remain unchanged , then calculate percentage change in speed for half of the load torque	5	CO4	Apply
(OR)				
8.	a) Why starter is required for DC motor and explain the parts of three point starter with neat sketch	10	CO4	Understanding
<u>UNIT-V</u>		Marks	CO	Blooms Level
9.	a) Derive the EMF equation in transformers	5	CO5	Remembering
	b) A 440/220V, 2 KVA, 50 Hz, 1-ph.transformer has no load primary current is 0.8 A with power factor of 0.2 lag. The full load is applied on secondary with power factor 0.8 lag. Find the primary current ant its power factor.	5	CO5	Apply
(OR)				
10.	a) Draw and explain the phasor diagram of the transformer with R, RL loads.	5	CO5	Remembering
	b) A 5 KVA transformer has core loss of 40 W and full load copper loss is 120 W. the daily variation of the load is given 7 AM to 1 PM : 3 KVA at pf of 0.6 1 PM to 6 PM : 2 KVA at pf of 0.8 6 PM to 7 AM : No Load Determine the all day efficiency of the Transformer	5	CO5	Apply
<u>UNIT-VI</u>		Marks	CO	Blooms Level
11.	Explain the procedure for calculating efficiency and regulation by conducting Sumpners test.	10	CO6	Remembering
(OR)				
12.	Explain the procedure for conducting OC and SC test on a given single phase transformer to determine regulation and efficiency.	10	CO6	Understanding

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

<u>UNIT-I</u>			Marks	CO	Blooms Level
1.	a)	Illustrate the different types of loops available in Python with flowcharts.	5	1	3
	b)	Develop a program to check whether the given number is Strong number or not.	5	1	1
(OR)					
2.	a)	Explain how to run the python scripts?	5	1	2
	b)	Define Expression and explain its order of evaluation.	5	1	1
<u>UNIT-II</u>			Marks	CO	Blooms Level
3.	a)	Define list. Recall the various methods performed on it.	5	2	1
	b)	Write a python program to remove duplicates from the list	5	2	6
(OR)					
4.	a)	Classify the built-in functions in python	5	2	2
	b)	Define Dictionary. Recall the various methods performed on it.	5	2	1
<u>UNIT-III</u>			Marks	CO	Blooms Level
5.	a)	Explain the concept parameter passing in python	5	3	2
	b)	Write a program to read and displays the content of the file	5	3	6
(OR)					
6.	a)	Define file. Recall the different type of I/O operations	5	3	1
	b)	Construct a program to find GCD of two numbers	5	3	6
<u>UNIT-IV</u>			Marks	CO	Blooms Level
7.	a)	Discuss about namespace in python.	5	4	2
	b)	Write a python program to define a module to find Fibonacci Numbers and import the module to another program.	5	4	1
(OR)					
8.	a)	What is module? How to importing module in python.	5	4	3
	b)	Explain different Module Built-in Functions in python.	5	4	2
<u>UNIT-V</u>			Marks	CO	Blooms Level
9.	a)	Create Classes in python with examples and explain Instance Methods	5	5	3
	b)	Recall the principles of Object Oriented Programming.	5	5	1
(OR)					
10.	a)	Describe how method overriding is achieved in inheritance.	5	5	2
	b)	Write a program to define a class, which have a class parameter and have a same instance parameter.	5	5	1
<u>UNIT-VI</u>			Marks	CO	Blooms Level
11.	a)	Discuss the following methods supported by compiled regular expression objects. a) search() b) match() c) findall()	5	6	2
	b)	Write the python programs to implement Re.findall, re.split, re.sub	5	6	2
(OR)					
12.	a)	Write about Special Symbols and Characters in python Regular expressions	5	6	2
	b)	Consider a file "abc.txt". Write a Python program to read the file and look for lines of the form X-DSPAM-Confidence: 0.8475 X-DSPAM-Probability: 0.458 Extract the number from each of the lines using a regular expression. Compute the average of the numbers and print out the average	5	6	4

AR18

CODE: 18CET204

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech I Semester Supplementary Examinations, March-2022

SURVEYING AND GEOMATICS

(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) Define surveying. Explain in detail about the principles of surveying? 6M
b) The following bearings were observed with the compass. Calculate the interior angle? 6M

Line	F.B
AB	140°30'
BC	80°30'
CA	340°00'
DE	290°30'
EA	230°30'

(OR)

2. a) Explain about compass surveying? 4M
b) The following bearings were observed while traversing with compass? 8M

Line	F.B	B.B
AB	50°30'	230°30'
BC	140°30'	319° 00'
CD	219°00'	38°00'
DA	328°00'	150°30'

Mention which stations are affected by local attraction and determine the corrected bearings?

UNIT-II

3. a) The following staff readings were observed successfully with a level, the instrument having been shifted after 5th and 11th readings: 0.585, 1.010, 1.735, 3.295, 3.775, 0.350, 1.300, 1.795, 2.575, 3.375, 3.895, 1.735, 0.635, 1.605 meters. Enter the above readings in a page of level book and calculate the R.L of points by using Rise and Fall method, if the first reading was taken with a staff held on a benchmark of 136.440m. 8M
b) Write the characteristics of contouring? 4M
- (OR)**
4. a) Explain with neat sketch about indirect methods of contours? 6M
b) What are the temporary adjustments of level? 6M

UNIT-III

5. a) Explain the various parts of a theodolite? 6M
b) Explain any two tape methods of setting out simple curves with neat sketch. 6M
(OR)
6. a) Explain principle of stadia method in tacheometric surveying? 6M
b) Explain the Rankine's method of setting out compound curves with neat sketch. 6M

UNIT-IV

7. a) Describe briefly about relief and tilt displacements? 8M
b) Write down the advantages of photogrammetric surveying? 4M
(OR)
8. a) Explain about Perspective geometry of aerial photograph? 6M
b) Write about terrestrial photogrammetric surveying? 6M

UNIT-V

9. a) Explain about electromagnetic spectrum with neat sketches? 8M
b) Describe briefly about interaction of electromagnetic radiation with the atmosphere and earth surface? 4M
(OR)
10. a) Write about remote sensing data acquisition? 6M
b) Explain about visual image interpretation? 6M

AR18

CODE: 18EET203

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech I Semester Supplementary Examinations, March-2022

ELECTRO MAGNETIC FIELD THEORY

(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) State and prove Gauss's law? Derive an expression for the point form of Gauss's law? 6M
- b) By applying Coulomb's derive an expression for \mathbf{E} due to a line of charge. 6M

(OR)

2. a) A 100nC point charge is located at A(-1,1,3) in free space. Find (a)the locus of all points (x,y,z) at which $E_x = 500\text{V/m}$ (b)Find y_1 if P(-2, y_1 ,3) lies on that locus. 6M
- b) Express the field $E = Aa_r/r^2$ in (a) rectangular components (b) cylindrical components 6M

UNIT-II

3. Derive expressions for the Dielectric-Dielectric boundary condition? 12M

(OR)

4. a) What is the Capacitance of a Capacitor consisting of two parallel plates 30 cm by 30 cm, Separated by 5 mm in air. What is the energy stored by the capacitor if it is charged to a potential difference of 500 volts. 6M
- b) Derive the expression for the continuity equation. 6M

UNIT-III

5. a) A filamentary conductor is formed into an equilateral triangle with sides of length l carrying current I. Find the magnetic field intensity at the center of the triangle 6M
- b) A hollow conducting cylinder has inner radius 'a' and outer radius 'b' and carries current 'I' along the positive z-direction. Find \mathbf{H} everywhere. 6M

(OR)

6. a) State and explain Biot-Savart's Law 6M
- b) State Ampere's law and derive an expression for $\nabla \times \mathbf{H} = \mathbf{J}$ 6M

UNIT-IV

7. a) Derive an expression for self inductance of Solenoid. 6M
- b) Find the magnitude of force exerted on a 0.2C point charge having velocity $\mathbf{V} = 4\mathbf{i} - 5\mathbf{j} + 2\mathbf{k}$ m/s. in the field. a). $\mathbf{E} = 15\mathbf{i} + 15\mathbf{k}$ N/C b). $\mathbf{B} = 3\mathbf{i} - 4\mathbf{j} + 6\mathbf{k}$ T c). Both 6M

(OR)

8. a) Derive the expression for the Lorentz's force equation 6M
- b) A rectangular filamentary current loop in the xy-plane has corners at (0,0,0), (2,0,0), (2, 2, 0) and (0,2,0). The loop carries a current of 6A in the a_x direction on the X-axis. Find the total force on the current loop produced by the magnetic field $\mathbf{B} = 2\mathbf{i} + 2\mathbf{j} - 5\mathbf{k}$ T 6M

UNIT-V

9. State pointing vector theorem. Derive an expression pointing vector. 12M

(OR)

10. a) Define a) Faradays laws b) Lenz's law 6M
- b) Derive an expression for displacement current. 6M

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

**II B.Tech I Semester Supplementary Examinations, March-2022
ENGINEERING MECHANICS
(Common to ECE & ME)**

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) State and prove Parallelogram Law 4M
- b) Three forces of magnitude 40 kN, 15 kN and 20 kN are acting at a point O as shown in Figure 1. The angles made by 40 kN, 15 kN and 20 kN forces with X-axis are 60° , 120° and 240° respectively. Determine the magnitude and direction of the resultant force. 8M

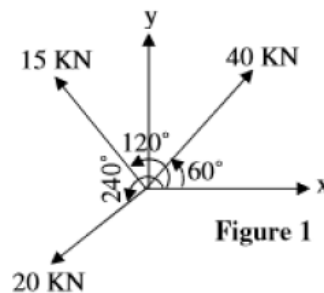


Figure 1

(OR)

2. a) Find the magnitude of the two forces, such that if they act at right angles, their resultant is 10 N. But if they act at 60° , their resultant is 13 N 6M
- b) A horizontal line PQRS is 12 m long, where PQ = QR = RS = 4 m. Forces of 1000, 1500, 1000 and 500 N act at P, Q, R and S respectively with downward direction. The lines of action of these forces make angles of 90° , 60° , 45° and 30° respectively with PS. Find the Magnitude, direction and position of the resultant force 6M

UNIT-II

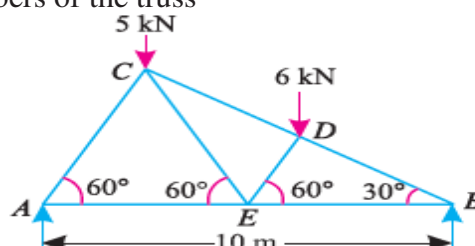
3. a) State and prove Varignon's theorem 6M
- b) Five strings are tied at a point and are pulled in all directions, equally spaced, from one another. If the magnitude of the pulls on three consecutive strings is 70N, 40N and 55N respectively, find graphically the magnitude of the pulls on two other strings, if the system is in equilibrium 6M

(OR)

4. a) Explain the concept of Free Body Diagram with example 4M
- b) Explain the graphical method procedure for equilibrium of planar systems 8M

UNIT-III

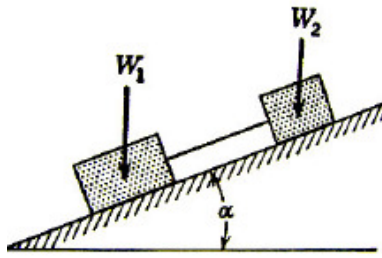
5. A truss of span 10 meters is loaded as shown in figure below Find the reactions and forces in the members of the truss 12M



Ra

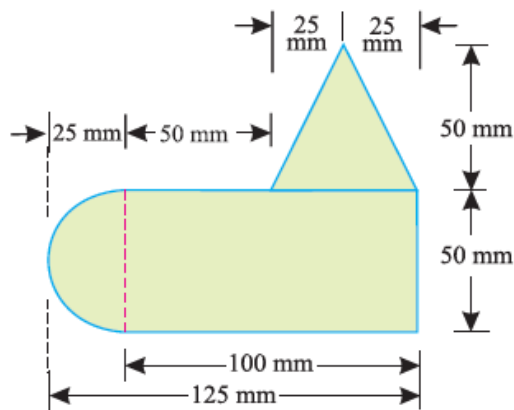
(OR)

6. a) Explain the concept of cone of friction 4M
b) Analyse the angle of inclination of the plane for which sliding will impend of two blocks of weight W_1 and W_2 rests on rough inclined plane and connect by string as shown in figure-5. If the coefficient of friction are $\mu_1 = 0.3$ and $\mu_2 = 0.4$ respectively 8M



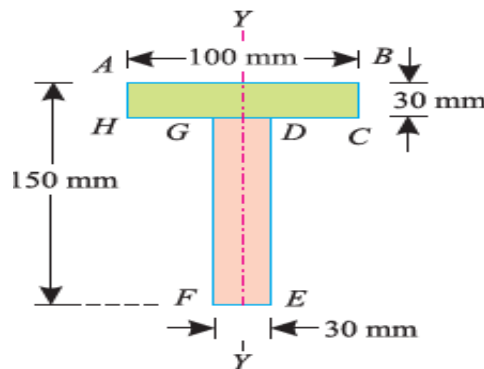
UNIT-IV

7. a) Find the moment of inertia of a rectangular section 60 mm wide and 40 mm deep about its Centre of gravity 4M
b) A uniform lamina shown in Fig consists of a rectangle, a circle and a Triangle. Determine the Centre of gravity of the lamina. All dimensions are in mm 8M



(OR)

8. a) Define centroid and centre of gravity, with examples 4M
b) Find the Centre of gravity of a 100 mm \times 150 mm \times 30 mm T-section.(8M) 8M



UNIT-V

9. a) Differentiate between Kinematics and Kinetics 4M
b) A tower is 100m in height. A particle is dropped from the top of the tower and at the same time another particle is projected upward from the foot of the tower. Both the particles meet at height of 40m. Find the velocity with which the second particle is projected upward 8M

(OR)

10. a) Explain the concept of D'Alemberts principle 6M
b) A stone dropped into a well is heard to strike the water in 5 seconds. Find the depth of the well assuming the velocity of sound to be 230 m/sec 6M

AR16

CODE: 16CE2004

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech I Semester Supplementary Examinations, March-2022

SURVEYING (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) Define surveying. Explain in detail about the principles of surveying? 6 M
- b) A rectangular plot of land measures 40cm x 50cm on a village map drawn to a scale of 200 m to 1 cm. Calculate its area in hectares. If the plot is re-drawn on a topo sheet to a scale of 1 km to 1cm, what will be its area on the topo sheet? Also determine the R.F of the scale of the village map as well as on the topo sheet. 8 M

(OR)

2. a) Write a short note on EDM? Write its advantages and applications. 9 M
- b) Explain the process of measuring directions, bearings and angles using compass survey. 5 M

UNIT-II

3. a) Define the following: 8 M
 - (i) Level surface and Level line
 - (ii) Datum and Bench mark
 - (iii) Elevation and Mean Sea Level
 - (iv) Horizontal Plane and Line
 - b) Explain differential and profile levelling with an examples. 6 M
- (OR)**
4. a) What are the temporary adjustments of levelling. 7 M
 - b) Explain Height of Instrument method and Rise and Fall method with suitable examples. 7 M

UNIT-III

5. a) Write temporary adjustments of transit theodolite. 8 M
b) Explain the general procedure to measure horizontal angles. 6 M

(OR)

6. a) Explain the principle of stadia method and derive an equation to get the horizontal distance. 8 M
b) Explain the principle of total station survey with a neat sketch and write an advantages of total station survey. 6 M

UNIT-IV

7. a) What are the methods of observing the bearing of lines in fast needle method? Explain any two methods. 8 M
b) Explain the process of taking measurements of open site using chain and compass. 6 M

(OR)

8. a) Define latitude and departure and explain the procedure for calculations of latitude and departure. 8 M
b) Explain about closing error in traverse survey. 6 M

UNIT-V

9. a) What is trigonometric levelling and Write its applications. 4 M
b) To determine the elevation of the top of a pole, the following observations were made: 10 M

Inst. Station	Reading on B.M	Angle of elevation	Remarks
A	1.255	10°33'	R.L of B.M=+100.00 m
B	0.989	8°45'	

Station A and B and the top of the pole are in the same vertical plane. Find the elevation at the top of the pole , if the distance between A and B is 60 m.

(OR)

10. a) Define curve and explain various types of curves with a neat sketches. 10 M
b) Write the applications curves in civil engineering. 4 M

AR16

CODE: 16EC2004

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech I Semester Supplementary Examinations, March-2022

**PULSE AND DIGITAL CIRCUITS
(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) Draw the circuit diagram of Low Pass Filter and explain the response of Low pass filter when excited by step input at different time constants. [7M]
- b) A pulse of 5 V amplitude and 1 ms pulse is fed to a High Pass Filter. Sketch the output waveform when $R=47K\ \Omega$ and $C=0.47\ \mu F$ and Calculate its tilt. [7M]

(OR)

2. a) Explain how High Pass Circuit acts as a differentiator. [7M]
- b) Draw and explain the response of RLC circuit when excited by Step Input? [7M]

UNIT-II

3. a) Draw the transfer characteristics for the circuit shown in figure-1 [7M] and also draw the output waveform for a sinusoidal input whose peak to peak amplitude is 20 V.

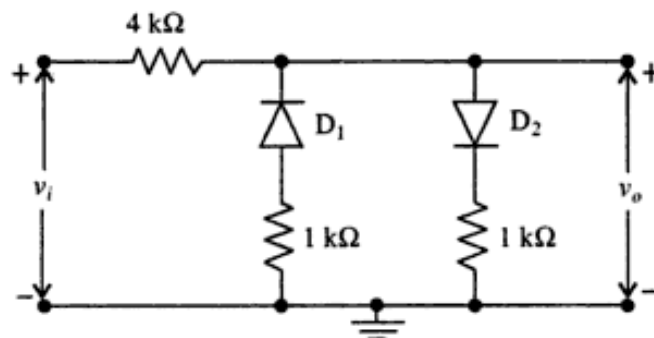


Figure-1

- b) With the help of transfer characteristics, explain the working of Emitter Coupled Clipper? [7M]

(OR)

4. a) State and Prove Clamping Circuit Theorem with the help of neat circuit diagrams and waveforms? [7M]
- b) Explain the working of Positive Clamper with the help of circuit diagram and waveform? [7M]

UNIT-III

5. a) Explain about Transistor Switching Times with the help of circuit diagram and waveform? [8M]
 - b) Explain how Diode acts as a Switch? [6M]
- (OR)**
6. a) A collector coupled Fixed bias Bistable Multivibrator uses NPN transistors with $h_{FE} = 90$. The circuit parameters are $V_{CC} = 12V$, $V_{BB} = 4V$, $R_C = 5K \Omega$, $R_1 = 7K \Omega$ and $R_2 = 11K \Omega$. Assume for transistors $V_{CE(sat)} = 0.3V$ and $V_{BE(sat)} = 0.7V$. Find the stable state currents and voltages for the circuit. [7M]
 - b) Explain how sine wave is converted to square wave using Schmitt Trigger? [7M]

UNIT-IV

7. a) Explain the working of Collector Coupled Monostable Multivibrator with the help of circuit diagrams and waveforms and derive the expression for Gate width? [14M]
- (OR)**
8. a) Explain the principle of Miller and Bootstrap Time base generator with relevant circuits? [7M]
 - b) Design an Astable multivibrator to generate a Square wave of 2KHz with $h_{fe} = 70$, $V_{cc} = 12V$, $I_{C(sat)} = 7 \text{ mA}$ and neglect junction voltages. [7M]

UNIT-V

9. a) With the help of circuit diagram and waveform, explain the working of RC Controlled Astable blocking oscillators using transistors? [7M]
 - b) Explain the working of Unidirectional diode gate to accommodate more than one input signal? [7M]
- (OR)**
10. a) Explain the working of Bidirectional Sampling gate using Transistor? [7M]
 - b) Explain the working of four diode Sampling gate and also calculate gain, V_{min} and $(V_c)_{min}$? [7M]

**PROBABILITY AND STATISTICS
(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 random variable X has the following probability function: 14M
- | | | | | | | |
|-------|-----|----|-----|----|-----|---|
| X: | -2 | -1 | 0 | 1 | 2 | 3 |
| P(X): | 0.1 | k | 0.2 | 2k | 0.3 | k |
- Find (i) k (ii) Mean (iii) Variance (iv) $P(X \geq 2)$ (v) $P(X < 2)$

(OR)

2. a) If X is a continuous random variable and k is a constant then prove that 7M
(i) $\text{Var}(X + k) = \text{Var}(X)$ (ii) $\text{Var}(kX) = k^2 \text{Var}(x)$
- b) Suppose 5 men out of 100 and 25 women out of 10,000 are colour blind. A colour blind person is chosen at random. What is the probability of the person being a male. 7M

UNIT-II

3. a) Out of 800 families with 5 children each, how many would you expect to have 7M
i) 3 boys ii) 5 girls Assume equal probabilities for boys and girls.
- b) A car hire firm has two cars which it hires out day by day. The number of demands for a car on each day is distributed as Poisson distribution with mean 1.5. calculate the proportion of days 7M
i) on which there is no demand ii) on which demand is refused

(OR)

4. Find the mean of Normal Distribution. 14M

UNIT-III

5. A population consists of 2,3,6,8,11. Consider all possible samples of size 2 which can be drawn without replacement from this population. Find 14M
- i) The population mean
 - ii) The population standard deviation
 - iii) The mean of the sampling distribution of means
 - iv) The standard deviation of the sampling distribution of means.

(OR)

6. a) If the mean breaking strength of copper wire is 575 lbs with a standard deviation of 8.3 lbs, how large a sample must be used in order that there may be one chance in 100 that the mean breaking strength of the sample is less than 572 lbs. 7M
- b) Determine the probability that X will be between 75 and 78 if a random sample of Size 100 is taken from an infinite population having the mean $\mu = 76$ and $\sigma^2 = 256$. 7M

UNIT-IV

7. From the following data find whether there is any significant liking in the habit of taking soft drinks among the categories of employees using chi-square test independent attributes. 14M

Employees			
Soft drinks	Clerks	Teachers	Officers
Pepsi	10	25	65
Thumsup	15	30	65
Fanta	50	60	30

(OR)

8. The life time of electric bulbs for a random sample of 10 from a large shipment gave the following data using t-test for difference of means: 14M

Item	1	2	3	4	5	6	7	8	9	10
Life in 1000s of hrs	1.2	4.6	3.9	4.1	5.2	3.8	3.9	4.3	4.4	5.6

Can we accept the hypothesis that the average life time of bulb is 4000 hrs. Use a 0.05 level of significance.

UNIT-V

9. Fit a curve $y=ab^x$ to the following data . 14M

X	1	2	3	4	5
Y	151	100	61	50	20

(OR)

10. Find the rank correlation coefficient for the following data: 14M

X	68	64	75	50	64	80	75	40	55	64
Y	62	58	68	45	81	60	68	48	50	70

Time: 3 Hours**Max Marks: 70****PART-A****ANSWER ALL QUESTIONS****[1 x 10 = 10 M]**

1. a) Give the significance of Curl function in electromagnetics.
- b) Draw the equipotential surface of a point charge located at origin.
- c) Define dipole moment.
- d) Write Laplace's equation in terms of Cartesian and spherical coordinates.
- e) State Ampere's Law.
- f) Give expression for Magnetic field intensity due to solenoid.
- g) List out any two applications of solution of Lorentz force equation?
- h) Define self inductance.
- i) Write Faraday's law in integral form.
- j) Interpret the necessary conditions to produce emf?

PART-B**Answer one question from each unit****[5x12=60M]****UNIT-I**

2. a) Define and explain the physical significance of the following 6M
(i). Divergence (ii). Gradient (iii). Curl
- b) Determine the electric field intensity \mathbf{E} at $P(1,1,1)$ caused by four identical 3nC charger located at $P_1(1,1,0)$, $P_2(-1,1,0)$, $P_3(-1,-1,0)$ and $P_4(1,-1,0)$. 6M

(OR)

3. State coulombs law, using coulombs law determine E due to line of charge.. 12M

UNIT-II

4. a) Apply solution of Laplace's equation to derive the expression for capacitance of a coaxial cable. 6M
- b) An electric dipole of $100 \text{ a}_z \text{ pC}$, m is located at the origin. Find V and E at $(0, 0, 10)$. 6M

(OR)

5. Derive boundary conditions between two perfect dielectrics in electrostatics. 12M

UNIT-III

6. a) Using Biot-Savarts law to find H due to line of current. 6M
- b) State Ampere's circuit law and derive an expression for H due to sheet of current. 6M

(OR)

7. a) Determine the magnetic field intensity, at the centre of the square current element. The length of each side is 2m and the current is $I=1\text{A}$. 5M
- b) For a coaxial cable, derive expressions for \mathbf{H} and plot \mathbf{H} with respect to distance. 7M

UNIT-IV

8. a) Derive the expression for Lorentz force equation. 6M
- b) Derive the expression for force between two current carrying conductors on the same direction. 6M

(OR)

9. Derive the expression for the torque on a current loop placed in magnetic field. 12M

UNIT-V

10. a) Derive the expression for self-inductance of solenoid and torrid. 6M
- b) Explain faraday's laws of electromagnetic induction and from that derive related Maxwell's equation. 6M

(OR)

11. State pointing vector theorem. Derive an expression pointing vector. 12M