

**ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES
(AUTONOMOUS)
II/IV B. Tech II- Semester Regular Examinations April – 2017
Basic Electrical and Electronics Engineering
(Mechanical)**

Time: 3 hours

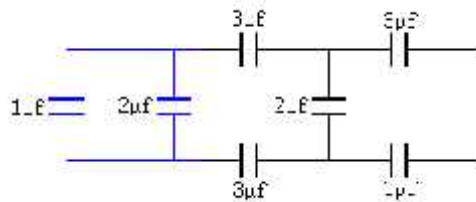
Max Marks: 60

**Answer ONE Question from each Unit
All Questions Carry Equal Marks**

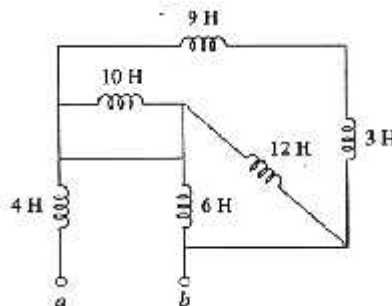
All parts of the question must be answered at one place only

UNIT-I

1. a) State and explain KCL, KVL and Ohm's Law. 6M
 b) Find the Equivalent Capacitance between the two terminals shown in figure. 3M

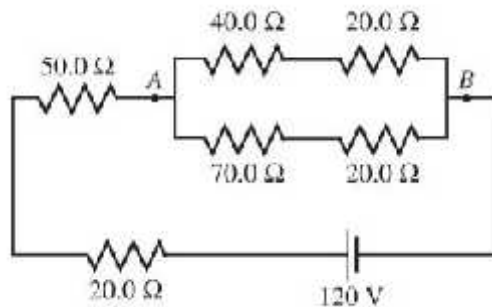


- c) Find the Equivalent Inductance between terminals a, b shown in figure. 3M

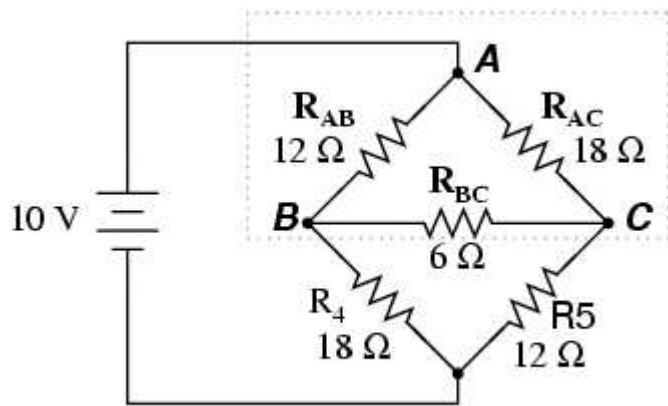


(OR)

2. a) Find all the branch currents for the circuit shown in figure. 6M



- b) Find the current supplied by the voltage source for the circuit shown below by using Star-Delta transformation. 6M



UNIT-II

- 3 a) Derive the EMF equation of a 1- transformer. 6M
 b) A 4 pole shunt generator with lap winding supplies a load of 200 A at 200 V. Shunt field resistance is 50 and armature resistance 0.05 . Calculate a) Armature current b) Current per parallel path and c) EMF generated. 6M

(OR)

- 4 a) Derive the expression for Armature Torque developed in a DC motor. 6M
 b) In a 50kVA transformer the iron loss is 500W and full load copper loss is 800W. Find the efficiency at full load and at half full load at 0.8pf lagging. 6M

UNIT-III

- 5 a) Explain the Torque-Slip characteristics of an Induction motor. 6M
 b) A 440V, 3- , 50Hz, 4-pole star connected induction motor has full load speed of 1425rpm. The rotor has an impedance of $(0.4+j4)$ and rotor/stator turns ratio of 0.8. Calculate (i) Full load Torque (ii) the Rotor current. 6M

(OR)

- 6 a) Describe the Synchronous impedance method to estimate the Voltage regulation of an Alternator 6M
 b) A 3- , 50Hz star connected Alternator has 180 conductors per phase and flux per pole is 0.0543wb. Find i) Generated Emf per phase and ii) Emf between line terminals. Assume the winding to be full pitched and distribution factor to be 0.96. 6M

UNIT-IV

- 7 a) What is a PN junction diode? Explain its V-I characteristics. 6M
b) Define Rectifier. Explain the working of a Full wave Bridge Rectifier. 6M

(OR)

- 8 a) Describe the characteristics of Silicon controlled Rectifier (SCR). 6M
b) Write the differences between pnp and npn transistors. 3M
c) What is a Potential Barrier? Write the different biasing methods. 3M

UNIT-V

- 9 a) Explain how to measure Voltage and Frequency by using CRO. 6M
b) Describe the various parts of a Cathode ray Tube (CRT) with a neat sketch. 6M

(OR)

- 10 a) Explain the working of Attraction type of Moving Iron instrument. 6M
b) Describe the construction and working of PMMC instrument. 6M

**ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES
(AUTONOMOUS)**

II/IV B. Tech II- Semester Regular Examinations April – 2017

Engineering Mathematics-IV

(MECH, CHEMICAL)

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 only

UNIT-I

1. (a) Find the regular function $f(z) = u + iv$ if $u - v = (x - y)(x^2 + 4xy + y^2)$ [6]

(b) Obtain the Taylor's series expansion of $e^{(1+z)}$ in the powers of $(z - 1)$ [6]

(OR)

2. (a) If $f(z)$ is an analytic function then prove that $\left\{ \frac{\partial}{\partial x} |f(z)| \right\}^2 + \left\{ \frac{\partial}{\partial y} |f(z)| \right\}^2 = |f'(z)|^2$ [6]

(b) Define removable singularity and find the nature of the function $\frac{z - \sin z}{z^2}$ [6]

UNIT-II

3. (a) Prove with the usual notations that $(E^{1/2} + E^{-1/2})(1 + \Delta)^{1/2} = 2 + \Delta$ [6]

(b) From the following table, estimate the number of students who obtained marks between 40 and 45 [6]

| Marks | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 |
|-----------------|-------|-------|-------|-------|-------|
| No. of students | 31 | 42 | 51 | 35 | 31 |

(OR)

4. (a) Show that $\Delta + \nabla = \frac{\Delta}{\nabla} - \frac{\nabla}{\Delta}$ [6]

(b) Given the values

| | | | | | |
|--------|-----|-----|------|------|------|
| x | 5 | 7 | 11 | 13 | 17 |
| $f(x)$ | 150 | 392 | 1452 | 2366 | 5202 |

Evaluate $f(9)$ using Newton's divided difference formula [6]

UNIT-III

5. (a) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Simpson's 3/8th rule taking $h=1/6$ [6]

(b) Given that

| | | | | | | | |
|-----|-------|-------|-------|-------|-------|-------|--------|
| x | 1.0 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 |
| y | 7.989 | 8.403 | 8.781 | 9.129 | 9.451 | 9.750 | 10.031 |

find $\frac{dy}{dx}, \frac{d^2y}{dx^2}$ at $x=1.1$ [6]

(OR)

6. (a) Use Simpson's 1/3rd rule to find $\int_0^{0.6} e^{-x^2} dx$ by taking seven ordinates. [6]

(b) Evaluate $\int_0^1 \frac{dx}{1+x}$ applying Trapezoidal rule [6]

UNIT-IV

7. (a) A problem in mechanics is given to three students A,B and C, whose chances of solving it are 1/2, 1/3, 1/4 respectively. What is the probability that the problem will be solved. [6]

(b) If X is a normal variate with mean 30 and S.D 5, find the probabilities that

(i) $26 \leq X \leq 40$ (ii) $X \geq 45$ (iii) $|X - 30| > 5$ [6]

(OR)

8. (a) State and prove Baye's theorem [6]

(b) A random variable X has the following probability function

| | | | | | | | | |
|------|---|---|----|----|----|----------------|-----------------|--------------------|
| x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| P(x) | 0 | k | 2k | 2k | 3k | K ² | 2k ² | 7k ² +k |

(i) Find the value of K (ii) Evaluate P(X<6), P(X = 6) (iii) P(0<X<5)

UNIT-V

9. (a) Two independent samples of 7 items respectively had the following values

| | | | | | | | | |
|-----------|----|----|----|----|----|---|----|---|
| Sample-I | 11 | 11 | 13 | 11 | 15 | 9 | 12 | 4 |
| Sample-II | 9 | 11 | 10 | 13 | 9 | 8 | 10 | - |

Is the difference between the means of samples of significant? [6]

(b) A die was thrown 264 times with the following frequency results

| | | | | | | |
|----------------------------|----|----|----|----|----|----|
| No. of appeared on the die | 1 | 2 | 3 | 4 | 5 | 6 |
| Frequency | 40 | 32 | 28 | 58 | 54 | 52 |

Test whether the die is un-biased?. [6]

(OR)

10. (a) Find the student's t for the following variable values in a sample of eight: -4, -2, -2, 0, 2, 2, 3, 3; taking the mean of the universe to be zero. [6]

(b) A machinist is making engine parts with axle diameter of 0.7inch. A random sample of 10 parts shows mean diameter 0.742 inch with a standard deviation of 0.04inch. On the basis of this sample, would you say that the work is inferior? [6]

Hall Ticket No:

Question Paper Code :

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES

(AUTONOMOUS)

II/IV B. Tech II- Semester Regular Examinations April – 2017

Fluid Mechanics

(Mechanical)

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 only

Unit-1

1. a) A simple U tube manometer containing mercury (sp. gr. 13.6) is connected to a pipe in which a fluid of specific gravity 0.8 and having vacuum pressure is flowing. The outer end of the manometer is open to atmosphere. Find the vacuum pressure in pipe, if the difference in mercury level in the two limbs is 40 cm and the height of the fluid in the left from the center of the pipe is 15 cm below. [6Marks]
- b) Determine the total pressure on a circular plate of diameter 1.5 m which is placed vertically in water in such a way that the center of the plate is 3 m below the free surface of water. Find the position of center of pressure also. [6 Marks]

(OR)

2. a) The surface tension of water in contact with air at 20° C is 0.0725 N/m. The pressure inside a droplet of water is to be 0.02 N/cm² greater than the outside pressure. Calculate the diameter of the droplet of water [6 Marks]
- b) A rectangular pontoon is 5 m long, 3 m wide and 1.2 m high. The depth of immersion of the pontoon is 0.80 m in sea water. If the center of gravity is 0.6 m above the bottom of the pontoon, determine the meta-centric height. The density of sea water is 1025 kg/m³. [6 Marks]

Unit-2

3. a) Derive the Euler's equation of motion. [6 Marks]
- b) A pipe through which water is flowing is having diameters, 20 cm and 10 cm at the cross sections 1 and 2 respectively. The velocity of water at section 1 is given as 4.0 m/s. Find the velocity head at sections 1 and 2 and also rate of discharge. [6 Marks]

(OR)

4. a) Write briefly about the different types of fluid flow. [6 Marks]
- b) A 30 cm x 15cm venturimeter is inserted in a vertical pipe carrying water flowing in upward direction. A differential mercury manometer connected to the inlet and throat gives a reading of 30cm. Find the discharge. Take $C_d=0.98$ [6 Marks]

Unit-3

5. a) Derive an expression for the power transmission through pipes. [6 Marks]
- b) Derive an expression for Hagen Poiseuille's law. [6 Marks]

(OR)

6. a) A pipe line 60 cm diameter bifurcates at a Y – junction into two branches 40 cm and 30 cm in diameter. If the rate of flow in the main pipe is $1.5 \text{ m}^3/\text{sec}$ and mean velocity of flow in 30 cm diameter pipe is 7.5 m/sec, determine the rate of flow in the 40 cm diameter pipe. [6 Marks]
b) Derive the relation between shear stress and pressure gradient in a viscous fluid flow through a circular pipe. [6 Marks]

Unit-4

7. a) What is meant by boundary layer separation? What are the different methods of preventing the boundary layer separation [6 Marks]
b) The resisting force R of a supersonic plane during flight can be considered as dependent upon the length of the aircraft ' l ', velocity ' V ', air viscosity ' μ ', air density ' ρ ' and bulk modulus of air ' K '. Express the functional relationship between these variables and the resisting force. [6 Marks]

(OR)

8. a) Define displacement thickness. Derive an expression for the displacement thickness. [6 Marks]
b) Explain the different types of similarities. [6 Marks]

Unit-5

9. a) Define drag and lift. [4Marks]
b) A flat plate 1.5 m x 1.5 m moves at 50 km/hour in stationary air of density 1.15 kg/m^3 . If the coefficients of drag and lift are 0.15 and 0.75 respectively, determine:
(i) the lift force (ii) the drag force
(iii) the resultant force, and (iv) the power required to keep the plate in motion. [8 Marks]

(OR)

10. a) Prove that coefficient of lift depends on angle of attack. [6 Marks]
b) Explain how lift force is developed on a rotating cylinder in a uniform flow field. [6 Marks]

Hall Ticket No:

Question Paper Code :

**ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES
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II/IV B. Tech II- Semester Regular Examinations April – 2017

Machine Drawing

(Mechanical)

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 only

[Tolerance tables are permitted]

[Missing data if any may be assumed suitably]

UNIT-I

1. Draw the (i) Full Sectional Front view (ii) Side view (iii) Top view (12M)

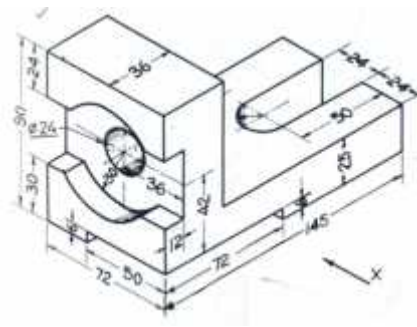


Figure 1

(OR)

2. Draw the (i) Half Sectional front view (ii) Top view (iii) side view from left (12M)

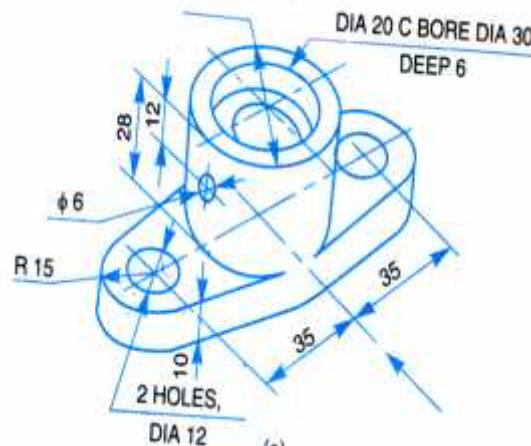


Figure 2

UNIT-II

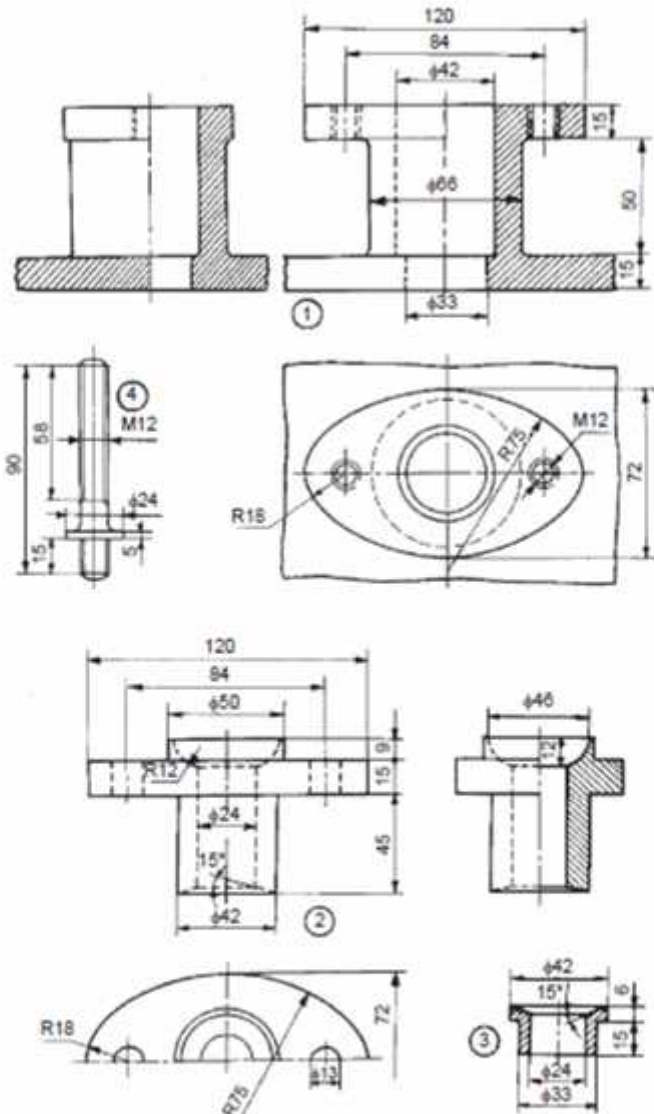
3. a) Sketch the Buttress thread profiles for a nominal diameter of 25 mm and pitch 3 mm. (2M)
b) Sketch the Hexagonal and Square Headed bolt with proportions marked. (4M)
c) Sketch any 2 locking arrangement for nuts, with proportions marked. (6M)
- (OR)
4. a) Sketch neatly, giving proportionate dimensions; the Rag foundation bolt of diameter 25 mm. (6M)
b) Draw (a) Sectional view from the front and (b) top view, of the Single riveted, double strap butt joint to join plates of thickness 10 mm. (6M)

UNIT-III

5. Draw the half sectional view from the front, with top half in section and the view from the side of a cotter joint with socket and spigot ends, to connect two rods of 50 mm diameter each.. (12M)
- (OR)
6. Sketch the required views of Oldham coupling indicating proportions, used to connect two shafts, each of diameter 30mm (12M)

UNIT-IV&UNIT-V

7. a) Calculate the maximum and minimum limits for 45H8/d7 (4M)
b) Assemble all parts of the stuffing box for a vertical steam engine, from figure 3 and draw, (i) half sectional view from the front, with left half in section, (ii) half sectional view from the right and (iii) view from above. (20M)
- (OR)
8. a) Indicate the tolerances and allowances for the hole shaft designated by 100H7p6 given 100 falls in the range 80 to 120. Fundamental deviation for p=IT7+3 (9M)
b) Sketch the production drawing of gland from figure 3 and prepare its Process Sheet (15M)



Parts list

| Part No. | Name | Matl | Qty |
|----------|----------|-------|-----|
| 1 | Body | CI | 1 |
| 2 | Gland | Brass | 1 |
| 3 | Bush | Brass | 1 |
| 4 | Stud | MS | 2 |
| 5 | Nut, M12 | MS | 2 |

Figure 3

Hall Ticket No:

Question Paper Code :

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES

(AUTONOMOUS)

II/IV B. Tech II- Semester Regular Examinations April – 2017

Manufacturing Technology-II

(Mechanical)

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 only

UNIT-I

1. a. Draw merchant circle diagram for metal cutting process and derive relations for various forces in metal cutting. (8M)
- b. Differentiate between orthogonal and oblique cutting process. (4M)

(OR)

2. a. Derive relation for shear angle in metal cutting. (6M)
- b. What is meant by built up edge in metal cutting. When it is formed. How to avoid it. (6M)

UNIT-II

3. a. Explain Orthogonal Rake System of single point cutting tool. (6M)
- b. What are the desirable properties of cutting fluids used in metal cutting (6M)

(OR)

4. a. Explain Normal Rake System of single point cutting tool. (6M)
- b. Distinguish between Crater and Flank wear of the cutting tool. (6M)

UNIT-III

5. a. Explain the difference between Capstan and Turret lathe. (6M)
- b. With the help of suitable sketch, describe the geometry of a twist drill. (6M)

(OR)

6. a. Distinguish between up and down milling. (6M)
- b. Explain the construction feature of dividing head used in milling. (6M)

UNIT-IV

7. a. Explain different ways in which the wear in grinding wheel can take place. What can be done to prevent them. (6M)
- b. Differentiate between cylindrical grinding and centreless grinding. (6M)

(OR)

8. a. What are the different abrasives which are generally used in grinding wheels. Explain in detail. (6M)
- b. Differentiate between honing and lapping process. (6M)

UNIT-V

9. a. What is the difference between conventional machining and non conventional machining process. (6M)
- b. Explain with neat sketch about laser beam machining. (6M)

(OR)

10. a. Explain with neat sketch about electron beam machining (6M)
- b. Distinguish between EDM and ECM process. (6M)

MODEL PAPER

Hall Ticket No:

Question Paper Code :

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES

(AUTONOMOUS)

II/IV B. Tech II- Semester Regular Examinations April – 2017

Theory of Machines-I

(Mechanical)

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 only

UNIT-I

1. a) Differentiate machine and mechanism 2 M
b) Classify the kinematic pairs with neat sketches. 10 M

(OR)

2. a) Describe the types of constrained motions. 4 M
b) Explain the construction and working of whitworth quick return mechanism with a neat sketch. 8 M

UNIT-II

3. a) What is a Pantograph? Give its applications 4 M
b) Show that pantograph can produce paths exactly similar to the ones traced out by a point on a link on an enlarged or reduced scale 8 M

(OR)

4. a) Derive the fundamental equation for correct steering gear 6 M
b) The driving shaft of a Hooke's joint has a uniform angular speed of 280 rpm. Determine the maximum permissible angle between the axes of the shafts to permit a maximum variation in speed of the driven shaft by 8% of the mean speed. 6 M

UNIT-III

5. a) State Kennedy's theorem 2 M
b) In a slider crank mechanism, the lengths of the crank and the connecting rod are 200 mm and 800 mm respectively. Locate all instantaneous centres of the mechanism for the position of the crank when it has turned 30° from the inner dead centre. Also find the velocity of the slider and the angular velocity of the connecting rod if the crank rotates at 40 rad/s. 10 M

(OR)

6. Figure 1 shows the configuration diagram of a four link mechanism along with the lengths of links in mm. The link AB has an instantaneous angular velocity of 10.5 rad/s and a retardation of 26 rad/s^2 in the counter clock wise direction. Find 12 M
i) The angular acceleration of links BC and CD
ii) The linear accelerations of the points E.

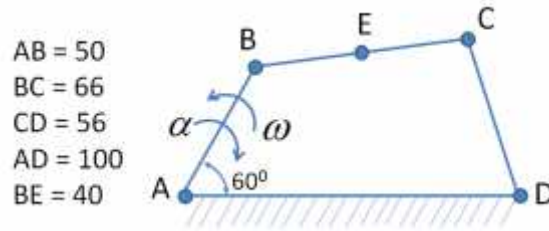


FIGURE 1
UNIT-IV

7. a) Classify cams and followers 4 M
 b) Derive the expression for the velocity and acceleration of a tangent cam when the roller follower is on the flank 8 M

(OR)

8. A cam with 30 mm as minimum diameter is rotating clockwise at a uniform speed of 1000 r.p.m. and has to give the following motion to a roller follower 10 mm in diameter: 12 M
 (a) Follower to complete outward stroke of 25 mm during 120° of cam rotation with equal uniform acceleration and retardation ;
 (b) Follower to dwell for 60° of cam rotation ;
 (c) Follower to return to its initial position during 90° of cam rotation with simple harmonic motion
 (d) Follower to dwell for the remaining 90° of cam rotation.
 Draw the cam profile if the axis of the roller follower passes through the axis of the cam

UNIT-V

9. a) State and prove the law of gearing 6 M
 b) A pinion having 30 teeth drives a gear having 80 teeth. The profile of the gears is involute with 20° pressure angle, 12 mm module and 10 mm addendum. Find the length of path of contact, arc of contact and the contact ratio. 6 M

(OR)

10. In the epicyclic gear train shown in Figure 2. The compound wheels A and B as well as internal wheels C and D rotate independently about the axis O. The wheels E and F rotate on the pins fixed to the arm a. All the wheels are of the same module. The number of the wheels are $T_A = 52$, $T_B = 56$, $T_E = T_F = 36$, Determine the speed of C if 12 M
 i) The wheel D fixed and arm a rotates at 200 rpm clockwise
 ii) The wheel D rotates at 200 rpm counter clockwise and the arm a rotates at 200 rpm counter clockwise.

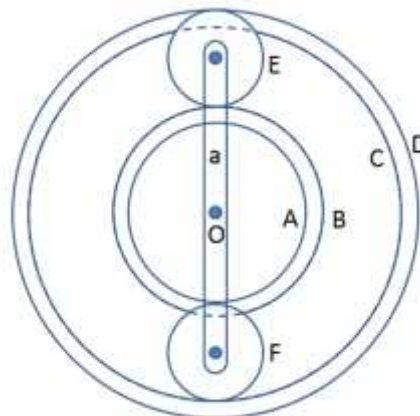


FIGURE 2

