Bearys Institute of Technology, Mangalore

DEPARTMENT OF CIVIL ENGINEERING
II – INTERNAL ASSESMENT

Semester: VII

Date: 28.12.2021 **Time: 10AM-11.30AM**

Subject: PAVEMENT MATERIALS AND CONSTRUCTION (18CV733) **Max Marks: 50**

Faculty: Prof.Purushothama C.T

ANSWER THE FOLLOWING QUESTIONS

PART- A

Q.No			Marks	CO	BT/CL
1	a	Explain the uses of bituminous emulsion. How are they prepared.	10	CO1	L2
	b	List the different types of cutbacks. When are these used?	10	CO1	L2
		OR			
2	a	Explain with neat sketch manufacturing process of bitumen.	10	CO1	L2
	b	What is stripping? What are the adverse effects? Explain any one test on bitumen adhesion	10	CO1	L2

PART- B

Q.No			Marks	CO	BT/CL
3	a	Explain the material specification and construction steps for bituminous surfacing	10	CO4	L2
	b	Explain the objectives, type of material and method of application for i) Prime coat and ii) Tack coat	10	CO4	L2
		OR			
4	a	Explain with neat sketch, different joints in rigid pavement.	10	CO4	L2
	b	Enumerate the steps involved in the construction of cement concrete pavements.	10	CO4	L2

PART -C

Q.No		Marks	CO	BT/CL
5	Explain the types of adhesion failure of bitumen	10	CO1	L2
	OR			
6	Draw a diagram showing various component layers of a CC pavement, mention the objective of each layer	10	CO4	L2

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BEARYS INSTITUTE OF TECHNOLOGY, MANGALORE
Department of Civil Engineering
SCHEME OF EVALUATION OF 2nd INTERNAL ASSESSMENT

Semester: VII	**Date:** 28.12.2021	HOD (Dept. of Civil Engineering) Bearys Institute of Technology Land End, Innoli, Kottara Village Near Mangalore University MANGALORE - 574 153
Subject: PMC (18CV733)	**Time:** 10AM - 11.30AM	
Faculty: Purushotama. C.T	**Max. Marks:** 50	**Approved by**

Note: (1) The major steps and answers at those points should be indicated in a split wise manner.
(2) The marks breakup should be indicated on the right corner after each major step.
(3) Figures if any reqd. should be indicated

Question Number	Solution	Marks
1 a)	Minimum 5 uses — 05 flow chaglam & Preparation — 05	10
b)	3 Types & Cut backs — 03 When they are used — (3x2) + 01	10
2 a)	Sketch — 06 Explanation — 04	10
b)	Definition — 02 Effects — 04 Explanation — 04	10

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Question Number	Solution	Mark
3 a)	Specifications — 05 Construction steps — 05	10
b)	objectives & i) Prime coat — 05 ii) Tack coat — 05	10
4 a)	Types — 02 Sketches — 04 Explanation — 04	10
b)	Steps — 05 Explanation — 05	10
5	Types — 05 Explanation — 05	10
6.	sketch — 05 objectives — 05	10

End

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INTERNAL ASSESSMENT TEST BOOK

NAME OF THE STUDENT : MOHAMMED HASHIM .M

YEAR : 2021-2022 2nd Year BRANCH : CIVIL ENGINEERING SECTION : .....

ROLL/UNIVERSITY SEAT NUMBER : 403

SUBJECT : STRENGTH OF MATERIALS [18CV32]

	DATE	MAX. MARKS	MARKS OBTAINED	TEACHER'S INITIAL	REMARKS
FIRST TEST	4-4-2022	25	19		
SECOND TEST	28/4/2022	25	17		
THIRD TEST	18/03/2022	25	16		
FINAL TEST		25	$\frac{23}{30}$ +10 = $\frac{33}{40}$		

FINAL TEST MARKS IN WORDS : thirty three only

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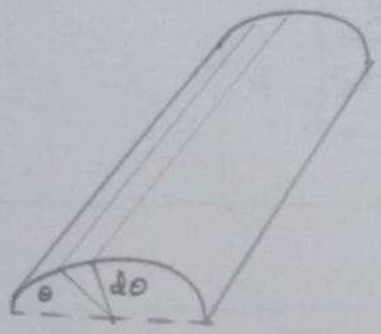
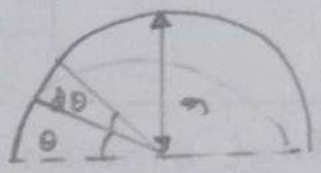
Signature | Staff | HOD | Principal

II nd Internal

1. a. Circumferential Stress :-

It is also known as hoop stress. Let us take longitudinal section x-x as shown in fig.





Forces normal to the section.

$$= [r d\theta L] \times p.$$

where, r = radius of cylinder.

Then, the bursting force is normal to the section, in limiting case bursting force is equal to the section.

$$= p r d\theta L \cos\theta.$$

Then the total bursting force,

$$= 2\int_0^{\pi/2} p r d\theta L \cos\theta.$$

$$= 2 p r L [\sin\theta]_0^{\pi/2}$$

$$= 2 p r L [1-0].$$

$$= pdL \quad -(1).$$

then resisting force to the bursting force.

$$= f_1 \times 2tL.$$

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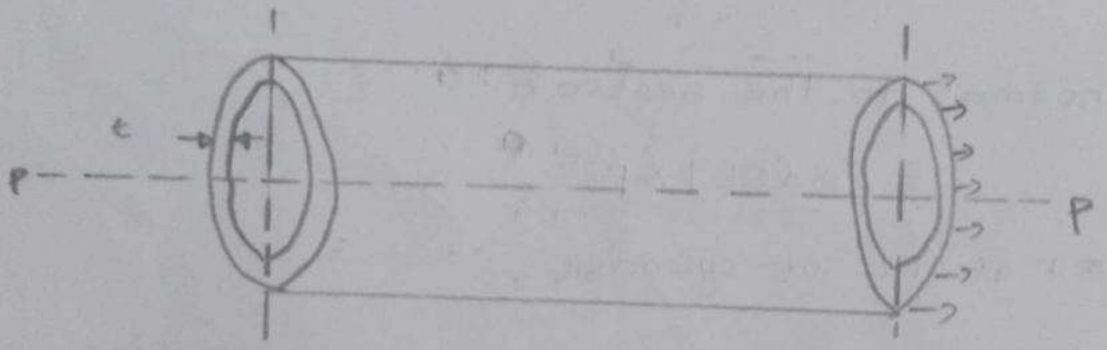
$= 2f_1 t l$ — ②

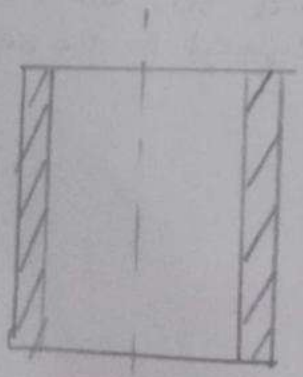
Equate eqn ① and eqn ② we get.

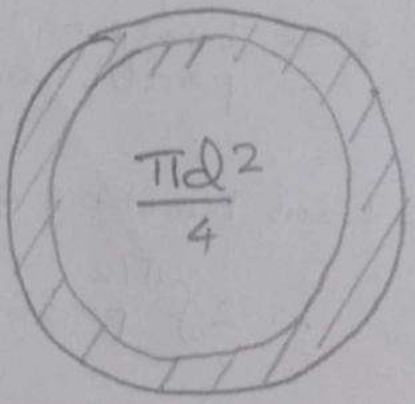
$p d l = 2 f_1 t l$

$$f_1 = \frac{pd}{2t}$$

b. Longitudnal stress:-







Let us take Longitudnal transverse section.

$= p \times \frac{\pi d^2}{4}$ — ③

then the resisting force.

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$= f_2 \pi d t$ — (4)

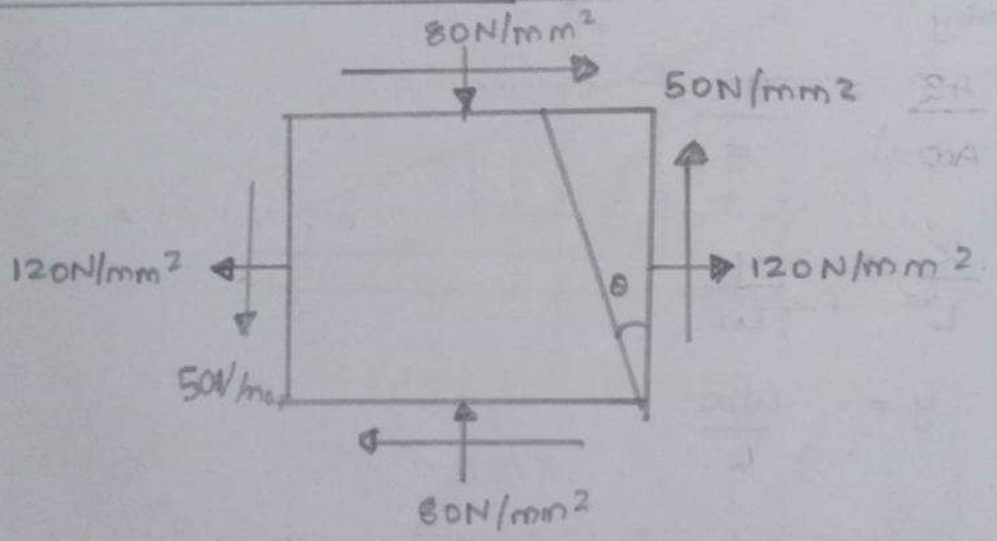
Equate eqn (3) and (4).

$$p \times \frac{\pi d^2}{4} = f_2 \times \pi d \times t$$

$$\boxed{f_2 = \frac{pd}{4t}}$$

8

1b.



Given data:-

$p_x = 120 N/mm^2$

$p_y = -80 N/mm^2$.

$q = 50 N/mm^2$.

$\theta = 40^\circ$.

Normal stress

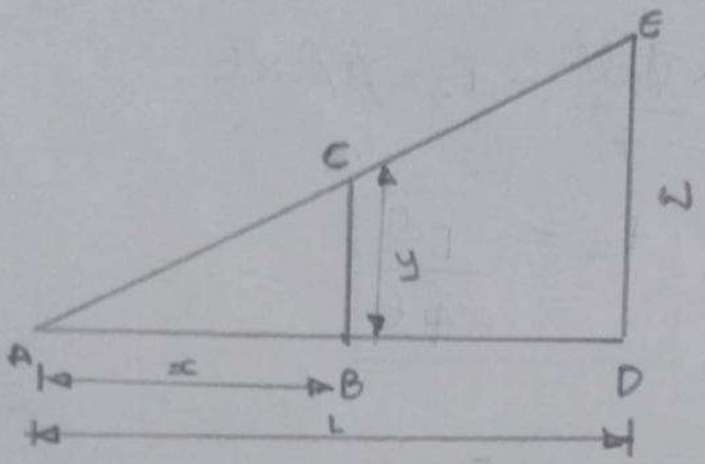
$$p_n = \left(\frac{p_x + p_y}{2}\right) + \left(\frac{p_x - p_y}{2}\right) \cdot \cos 2\theta + q \sin 2\theta$$

$$p_n = \left[\frac{120-80}{2}\right] + \left[\frac{120-(-80)}{2}\right] \cdot \cos(2 \times 40^\circ) + 50 \sin[2 \times 40^\circ]$$

20 100 0.173648177 + 49.24038705

96. Consider a cantilever beam subjected to uvl.

According to property of similarity triangle



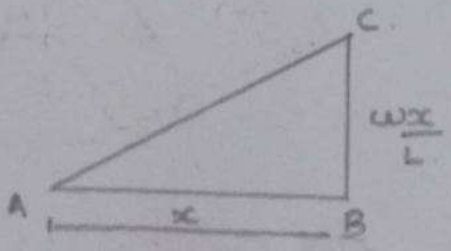
III property.

$$\frac{AB}{AD} = \frac{BC}{ED}$$

$$\frac{x}{L} = \frac{y}{\omega}$$

$$y = \frac{\omega x}{L}$$

Take section x-x at a distance of x m.



Area of the triangle = $1/2 \times x \times \frac{\omega x}{L}$

Shear = $-\frac{\omega x^2}{2L}$

Bending moment.

Shear force.

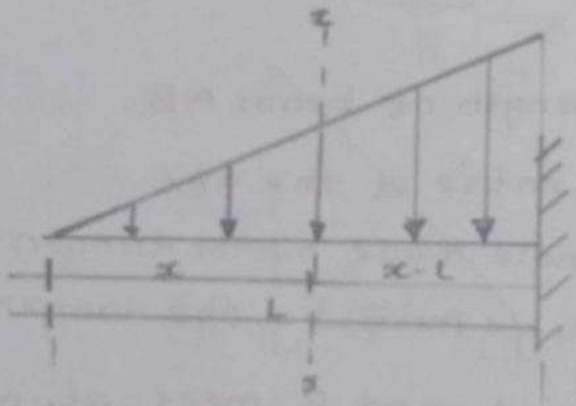
$x = 0$ $\quad F \Rightarrow 0$.

$x = L$ $\quad F \Rightarrow \frac{wL}{L}$.

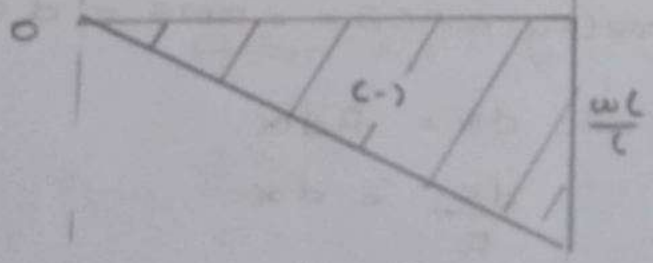
Bending moment

$x = 0$ $\quad M \Rightarrow 0$.

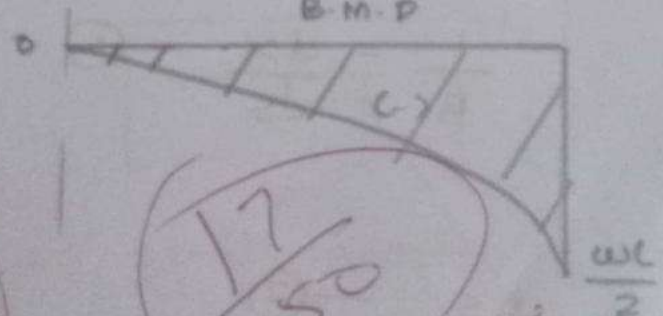
$x = L$ $\quad M = \frac{wL^2}{24} = \frac{wL}{2}$.



S.F.D



B.M.D



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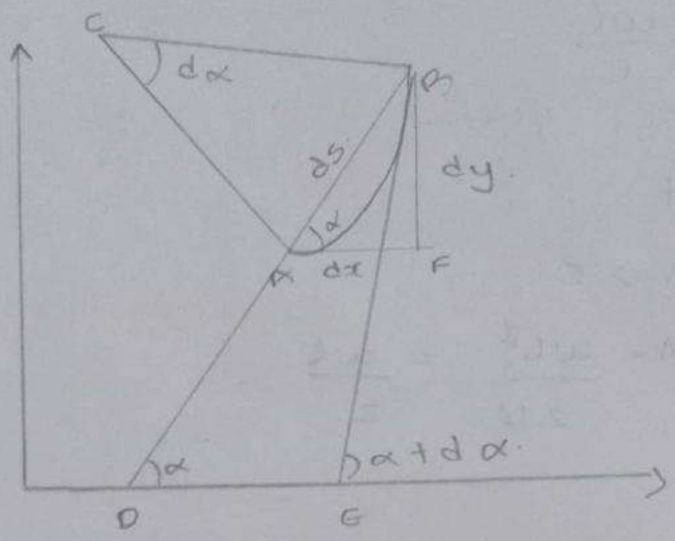
III RD INTERNAL

PART-A

1a.



Let, ds = length of beam AB.

C = Centre of the arc C.

α = Angle made by the tangent at A with X-Y axis

α+dα = Angle made by the tangent at B with Y-Y axis

The two tangents A and B meet at point 'M' as shown in fig

From Geometry ∠ACB = ∠DME = dα.

Length of arc ds = Rdα.

$$\frac{ds}{R} = d\alpha$$

$$\frac{1}{R} = \frac{d\alpha}{ds} \quad -(1).$$

From ΔABF.

$$\sec\alpha = \frac{hyp}{adj} = \frac{ds}{dx} \quad -(2)$$

$$\tan\alpha = \frac{opp}{adj} = \frac{dy}{dx} \quad -(3).$$

Diff eqn (3) w.r.t of x.

$$\frac{d^2y}{dx^2} = \tan\alpha \sec^2\alpha$$

$$\frac{d^2y}{dx^2} = \sec^2\alpha \times \frac{d\alpha}{ds} \times \frac{ds}{dx}$$

$$\frac{d^2y}{dx^2} = \sec^2\alpha \times \frac{1}{R} \times \sec\alpha$$

$$\frac{d^2y}{dx^2} = \sec^3\alpha \times \frac{1}{R}$$

$$\frac{1}{R} = \frac{\frac{d^2y}{dx^2}}{(\sec^2\alpha)^{3/2}}$$

$$\frac{1}{R} = \frac{\frac{d^2y}{dx^2}}{(1+\tan^2\alpha)^{3/2}}$$

$$\frac{1}{R} = \frac{\frac{d^2y}{dx^2}}{\left[1+\frac{d^2y}{dx^2}\right]^{3/2}}$$

Since $\frac{dy}{dx}$ is small quantity if square it will be again less so the denominator is neglected.

$$\frac{1}{R} = \frac{d^2y}{dx^2}$$

w.k.t, $$\frac{M}{I} = \frac{E}{R} = \frac{\sigma}{y}$$

$$\frac{M}{I} = \frac{E}{R}$$

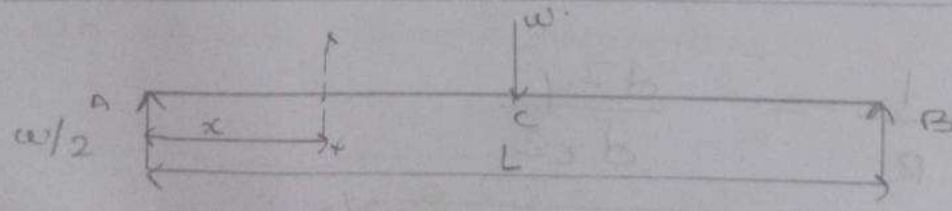
$$\text{or } \frac{1}{R} = \frac{M}{EI}$$

$$\therefore \frac{d^2y}{dx^2} = \frac{M}{EI}$$

$$\boxed{E \cdot I \frac{d^2y}{dx^2} = M} \quad \text{— (4)}$$

The above eqn is known deflection equation

1b



Taking sagging moment.

$$M = \frac{wx}{2}$$

$$E \cdot I \frac{d^2y}{dx^2} = \frac{wx}{2}$$

$$E \cdot I \frac{dy}{dx} = \frac{wx^2}{4} + C_1 \quad \text{— (1)}$$

Applying B.C to eqn ①

At point of symmetry $x = L/2$, $dy/dx = 0$.

$$0 = \frac{w[L/2]^2}{4} + C_1$$

$$\boxed{C_1 = -\frac{wL^2}{16}} \quad -②$$

$$EI\frac{dy}{dx} = \frac{wx^2}{16} - \frac{wL^2}{8} \quad -③$$

$$EIy = \frac{wx^3}{48} - \frac{wL^2}{8}x + C_2 \quad -④$$

Applying B.C to eqn ④

At fixed ends, $x = 0$ $y = 0$

$$0 = C_2$$

$$\boxed{C_2 = 0} \quad -⑤$$

~~Applying~~

$$EIy = \frac{wx^3}{48} - \frac{wL^2}{8}x \quad -⑥$$

At point of symmetry $x = L/2$

$$EI\frac{dy}{dx} = \frac{w \times [L/2]^2}{2} - \frac{wL^2}{8}$$

$$EI\frac{dy}{dx} = \frac{wL^2}{32} - \frac{4wL^2}{32}$$

$$EI\frac{dy}{dx} = -\frac{3wL^2}{32}$$

$$\frac{dy}{dx} = -\frac{3wL^3}{32}$$

$$EI\frac{d^2y}{dx^2} = \frac{wL^2}{2}$$

Applying B.C to eqn (1)

At point of symmetry $x = L/2$, dy/dx

$$EI\frac{dy}{dx} = \frac{wx^2}{4} + C_1$$

$$EI\frac{dy}{dx} = \frac{w[L/2]^2}{4} + C_1$$

$$EI\frac{dy}{dx} = \frac{wL^2}{16} + C_1$$

$$\boxed{C_1 = -\frac{wL^2}{16}} \quad -(2)$$

$$EI\frac{dy}{dx} = \frac{wx^2}{4} - \frac{wL^2}{16} \quad -(3)$$

$$EIy = \frac{wx^3}{12} - \frac{wL^2}{16}x + C_2 \quad -(4)$$

Applying B.C to eqn (4).

$x = 0$, $y = 0$.

$$0 = C_2$$

$$\boxed{C_2 = 0} \quad -(5)$$

$$EI \cdot y = \frac{wx^3}{12} - \frac{wL^2}{16}x \quad -(6)$$

at $x = L/2$. in eqn (3)

$$\frac{w[L/2]^2}{4} - \frac{wL^2}{16}$$

$$EI\frac{dy}{dx} = \frac{wL^2}{16} - \frac{wL^2}{16}$$

$$\boxed{\frac{dy}{dx} = 0}$$

at $x = 0$ in eqn (3)

$$E.I\frac{dy}{dx} = -\frac{wL^2}{16}$$

$$\boxed{\frac{dy}{dx} = \frac{-wL^2}{16E.I}}$$

at $x = L$ in eqn (3)

$$E.I\frac{dy}{dx} = \frac{wL^2}{4} - \frac{wL^2}{16}$$

$$E.I\frac{dy}{dx} = \frac{4wL^2 - wL^2}{16}$$

$$E.I\frac{dy}{dx} = \frac{3wL^3}{16}$$

$$\boxed{\frac{dy}{dx} = \frac{3wL^3}{16EI}}$$

at $x = L/2$ in eqn (6)

$$E.I\,y = \frac{w\times\left(\frac{L}{2}\right)^3}{12} - \frac{wL^2}{16}\times\frac{L}{2}$$

$$E.I\,y = \frac{wL^3}{96} - \frac{wL^3}{32}$$

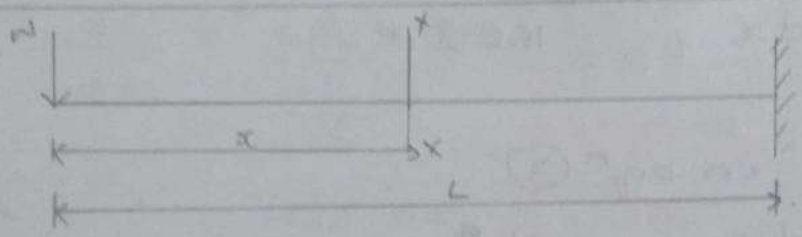
$$E \cdot I\, y = \frac{wL^3}{96} - \frac{3wL^3}{96}$$

$$E \cdot I\, y = -\frac{2wL^3}{96\,48}$$

$$y = \frac{-wL^3}{48EI}$$

$$\boxed{y = -\frac{wL^3}{48EI}} \quad [\text{downward}]$$

4b.



Taking moment negative.

$$Mx = -wx$$

$$E \cdot I \frac{d^2y}{dx^2} = -wx \quad \text{---(1)}$$

$$E \cdot I \frac{dy}{dx} = -\frac{wx^2}{2} + C_1 \quad \text{---(1)}$$

Applying B.C in eqn (1).

$x = L$, $dy/dx = 0$

$$0 = -\frac{w[L]^2}{2} + C_1$$

$$\boxed{C_1 = \frac{wL^2}{2}} \quad \text{---(2)}$$

$$E \cdot I \frac{dy}{dx} = \frac{-wx^2}{2} + \frac{wL^2}{2} \quad -(3)$$

$$E \cdot I\, y = \frac{-wx^3}{6} + \frac{wL^2}{2}x + C_2 \quad -(4)$$

Applying B.C in eqn (4)

$x = L,\ y = 0.$

$$0 = \frac{-wL^3}{6} + \frac{wL^3}{2} + C_2 \quad -(5)$$

$$C_2 = \frac{wL^3}{6} - \frac{wL^3}{2} = \frac{wL^3 - 3wL^3}{6} = \frac{-2wL^3}{6}$$

$$C_2 = \left| \frac{-wL^3}{16} \right| \quad -(5) \qquad \boxed{C_2 = -\frac{wL^3}{3}}$$

$$E \cdot I\, y = \frac{-wx^3}{6} + \frac{wL^2x}{8} - \frac{wL^3}{16} \quad -(6)$$

$x = 0$, in eqn (3)

$$E \cdot I \frac{dy}{dx} = \frac{wL^2}{2}$$

$$\boxed{\frac{dy}{dx} = \frac{wL^2}{2EI}} \quad -(7)$$

$$E \cdot I\, y = \frac{-wx^3}{6} + \frac{wL^2}{2}x - \frac{wL^3}{3} \quad -(6)$$

$x = 0$ in eqn (6)

$$E \cdot I\, y = -\frac{wL^3}{3}$$

$$y = -\frac{wL^3}{3EI}$$

$$\boxed{y = \frac{wL^3}{3EI}} \quad [\text{downward}]$$

4c. Given data:

$l = 4m = 4000mm$

$w = 2kN/m^2 = 2N/mm$

$C.I = 80 \times 10^2 N - mm^2$

$= 80 \times 10^9 N - m^2$

$$\frac{dy}{dx} = \frac{wL^3}{24EI}$$

$$\frac{dy}{dx} = \frac{2 \times 4^3}{24 \times 80 \times 10^9} = \frac{2 \times 4000^3}{24 \times 80 \times 10^2}$$

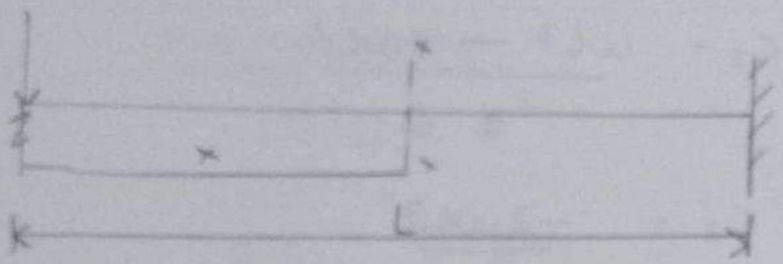
$$\frac{dy}{dx} = 6.66 \times 10^{-8} = 666.67 \times 10^3 \, mm.$$

$$y = \frac{5}{384} \frac{wL^4}{EI}$$

$$y = \frac{5}{384} \times \frac{2 \times 4^4}{80 \times 10^9} \qquad \frac{5 \times 2 \times (4000)^4}{384 \times 80 \times 10^2}$$

$y = 8.38 \times 10^{-8}$ $= 833.33 \times 10^6 \, mm$

5



Taking moment -ve

$$M = -wx$$

$$EI \frac{d^2y}{dx^2} = -wx$$

$$EI \frac{dy}{dx} = -\frac{wx^2}{2} + C_1 \quad \text{— (1)}$$

Applying B.C to eqn (1)

$x = L$, $dy/dx = 0$

$$0 = -\frac{wL^2}{2} + C_1$$

$$C_1 = \frac{wL^2}{2} \quad \text{— (2)}$$

$$EI \frac{dy}{dx} = -\frac{wx^2}{2} + \frac{wL^2}{2} \quad \text{— (3)}$$

$$EI\, y = -\frac{wx^3}{6} + \frac{wL^2}{2}x + C_2 \quad \text{— (4)}$$

Applying B.C to eqn (4)

$y = 0$, $x = L$

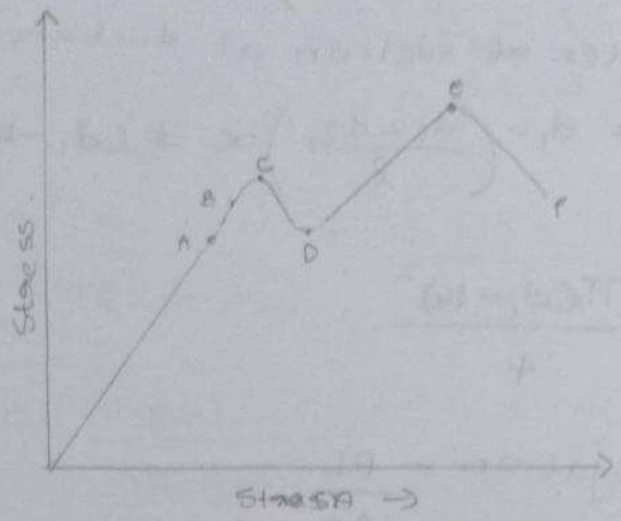
$$0 = -\frac{wL^3}{6} + \frac{wL^3}{2} + C_2$$

$$C_2 = \frac{wL^3}{6} - \frac{wL^3}{2}$$

FIRST INTERNAL

PART-A

1a.



1) Limit of proportionality [A].

2) Elastic limit [B].

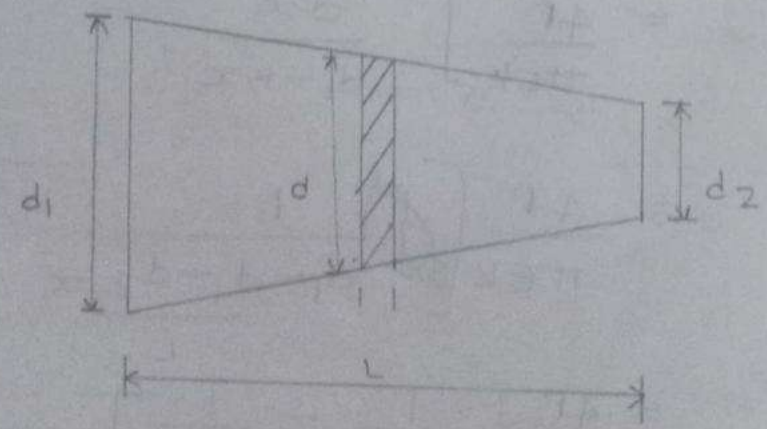
3) Upper yield point [C].

4) Lower yield point [D].

5) Ultimate stress [E].

6) Breaking point [F]

1b



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Change in dia over length = $d_1 - d_2$.

Rate of change in dia = $\frac{d_1 - d_2}{l} = k$

diameter of section at distance.

Change in dia $d_1 - \left(\frac{d_1 - d_2}{l}\right) x = (d_1 - kx)$ where, $k = \frac{d_1 - d_2}{L}$

$$\text{Area} = \frac{\pi (d_1 - kx)^2}{4}$$

$$\text{w.k.t elongation} = \frac{PL}{AE}$$

$$= \frac{P\,dx}{\frac{\pi (d_1 - kx)^2}{4} \times E}$$

$$= \frac{4P\,dx}{\pi (d_1 - kx)^2 E}$$

To determine the total elongation in the bar.

$$\Delta L = \int_0^L \frac{4P\,dx}{\pi (d_1 - kx)^2 E}$$

$$= \frac{4P}{\pi E k} \int_0^L \frac{dx}{d_1 - kx}$$

$$= \frac{4P}{\pi E k} \left[\frac{1}{d_1 - \frac{d_1 - d_2}{L} x} \right]_0^L$$

$$= \frac{4P}{\pi E k} \left[\frac{1}{d_2} - \frac{1}{d_1} \right]$$

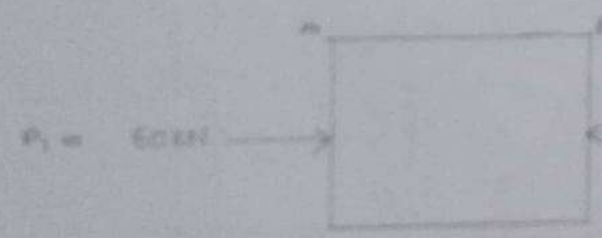
$$= \frac{4P}{\pi E K}\left[\frac{d_1 - d_2}{d_2 \cdot d_1}\right]$$

$$= \frac{4P}{\pi E\left[\frac{d_1 - d_2}{L}\right]} \times \left[\frac{d_1 - d_2}{d_2 \cdot d_1}\right]$$

$$= \frac{4PL}{\pi E[d_1 - d_2]} \times \frac{d_1 - d_2}{d_2 \cdot d_1}$$

b elongation $\Delta L = \dfrac{4PL}{\pi E \cdot d_1 d_2}$

c Section AB:



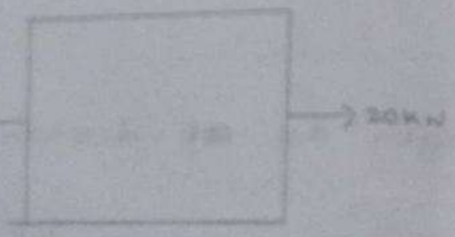
$= -70 - 80 + 100$

$= -50kN$

[Compression]

Section BC:-

$50 - 70 = -20kN$

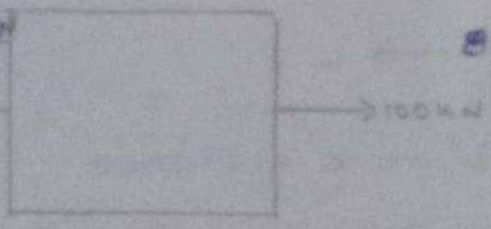


$-80 + 100 = 20kN$

[tensile]

Section CD:-

$50 - 70 - 80 = -100kN$



[tensile]

$$\Delta_1 = \frac{P_1 L_1}{A_1 E_1} = \frac{50\times10^3 \times 750}{1000 \times 200\times10^3} = 0.1875\,mm$$

$$\Delta_2 = \frac{P_2 L_2}{A_2 E_2} = \frac{20\times10^3 \times 500}{1000 \times 200\times10^3} = 0.05\,mm$$

$$\Delta_3 = \frac{P_3 L_3}{A_3 E_3} = \frac{100\times10^3 \times 750}{1000 \times 200\times10^3} = 0.375\,mm$$

10

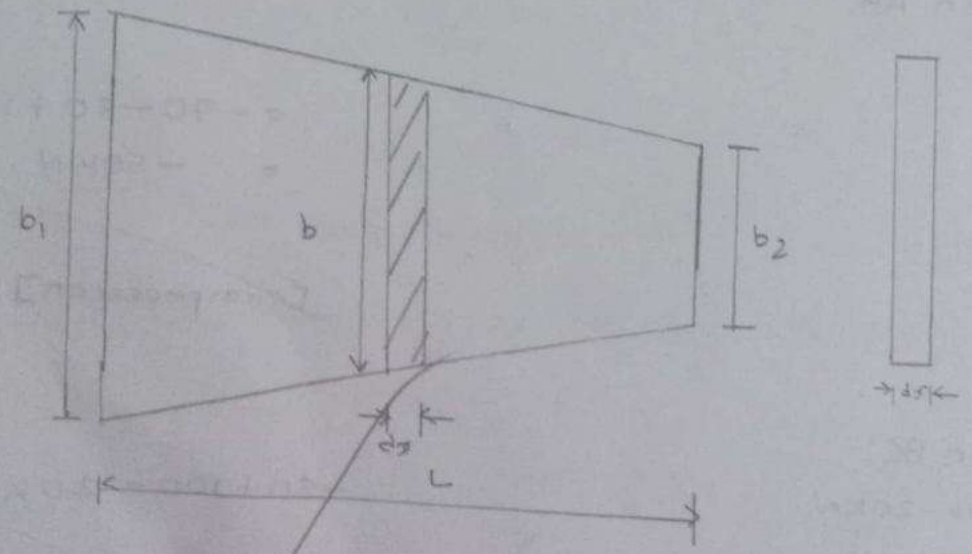
$$\Delta = -\Delta_1 + \Delta_2 + \Delta_3.$$

$$\Delta = -0.1875 + 0.05 + 0.375$$

$$\Delta = 0.2375\,mm.$$

PART-B

4a.



Consider an elemental length 'dx' at distance 'x' from the larger end.

$$b_1 \rightarrow 0.$$

$$b_2 \rightarrow L.$$

To find the height 'b' at x distance

$$b\ ? \rightarrow x.$$

Interpolating we get $\frac{b_1 - b_2}{L}$

Hence area of the $= \left(b_1 - \left[\frac{b_1 - b_2}{L}\right] x\right) t$

$= (b_1 - kx)\, t$ $\qquad k = \frac{b_1 - b_2}{L}$

w.k.t elongation $= \frac{PL}{AE}$

$= \frac{P\,dx}{b_1 - kx\, t\, E}$

Integrating, to get extension of whole bar,

$$\Delta = \int_0^L \frac{P\,dx}{(b_1 - kx)\, t\, E}$$

$$\Delta = \frac{P}{t \cdot E} \int_0^L \frac{dx}{b_1 - kx}$$

$$\Delta = \frac{P}{t \cdot E} \times \frac{1}{k} \int_0^L \frac{1}{b_1 - kx}$$

$$\Delta = \frac{P}{t \cdot E} \times \frac{1}{k} \int_0^L \frac{1}{b_1 - \left(\frac{b_1 - b_2}{L}\right) x}$$

$$\Delta = \frac{P}{t \cdot E} \times \frac{1}{k} \left[\log_e \left[b_1 - \left(\frac{b_1 - b_2}{L}\right) x\right]\right]_0^L$$

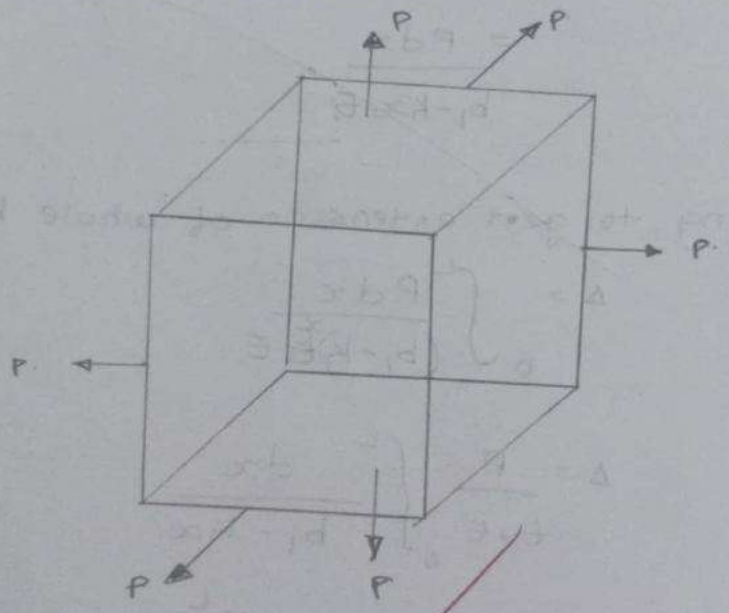
$$\Delta = \frac{P}{k\, t\, E} \left[\log_e b_1 - b_1 + b_2 - \log_e\right]$$

$$\Delta = \frac{P}{k\, t\, E} \left[\log_e b_2 - b_1\right]$$

$$\Delta = \frac{P}{Kt\epsilon} \times \log_e \frac{b_2}{b_1}$$

$$\Delta = \frac{PL}{t\epsilon b_1 - b_2} \times \log_e \frac{b_1}{b_2}$$

4b Consider a cubical element subjected to stress on three a mutually perpendicular direction.



Now the stress p causes tensile strain in x direction $\frac{P}{E}$ and now the stress p causes compression strain on y and z direction i.e. $\mu \times \frac{P}{E}$

$$e_x = \frac{P}{E} - \mu\frac{P}{E} - \mu\frac{P}{E}$$

$$e_x = \frac{P}{E}[1-2\mu]$$

similarly $e_y = \frac{P}{E}[1-2\mu]$

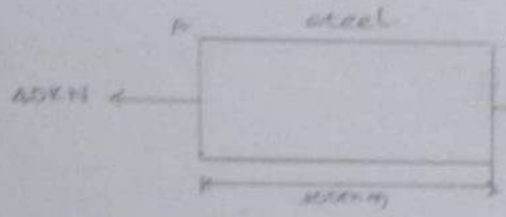
$e_z = \frac{P}{E}[1-2\mu]$.

$e_v = e_x + e_y + e_z$

$CV = \frac{3P}{E}[1-2\mu]$

4c

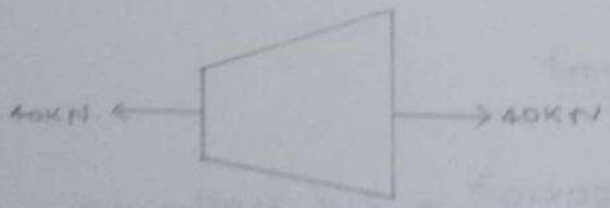
PART AB



(tensile).

$E = 200 \times 10^3 N$

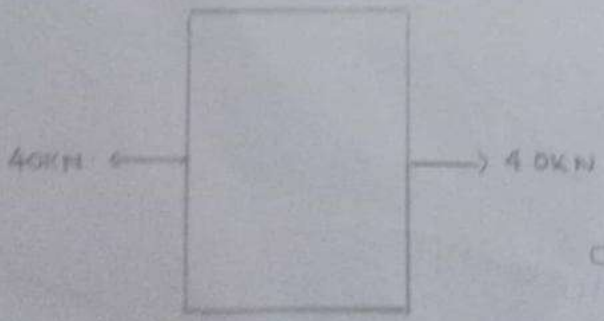
PART BC



(tensile)

$E = 70 \times 10^3 N$

PART CD



(tensile)

$E = 100 \times 10^3 N$

$\Delta_1 = \frac{P_1 L_1}{A_1 E_1} = \frac{4 \times 40 \times 10^3 \times 300}{\pi (20)^2 \times 200 \times 10^3} = 0.19mm$

iv) % increase elongation = $\frac{50}{200} \times 100$

$= 25\%$

v) % decrease in c/s = $\frac{\text{change in area}}{\text{original area}} \times 100$

$= \frac{\frac{\pi(20)^2}{4} - \frac{\pi(16)^2}{4}}{\frac{\pi(20)^2}{4}} \times 100$

$= 36\%$

49/50

Cw Arsi

Bearys Institute of Technology
MANGALORE

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
FIRST INTERNAL ASSESSMENT TEST

SUB: MANAGEMENT AND ENTREPRENEURSHIP FOR IT INDUSTRY
DATE: /11/2021
SUB CODE: 18CS51 **TIME:**
SEM: FIFTH **MAX. MARKS: 50**
FACULTY NAME: AKSHATHA S.A

*Answer **Any One Full Question** from each part*

		PART A	M	CO	BTL
1.	a)	Define Management. Write various characteristics of management.	8	CO1	L1
	b)	What are the types of organization? Explain with flow chart Line organization.	8	CO1	L1
	c)	Write a short note on need and importance of staffing.	4	CO1	L1
		OR			
2.	a)	Define Leadership. What are the types of leadership types.	8	CO1	L1
	b)	Explain the techniques of co-ordination	8	CO1	L2
	c)	What are MBO and MBE explain.	4	CO1	L1
		PART B			
3.	a)	What are the characteristics of management?	10	CO1	L2
	b)	State and explain steps in decision making	10	CO1	L1
		OR			
4.	a)	Explain steps in controlling.	10	CO1	L2
	b)	Explain the following 1) Cognitive evaluation theory 2) Herzberg theory	10	CO1	L1
		PART C			
5	a)	Explain the F.W theory of management	10	CO1	L1
		OR			
6	a)	Define staffing. Explain the process of recruitment and selection.	10	CO1	L2

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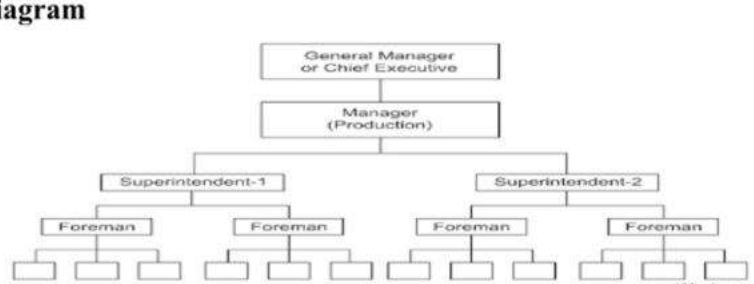
MANGALORE

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
FIRST INTERNAL scheme

SUB: MANAGEMENT AND ENTREPRENEURSHIP FOR IT INDUSTRY
DATE: /11/2021
SUB CODE: 18CS51 **TIME:**
SEM: FIFTH **MAX. MARKS: 50**
FACULTY NAME: AKSHATHA S.A

*Answer **Any One Full Question** from each part*

		PART A	**M**	**M**	**CO**	**BT L**
1.	a)	Define Management. Write various characteristics of management. **By Mary Parker Follett -** "Management is art of getting things done through people". **Nature of Management** It should be stable 2. It should be applicable to all kinds of Organizations 3. It should be transparent 4. Its approaches are to be clear and goal oriented. 5. It should be simple yet effective. 6. It should have well defined goals. 7. It should have good planning, organizing, staffing, directing and controlling functions. 8. It should provide conductive atmosphere of work.	2 8	10	CO1	L1
	b)	What are the types of organization? Explain with flow chart Line organization. **Types** 1. Line organization 2. Functional or Staff organization 3. Line and Staff organization 4. Committee organization 5. Matrix organization **Diagram**  	2 2	8	CO1	L1

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		There are three important principles in this system 1. Command should be given to subordinate through the immediate superior. 2. There should be only one chain i.e., command should be received from only one immediate superior. 3. The number of subordinates whose work is directly commanded by the superior should be limited. **Advantages:** 1. Simple and easy to understand 2. Flexible, easy to expand 3. Makes clear division of authority 4. Clear channel of communication with no confusion 5. Strong in discipline as it fixes responsibility on an individual	4			
	c)	Write a short note on need and importance of staffing. **Importance and need for proper staffing** There are a number of advantages of proper and efficient staffing. **1**. It helps in discovering talented and competent workers and developing them to move up the corporate ladder. **2**. It ensures greater production by putting the right man in the right job. **3.** It helps to avoid a sudden disruption of an enterprise's production run by indicating shortages of personnel, if any, in advance. **4**. It helps to prevent underutilization of personnel through over manning and the resultant high labor cost and low profit margins.	 1 1 1 1	4	CO1	L1
2.	a)	Define Leadership. What are the types of leadership types? **Definition:** The action of leading a group of people or an organization. **Types** 1) *Traits approach* *2) Behavioral approach* *3) Contingency approach*	 2 2 2 2	8	CO1	L1
	b)	Explain the techniques of co-ordination 1. **Rules procedures and policies** 2. **Planning**	 8	8	CO1	L2

		3. **Hierarchy** 4. **Direct contact** 5. **Task force** 6. **Committees** 7. **Induction** 8. **Incentives**				
	c)	What are MBO and MBE explain. **MBO** MBO is a process, in which the general Manager and his subordinates of an organization jointly identify the common objectives, define individual's responsibility and use these measures as guides in achieving the company's goal. The nature of objectives can be of the following types 1. Short term 2. Long term 3. Specific 4. General Advantages of MBO 1. It provides a basis for planning and development of policies, budgets and procedures. 2. It is a powerful tool for the management to achieve a higher productivity. 3. It gives proper direction and necessary responsibility to the people in an organization 4. It coordinates the efforts of various departments of an organization 5. It improves employee morale and discipline **MBE** According to this principle only unusual or exceptional items of major deviation in the daily activities should brought to the notice of a manager **Six Phases of Management by Exception** 1. Assignment of values to identify the exceptions 2. Projection of meaningful measurements to business objectives 3. Make observation 4. Comparison of actual performance with expected performance 5. Reporting the balance to management 6. Decision making	2 2	4	CO1	L1
		PART B				
3.	a)	What are the characteristics of management? It should be stable 2. It should be applicable to all kinds of Organizations 3. It should be transparent 4. Its approaches are to be clear and goal oriented.	10	10	CO1	L2

		5. It should be simple yet effective. 6. It should have well defined goals. 7. It should have good planning, organizing, staffing, directing and controlling functions. 8. It should provide conductive atmosphere of work.				
	b)	Explain different methods of establishing the control. i)**Traditional Techniques** 1.Personal observation 2.statistical reports 3.Break even analysis 4.Budgetary Control **ii)Modern techniques** 1.Return on investment 2.Responsibility accounting 3.Management audit 4.PERT 5.CPM 6.Management Information system 7.Internal audit	5 5	10	CO1	L1
4.	a)	Explain steps in controlling. **Diagram**  1)**The Establishment of Standards:** **2)Measurement of Performance:** **3)Comparing Measured Performance to Stated Standards:** **4)Taking Corrective Actions:** **5)Follow – ups**	2 8	10	CO1	L2
	b)	Explain the following **Skinner behavior modification theory** The theory is believed and based on the behavior of the past circumstances which they have learnt that the certain behaviors associated with pleasant outcomes and certain other behaviors are associated with unpleasant outcomes. Example: Obedience to authority leads to praise and disobedience leads topunishment. **Herzberg theory** Original study based on the research by Fredrick and Herzberg who interviewed 200 engineers and accountants and were asked about the good times and bad times they think about their jobs. Out of these interviews two factors emerged calledthe I Maintenance factors II Motivators or satisfiers. **I Maintenance factors (Factor 1)** 1) Fair company polices and	5 5	10	CO1	L1

		administration 2) A supervisor who knows the work 3) A good relationship with ones supervisor. 4) A good relationship with one's peers. 5) A good relationship with ones subordinates				
		PART C				
5	a)	Explain the Fayol's administration theory of management (1)Division of work (2)Authority and responsibility (3)Discipline (4)Unity of command 5)Unity of direction 6)Subordination of individual interest to general interest 7)Remuneration 8)Centralization 9)Scalar chain: 10)Order	10	10	CO1	L1
6	a)	Define staffing. Explain the process of recruitment and selection. **Definition** Staffing is the managerial function of recruitment, selection, training, developing, promotion and compensation of personnel. **Steps** 1. Recruitment or getting applicants for the jobs as they open up. 2. Selection of the best qualified from those who seek the jobs. 3. Training those who need further instructions to perform their work effectively or to qualify for promotions. 4. Performance appraisal, since it serves as the basis for job change or promotion. 5. Administration of compensation plans, since it is an important factor in both getting and holding qualified people.	2 8	10	CO1	L2

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INTERNAL ASSESSMENT TEST BOOK

NAME OF THE STUDENT : Shireen Fathima

YEAR : 3 , 5th Sem BRANCH : CSE SECTION : -

ROLL/UNIVERSITY SEAT NUMBER : 4BP19CS060

SUBJECT : MANAGEMENT AND ENTREPRENEURSHIP FOR IT INDUSTRY (18CS51)

	DATE	MAX. MARKS	MARKS OBTAINED	TEACHER'S INITIAL	REMARKS
FIRST TEST		~~25~~ 50	49/50	6/12/2021	V. good
SECOND TEST		~~25~~ 50	~~37~~ 45/50	29/12/21	
THIRD TEST	24-1-22	~~25~~ 50	50/50	29/1/21	
FINAL TEST		~~25~~ 30	29	21/2/22	

29 + 10 = 39

FINAL TEST MARKS IN WORDS : 39 ~~two~~ thirty nine only

Signature Staff HOD Principal

Manjur Basha Sheik Ibrahim Digitally signed by Manjur Basha Sheik Ibrahim Date: 2023.08.09 15:53:37 +05'30'

Name: Shireen. Talhime
USN: 4BP19CS060
Sub: ME (18CS51)
Sem: 5th Branch: CSE

PART-A

1.(a) Management is the process of planning, organisin directing, controlling and coordinating individua group of individual working towards attaining the main goal & objective.

* Every buisness needs management for proper functioning
* Management is the art of getting things done through people.

Characteristics of management:

* Management is Universal: Management is univers irrespective of different department, fields like financial, medical, education, organisational etc. It necessary in every field
* Management is goal diented: Management has its objectives and goals. Goals are prime attraction for all the people working for it.
* Management involves coordinatin: People from different departments and levels coordinate to execute the process and to accomplish the desired goals.
* Management is the continous process & Buisness ke expandanding and it has to be properly looked

* Management involves Communication : Communication is the main aspect of management. Communica is the process sending messages, receiving messag If there is no proper communication it may lead to misunderstanding and chaos. chaos.

* Management involves planning : Planning is bridge that connects where we are and where we w to be. Its as if we are planning for the future

* It helps in creative thinking and incapacity innovation

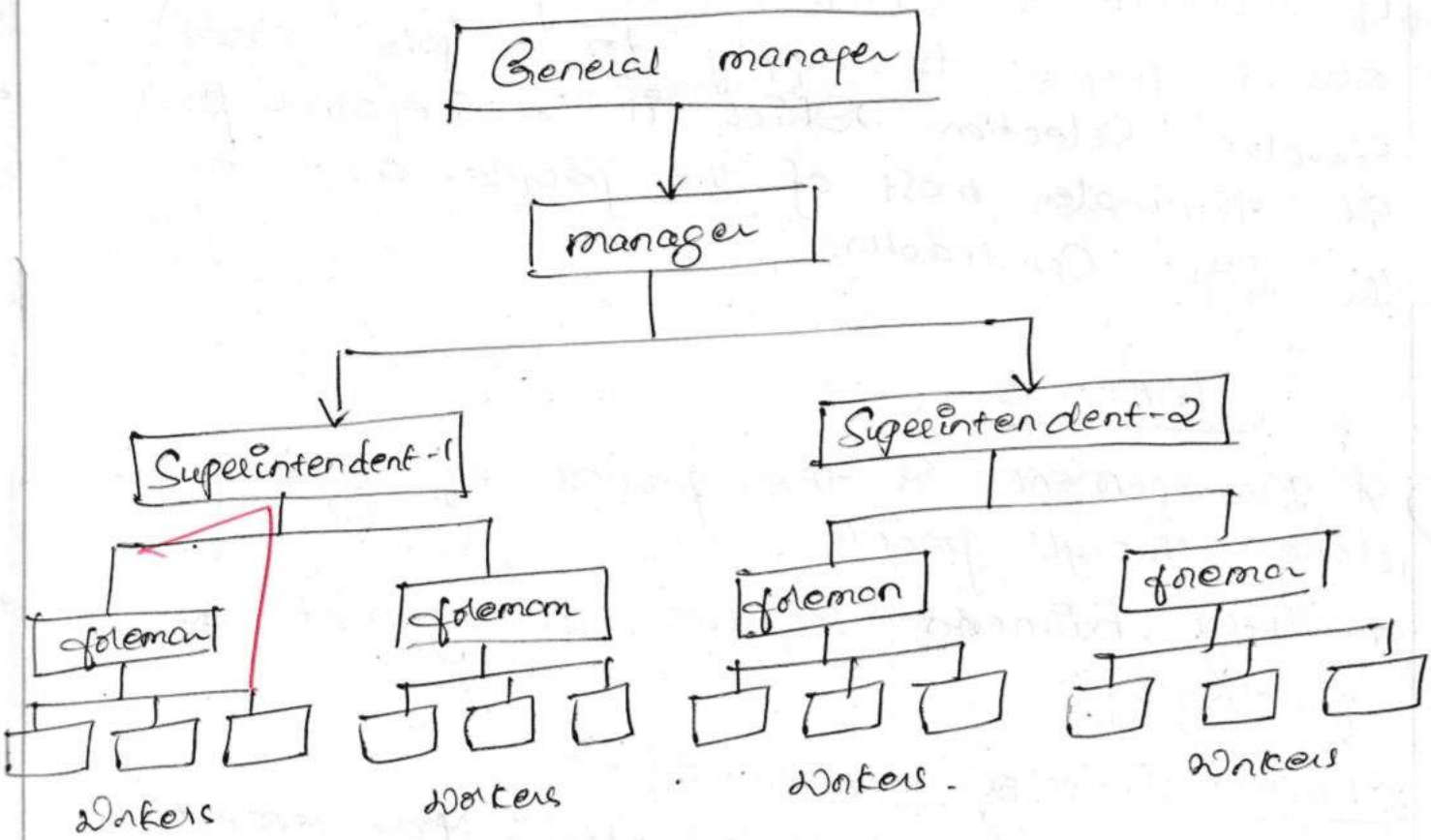
* It is intangible : Management cannot be felt but its presence can be measured by looking at objectives that are accomplished.

15) Organisation : Organisation is the backbone of manag It is basically to : * Identify goals.
* Dividing people and allocating them with right job and responsibility
* Giving them the complete freedom to execute the responsibilities.

Types of Organisation
* Line organisation
* functional organisation
*

Line Organisation : Line organisation is also call a) Scalar organisation & military organisation
* its called military organisation as the older passed there resemble military format.

* the orders come from the person at the top to the bottom most person.
* there is linear flow of orders / powers.
* there is clear cut communication between all the levels.
* Orders to each level is given from their immediate superiors.
* Orders cannot be passed from lower level to higher level.



Advantages:
* Easier to implement
* Clear channel of communication
* time saving

Disadvantages:
* Does not allow (other) people at lower level to show co their proficiencies
* When we have incompetant managers.

1c) Staffing: After organisation, staffing needs to be done. Staffing is the process of choosing right people to do a particular job. It is the process of choosing qualified candidates for th job. Staffing is the continous process as peop may leave the job, expire, get promoted, transfer etc. So the staffing is needs to closely looked into. Staffing involves the proce of recruitment which is a positive process that allows people to apply for a job and it al involves selection which is a negative process of eliminates most of the people and only selu the right candidates.

PART - B

3(a) * Management is the process of getting things done through people.
* Every business requires management for smoo functioning

Characteristics of management:

* Management is goal oriented: Management has its objectives and goals. Everybody needs wor inorder to attain those goals.
* Management involves rational thinking: Managers have to be emotionally, physically and practical stab inorder to think and make practical decisions for the betterment of the organisation.

* Management is intangible: Management cannot be felt & touched. It can be measured by the objectives that were attained.

* Management involves Coordination: People from various department, fields work together to max the efficiency and profit. It helps in time management.

* Management involves planning: Planning is the determination of where we are, what we want where we want to be, how to do it and who has to do it. It's basically making plans of the future.

* Management is Universal: Irrespective of th field be it medical, forensic, school, college etc management is a must everywhere.

* Management involves decision making: Managers must have the capability to make right decisi for the organisation that can helps in attaining th goal.

* Management is Structural process: Decision of pla made at the lower level helps the higher level and thus an overall attainment of the go

3b) Decision making: Decision making is one of the main criteria in management. Managers must ma the right decision which helps in progressing towards the goals.

Steps involved in Decision making:

Step 1: * To obtain the objectives: the goal / objectives

of the organisation must be done. before that there
two factors which must be looked into they are
* Internal Sources
* External Sources.

Internal factors are the factors that affect internally like financial le
production level) Sales, hours of work, creditworthyne

External factors are the externally factors that
involve in decision making like: company image,
brand image, etc.

Step 2: to evaluate planning premises: Decisio
must be made keeping the future in mind
like: future trends, population growth, raw materi
availability
government rules, socio-economic growth etc.

Step 3: to evaluate alternate source of achin: they
are various alternatives available. the world is
very competitive and fast moving. the products/
materials can be bought anywhere from the
world.

Step 4: to evaluate and select best alternative source: All the
alternatives sources are evaluated and checke
and the best one is choosed. Selection is done
by various searching techniques and open research.

Step 5: to make derivative plans: ~~Inte~~ need t
~~make~~ After choosing the alternate source of ac
we need to make sub plans in order to execu
the main plans. eg:- if TATA motors wants to pro
5 million Nano cars then its derivative plan is
to: producing, costing, ~~forging~~ getting raw materials etc
execute the plan

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Step 6: To maintain develop Cooperation and Improvement of employee performance

Employee's must work in co-operative way and thus it helps the overall performance of the organisation

Step 7: To do regular follow ups & Decision making is a Continous process. failing to plan is planning to fail. Decisions must be closely looked into at regular intervals so that it does not deviate. from

PART-C

6(a) Staffing is the process of choosing right people to a particular job. It helps in Choosing qualified professionals to do the job.

Recruitment: It is the process of where people apply for a particular. It is a positive process as large number of people apply for it

Recruitment can be based on:

* Internal Sources: Hiring people within the organisation
* External Sources: Hiring people outside the organisation

Internal Sources: People within the company may be promoted, transferred to other posts.

Advantages:

* It helps in wastage of time
* It helps employees to a sense of responsibility and belonging
* It helps in development of employees finance

Disadvantages:

* They may not be Competant
* No innovative thinking
* May decrease the efficiency.

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Exteend Sources: People getly hired from Outsid
the Organisation.
(i) Recommendation: friends or family members of the curren
may apply for the job through recommendation
(ii) Retired | retrenched: Retired | retrenched employ
may apply for the jobs.
(iii) Government exchange: It was used earlier.
Where in government would exchange the employ
but now it's rarely used.
(iv) Campus Interview: Campus Interviews are condu
for graduates in the campuses which is very popu
now
(v) Walk in Interviews: People personally get into
Interviews after looking into it
(vi) Advertisements: Newspapers, Radio, News, Internet
are used as medium for endorsing the jobs
(vii) Human resource management: Company may
want HR's to select and gives the employees
(viii) Labour Unions: Labour Unions used to prom
workers etc. It's a old technique

Selection: After the recruitment process, Selection
done. It is a negative process where out of ma
applicants we select only a selected Candid
If the right candidate is not Choosen
then it may be a loss for the organisation
Step 1: fill the Application form: Candidates must
fill the application form with their details u

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educational qualification, family background, previous job, previous Salary drawn, Skills etc. If the application form is Selected they move into next level else they are rejected.

Step2: Preliminary interview: This step is helps in selecting the unqualified / Unfit candidates It checks the educational qualification of candidate If they pass it they move to next level

Step3: Employment test: this step checks skills abilities of the Candidate

Step4: Aptitude test:

(i) Proficiency test: Checks knowledge & proficiency areas mentioned in the form

(ii) Interest test: Checks the interest regarding the job

(iii) Intelligent test: checks IQ of the candidate

(iv) Attitude test: checks the personality, attitude of the candidate

Step5: Group discussion: Random random are given they must speak on it and expless their thoughts etc. It helps in knowing their Communication Skills, overall clarity etc.

Step6: Final interview: Its done by the top people of Company which is based on their overall personality

Step7: Checking References: they are background is properly investigated before actually moving ahead

Step8: Medical checkup: they are medically examined properly so that they donot carry any contagious disease

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Step 9: Placement: finally the placement is done after the Candidate qualifies all the steps. Some terms and Condition are to be signed

49/50

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INTERNAL - 2

PART - A :

1(a). = Entrepreneurs are the one's who take up the initiative to bring about change by inventing new changes and taking up risks and rewards along the way.

Different types of Entrepreneur :

* According to types of Economic development :
  * Innovative Entrepreneur
  * Imitative Entrepreneur
  * Fabian Entrepreneur
  * Drone Entrepreneur

* According to the buisness types :-
  * Buisness Entrepreneur : Buissnessmen people
  * Trading Entrepreneur : People who do trading.
  * Industrial Entrepreneur ← People who set up different industries and look after them are
  * Corporate Entrepreneur : People who Corporate sector
  * Agricultural Entrepreneur ← : People who do agricu
  * Resource Entrepreneur ← People who supply different resources.
  * Services Entrepreneur
    → Enterprise that provide different services

* According to the technology :
  * High-tech Entrepreneur : People with high technical skills
  * Low-tech Entrepreneur : People with low technical skil
  * Professional Entrepreneur : People who a very experienced and well versed in
  * Technical Entrepreneur
  * Non technical Entrepreneur ← People without any technical knowledge

* According to the Area :
  → * Urban Entrepreneur : they are people building the Enterprise are in Urban areas.
  * Rural Entrepreneur : they are people building the Enterprise in rural areas and are developing rural areas.

According to the Scale of Operation:

* Small Scale Entrepreneur: they make total investment upto ₹ 1 Crore
* Medium Scale Entrepreneur: they make total investment upto 1–5 Crore.
* Large Scale Entrepreneur: they make total Investm greater than 5 crore

According to the gender:

* Male Entrepreneurs and * Female Entrepreneu } of different age like young, old, Adult.

Let us elaborate some of the main Entrepreen

* Innovative Entrepreneurs: Entrepreneurs are ma known to bring about changes. They invent n products & methods and are very creative. It can also be new varient of old pro they change the society adversely. They are mainly found in most developed countries.

* Immitative Entrepreneurs: Entrepreneurs who do invent anything new but rather immitate th others and build their enterprise are said be Immitative Entrepreneurs. They are mainly found in developing countries. Nevertheless they are very important for the development the country

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* Fabian Entrepreneurs: Entrepreneurs who do not innovate but neither do they imitate, they stick to their own method and are resistant to change. They are scared of the risk that accompanies along with it. They only change when they are compelled to do it, else they won't.

* Drone Entrepreneurs: Entrepreneurs like these are mainly found in India. They are old fashioned and stick to the same methods even though the business is not doing great. They would prefer to sink than to adopt & imitate others. eg: Ideal Jawa, motorbike company in Mysore.

(c) Project Formulation:

Project formulation is one of the main criteria of the Business. Out of all the Business ideas, we they must select one of the best idea & work on it.

Different Stages are:

* Selection and Evaluation of appropriate project:

Before formulating it, Project must analysed properly with respect to all its pro's and cons.

* Different business opportunities: with regards to the project they must look into.

→ Bridging the gap in the market

→ Making breakthrough technological innovation

→ the actual needs of the customer

→ Conducting different market surveys.

* Project formulation helps in giving the direc
to check if you are going in the right
direction or not.
* Project formulation is also very important not
only in planning but also in implementation
* It will helps in deciding the way to know
all your goals and objectives, where you want
to be, how you will get and when you
will get there.
* Project formulation is done after managerial
tool is operation that SWOT analysis, which
is to look into the Strength, Weakness, and
Opportunities and threat in the project.
* Project formulation helps in also attracting the
investors, venture capitalists, Banks etc.
* It also without proper the project formulati
it is nearly impossible for license clearance
and other documentation works.
* It helps to get a great start in Business.

3(a) Entrepreneurship is actually derived from a
french word "Entreprendre" which means "to
undertake". They being about changes. They bri
gap between the market. They create a large-scale
employment opportunities. They helps to increase the
economy. They also develop the rural areas thus
reducing the regional imbalances. It also helps in
maintain good relation with other Countries through sal
export et

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2(a) Important qualities of Entrepreneurs are:

* Innovation: Entrepreneurs must be innovative, they must bring about changes, standing by the actual meaning of "Entrepreneurship" which mean to undertake.
* Effective Communicator: they must be able to communicate efficiently as it would avoid a misunderstandings along the way
* Responsible: they must responsible with handl the Enterprise be it financial, market, technological ch
* Negotiating skills: they must handle all the situations efficiently. they should be able to tactical.
* Leadership: they must be team man, which is to lead the team properly and achieving the goals together
* Ethical: they should be careful with all th Government rules and regulations and should n break any law.
* Preseverance: they must be able to endure al the problems along with it.
* Problem solving: It is one of the main qualities that is to anticipate problems and be ready fo with the solution
* time management: they must always value tim and work accordingly with it.
* they are several other qualities like dedicatio motivation, creativity etc. Risk bearing,
* Risks: they must bear all the risks and work carefully.

2(b) Entrepreneur and manager are quiet diffe
from each other based on economic Standard
An Entrepreneur can be a manager but a
manager cannot be a Entrepreneur.

Differences:

Entrepreneur	Manager
* The main motive of Entrepreneur is to build Enterprise and make profits and making his personal growth.	* The main motive of manager is to provide services to the enterprise get his salary in return
* He bears all the risks and uncertain conditions	* He does not bear an any risk. He only does what is instructed to do
* He gets rewards in the form of Profit. He is the owner of the Entrepreneur	* The status of the ma of just of employer. He gets rewards in the form of salary & promotion
* He faces all the necessary decision and Strategies the plan for the Enterprise. He has the complete authority	* He may also participa in making Strategies wi the Entrepreneur, but does what is required for the plan and looks after the Subordinates.
* He need not have any educational qualification but must have skills like leadership, time management, problem Solving, Creative, innovative etc	* He needs to have educational qualification with lot of other skil which helps them to get recruited quickly

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5(a) Every since ages humans have evolved and they have brought many changes making the life life very easier. Entrepreneurship is to take the initiative to bring changes and accompany the risks and rewards along with it.

Different Stages of Entrepreneurial process are:

Step1: * Selection and Evaluation of Buisness opportunity

* they are many opportunities that arise in the market from time to time. But only a few take up the opportunity and sieze them.
* Buisness opportunities must be evaluated based
  → real and perceived opportunity ~~and its~~ and the
  → market needs. they must look into all the aspects of it so as to reduce risks.

Step2: Develop an plan for the buisness: After Selection of buisness, they must plan efficiently looking into the current and future demands. the kind of customers to be targeted and developing a plan to maximise profits and to minimise loss.

Step3: Determing the resources required: They must Calculate all the resources like that of raw materials required, power, plant and machinery and the location. It must be looked into careful before the setup. and also financial aspects

Step4: ~~formulating~~ Setting up the buisness:

They must also looks into all the governme laws and regulations and must be ready wit all the documentation work. They

must get licenses and other clearances that are required, With the help of the funds raised they can start the Buisness. They can also consu for professional help if needed.

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INTERNAL - 3

1(a). Manager plays a variety of roles in toward the betterment of the organisation.
There are mainly 3 main types they are
* Interpersonal roles
* Informational roles
* Decision roles.

1. Interpersonal roles:
* figure head: Manager acts like a representative he has to look after the Organisation. take the dignaties to lunch, greet them and attend weddings of employees.
* Leader: Manager is the leader of the organisation employees and keep guiding them.
* Liason: Manager has to look after the external matters as well, he to build external Connection for the wellbeing of the organisation

2. Informational roles:
* Dessemination: Manager has to pass the information in the organisation. Like the rules from top level to lower level and advices lower level to the top level.
* Spokesman: Manager has to represent the company at various organisation events and be the spokesperson & Communicate the goals and plans to the Outside world etc.

Extend links: Manager has to have good Contact with external world as it would helpful in scaling the buisness, extend links be created through personal formales, colleques etc. it develops healthy environment to work in

(3) Decisin roles:

* Entrepreneur: Manager at times have to act a entrepreneur and take decisons for the be of the organisation and input the ideas
* Resource allocator: Manager has to take decis regardig resource distribution and how resource are going to get shared.
* Negotiator: Manager has to negotiate with trad unions, vendors, unions etc and resolve any conflict that arises.

15) Management has three levels. the level of management acts like a line of separation with respect to the duties, responsibility an status. the three levels of management are:

* top level management
* Middle level management
* low level managent.

top level management: top level management is repo

by Board of directors, Chief executive officers, Managing directors, Chief General - etc.

* they establish the policies.
* they make the goals and formulate the plan of the organisation
* they evaluate the performance
* they judge the results

Middle level management: they are represented by the finance manager, Department heads, technical manager etc

* they help in Communicating the plans from the top level for smooth functioning of the organisation
* they act as a link between top and low level management.
* they assist the low level management and look after the progress of the organisation

Low level management: they are represented by the Supervisors, clerks, foreman etc.

* they help in doing all the activities as guided by Supervisor.
* they work under the low level management
* they fulfil all the day to day to works which are basic and needed for the long term betterment.

PART-B

3(a) Enterpreneurship in India:

* Metal handicrafts have existed every since pr
Christian era and was sold and traded fo
profit
* In post christian Era, Caste based business
created "Khastkhonds" and handicraftsmen formed a
association called Guilds.
* the dominance of Entrepreneurial activity was
during the east rule of east indie Company
the parsi Enteprenewrs like Manjee Dhorjee and
Cowasjee Nushirwan built Ships and Gun powde
of the Company
* Ranchod Lal Chotalal, Nagar brahmin was
the first to set up textile industry in In
in the year 1854 which was a fail initially
succeeded in the second attent 1861.
* Indian Handicrafts had world wide reputation
like Cotah from Bengal, Chintzes from Lucknow
Shawls from Kashmir, Metalware from Varanasi
Dupatta and Dhoti from Ahmedabad etc
* the Successful Parsi Jamshedjee Tata was the
first to start Steel Industry in India 1911 a
later this led to the entry of Birla fam
in 1911.

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* The Swadeshi movement called by Mahathma Gandhi for the use of Indian Goods led the entrepreneurial activity. Jains and Vaishyas led to give up their Conservative attitude and joined the Industrial Entrepreneurs.

* The Socialistic movement by the Nehru government also helped in strengthening India Entrepreneurs and protected them from Multinational Companies but it prevented Indian goods from selling abroad.

* The monopoly, Red tapes, low production, high taxes etc. marked the first 40 years of Independence. Inspite of all this India saw the rise of Dhirubhai Ambani, and Karsanbhai patel extraordinary Entrepreneurs who overcame all the obstacles and sow the seeds for their empire.

* the Emerging ~~to~~ ~~after~~ then India saw exceptional Entrepreneurs like Azim Premji, Narayan Murthy etc who made India globally famous. In 21st Century there are several Indian Entrepreneurs who are known World wide and there is no stopping.

* In 2008, Entrepreneurship was introduced in Core Engineering Curriculum.

3 b) Supply chain management: Supply chain management helps in delivering the right product at the right time to the right time with

right quantity at a proper cost.

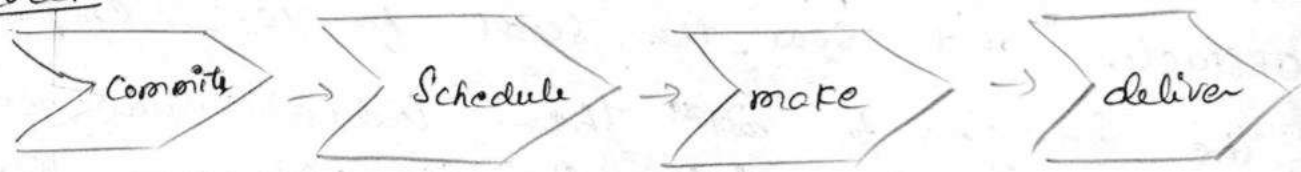
* the main motive is to reduce cost, increase efficiency and proper utilisation of the resources.

* It helps in proper utilisation of the utilities. Supply Chain is also know as value chain as they values at each level

* It helps in proper Communication with investors, producers, suppliers and Distribu

* It can take proper feedback at each Chain level and implement it for the bette of the organisation.

Process:



* It helps in reducing wastage, overlapping an sharing of resource thus reduce man power and overall Cost Spent on the project

* It is becoming more popular as it benefit for a long term development in building re with all its business related people involved

* It can make changes at any given time the customers requirement, and customer need has to evaluated properly therefore maximising Sales and getting more profit thrugh it.

PART-C

6(a) Fedal Tayla was known as the father of Scientific management. He formulated many theories and contributed towards the betterment of management.

* Separation of planning and doing: Taylor understood the burden of foreman as they had to bear both responsibity of planning and execution of work. He wanted a separate planning team to be created so that the work doesnot overlap.

* ~~Area~~ functional organisation: Taylor stressed on Specialisation and not Generalisation. He wanted the workers to be evaluated properly and placed them into the job they were specialised at.

* Analysis of job: Taylor with his experiment with lathe workers, understood studied on timesheet and understood about different jobs and he wanted job to split into elements and evaluate the time that it would require to complete a day. He made a 'fair day's work' including fatigue factor for workers.

* Placement of workers and training: Taylor understood that different jobs required different mental and physical abilities to complete them. So he wanted the workers to be trained properly before placing them into the work place, this would increase the efficiency of work.

* Different piece-rate plan: Taylor wanted to pay more salary to more efficient workers

and low salary to (ex) efficient workers. His motto was "More work, more pay". These were the theory of mercyant formulated by F-W T

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USN :

Bearys Institute of Technology

Mangalore

Department of Electronics & Communication Engineering

I - Internal Assessment

Semester: 5-CBCS 2018
Subject: INFORMATION THEORY AND CODING (18EC54)
Faculty: Mrs Rashmi A V

Date: 26 Nov 2021
Time: 02:30 PM - 04:00 PM

Max Marks: 50

Answer any 3 question(s)

Q.No			Marks	CO	PO	BT/CL
1	a	Derive the expression for average information contents of symbols in long independent sequence	6	CO1	PO1	L2
	b	A binary source is emitting an independent sequence of 0's and 1's with probabilities p and 1-p respectively. Plot the entropy of the source versus p (0<p<1)	5	CO1	PO1	L2
	c	A source emits one of four symbols S0, S1,S2 and S3 with probabilities 1/3, 1/6, 1/4 and 1/4 respectively. The successive symbols emitted by the source are stastically independent. Calculate the entropy of the source	3	CO1	PO1	L2

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	d	A code is composed of dots and dashes. Assuming that a dash is 3 times as long as a dot and has one-third the probability of occurence. Calculate i) the infoemation in a dot and a dash ii)the entropy of dot-dash code iii)the average rate of information in a dot lasts for 10m-sec and this time is allowed between symbols	6	CO1	PO2	L2
		OR				
2	a	Define (i) Self information (ii) Entropy (iii)Information rate (iv) Zero-memory source	6	CO1	PO1	L1
	b	Prove that entropy of zero memory extension source is given by H(S^n) =nH(S)	6	CO1	PO2	L2

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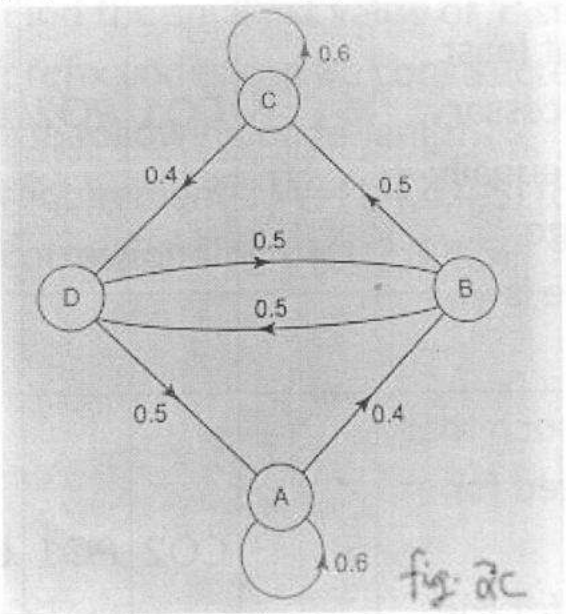
	c	Consider the Markov source shown in fig.2c . Find (i) State probabilities (ii)State entropies (iii) Source entropy  fig: 2c	8	CO1	PO2	L2
3	a	Consider a source with source alphabet S=(A,B,C,D) with the corresponding probabilities P= (0.1,0.2,0.3,0.4). Find the codewords for symbols using Shannon's encoding algorithm. Also find the source efficiency and redunadancy	7	CO2	PO1	L2
	b	Consider a source with aplhabets x1,x2,x3,x4 with respective probabilities 1/2, 1/4,1/8,1/8. Determine the entropy of the source H(S) and show that H(S^2)= 2H(S) by listing all the second extension symbols and their respective probabilities.	7	CO1	PO2	L3
	c	Explain extremal property of entropy	6	CO1	PO1	L2

		OR				
4	a	In a facsimile transmission of a picture, there are 4 x 10^6 pixels/frame. For a good reconstruction of the image at least eight brightness levels are necessary. Assuming all these levels are euqally likely to occur, find the average information rate if one picture is transmitted every 4s.	6	CO1	PO2	L2
	b	Find the smallest value of 'r' such that prefix codes can be constructed for the follwing code-length requirements: W= (1,4,4,4,5) for the corresponding L=(1,2,3,4,5).	5	CO2	PO1	L2
	c	A black and white TV picture consists of 525 lines of picture information. Assume that each line consists of 525 picture elements (pixels) and that each element can have 256 brightness levels. Picture are repeated at the rate of 30 frames/sec. Calculate the average rate of information conveyed by a TV set to a viewer	5	CO1	PO1	L3
5		A source produces two symbols 'A' and 'B' with probabilities 0.05 and 0.95 respectively. Construct a suitable binary code such that the efficiency of coding is at least 65%	10	CO2	PO2	L3

		OR				
6	a	Find relationship between Hartley, nats and bits	6	CO1	PO1	L2
	b	Find the smallest value of 'r' such that prefix codes can be constructed for the following code-length requirements: W=(1,4,4,4,5) for the corresponding L=(1,2,3,4,5)	4	CO2	PO1	L3

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Bearys Institute of Technology Mangaluru

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Near Mangalore University, Mangalore - 574153

1st IA QUESTION PAPER SCHEME (2020-21)

Class : V EC | Max. Marks : 50
Subject : Information Theory and coding | Subject code: 18EC54
Date : 26/11/2021 | Duration: 90 Minutes | Faculty Name :Rashmi A V

Question number		Explanation	Mark split up		Total marks
1	a)	Average Information contents of Symbols in long independent Sequence: Consider the source alphabet $S = \{S_1, S_2 \dots S_q\}$ with Probabilities $P = \{P_1, P_2 \dots P_q\}$ respectively. * Consider a long independent Sequence of length L Symbols this long Sequence contains P_1 number of messages of type S_1. P_{q1} number of messages of type S_q.	02	06	20
		* Total Information conveyed by Symbol S_1 is $P_1 L \log 1/P_1$ bits. My, total information conveyed by symbol S_q is $P_q L \log 1/P_q$ bits.	02		
		$I_{total} = L \sum_{i=1}^{q} P_i \log \frac{1}{P_i}$ bits $H(S) = \sum_{i=1}^{q} P_i \log \frac{1}{P_i}$ bits/symbols	02		
	b)	$H(S)=\sum_{i=1}^{q} P_i \log \frac{1}{P_i}$ bits/symbols $H(S) = p \log \frac{1}{p} + (1-p) \log \frac{1}{(1-p)}$	1.5	05	

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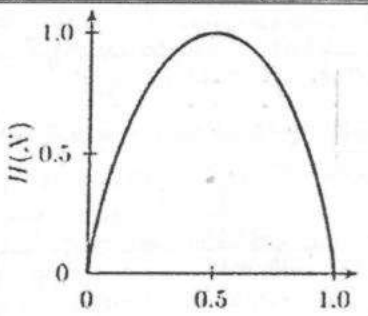
1st IA QUESTION PAPER SCHEME (2020-21)

		P	0	0.2	0.4	0.5	0.6	0.8	1	02	
		H(S)	0	0.721	0.97	1	0.97	0.721	0		
										1.5	
	c)	Entropy of Source $H(S) = \sum_{i=1}^{4} P_i \log \frac{1}{P_i}$								01	03
		$H(S) = 1/3 \log 3 + 1/6 \log 6 + 2[1/4 \log 4]$ $= 0.528 + 0.4308 + 1$ $H(S) = 1.9588$ bits/symbol								02	
	d)	(i) Information in a dot [$P_{dot} = 3/4$, $P_{dash} = 1/4$] $I_{dot} = \log \frac{1}{P_{dot}} = \log_2 4/3 = 0.415$ bits $I_{dash} = \log \frac{1}{P_{dash}} = \log_2 4 = 2$ bits								2	06
		(ii) Entropy of dot-dash code is $H(S) = \sum_{i=1}^{2} P_i \log \frac{1}{P_i} = 0.8113$ bits/symbol								2	
		(iii) Symbol rate = $r_s = 4$ Symbols/100 m-sec									
		Information rate = $r_s \cdot H(S) = 40 \times 0.8113 = 32.452$ bits/sec.								2	
2	a)	(i) Self information: The amount of information conveyed by the source is called self information. The self-information of a message is inversely proportional to its probability of occurrence								1.5	06
		(ii) Entropy: The average self-information in long independent sequences $H(S) = \sum_{i=1}^{} P_i \log \frac{1}{P_i}$ bits/symbol								1.5	

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(iii) Information rate: Rate at which the source is giving us the information is called Information rate. — 1.5

$R_s = H(S) \cdot r_s$ bits/sec.

(iv) Zero-memory Source: The probability of occurrence of any event is independent of probability of occurrence of previous event is called as zero memory source. — 1.5

b) Extension of zero memory source: $H(S) = \{S1, S2\}$

$P = (P1, P_2)$. — 02

Second extension: $S1S1 \rightarrow P1P1$
$S1S2 \rightarrow P1P2$
$S2S1 \rightarrow P2P1$
$S2S2 \rightarrow P2P2$

$H(S) = \sum_{i=1}^{q} P_i \log \frac{1}{P_i}$ bits/symbol

$H(S) = P_1 \log \frac{1}{P_1} + P_2 \log \frac{1}{P_2}$ — 06

Second extension is represented by $H(S^2)$

$H(S^2) = P_1^2 \log \frac{1}{P_1^2} + P_1P_2 \log \frac{1}{P_1P_2} + P_2P_1 \log \frac{1}{P_2P_1} + P_2^2 \log \frac{1}{P_2}$ — 04

$= 2\left[P_1 \log \frac{1}{P_1} + P_2 \log \frac{1}{P_2}\right]$

$H(S^2) = 2H(S)$ i.e. $H(S^n) = nH(S)$

c) (i) State equations: $P(A) = 0.6P(A) + 0.5P(D)$ or $P(B) = 0.4P(A) + 0.5P(D)$, $P(C) = 0.6P(C) + 0.5P(B)$

$P(D) = 0.4P(C) + 0.5P(B)$.

Solving above eq's, we get — 03 or

$P(A) = 5/18$, $P(B) = 2/9$, $P(C) = 5/18$

$P(D) = 2/9$. — 08

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(ii) Entropy of each state is $H_i = \sum_{i=1}^{n} P_{ij} \log \frac{1}{P_{ij}}$

$H(A) = 0.971$ bits/symbol.

$H(B) = 1$ bit/symbol

$H(C) = 0.971$ bits/symbol

and $H(D) = 1$ bit/symbol

(iii) Entropy of the source

$H(S) = H = \sum_{i=1}^{n} P_i H_i$

$= P(A) H_A + P(B) \cdot H_B + P(C) \cdot H_C + P(D) \cdot H_D$

$H = 0.9839$ bits/binary digits

2.5 + 2.5

3	a)	* Probabilities in the non-increasing order $P = (0.4, 0.3, 0.2, 0.1)$ * Minimum value of l_i $l_i \geq \log_2 \frac{1}{P_i}$ $l_1 = 2, l_2 = 2, l_3 = 3, l_4 = 4$ * Calculate the parameters α_i $\alpha_1 = 0$ $\alpha_2 = P_1 = 0.4$ $\alpha_3 = P_1 + P_2 = 0.7$ $\alpha_4 = P_1 + P_2 + P_3 = 0.9$ $\alpha_5 = P_1 + P_2 + P_3 + P_4 = 1$ * $\alpha_1 = (0.00)_2$ $\alpha_2 = (0.4)_{10} = (0.01)_2$ $\alpha_3 = (0.7)_{10} = (0.101)_2$ $\alpha_4 = (0.9)_{10} = (0.1110)_2$ * $\eta_s = \frac{H(S)}{L}$, $H(S) = \sum_{i=1}^{4} P_i \log 1/P_i$ $H(S) = 1.8464$ bit/sym $L = \sum_{i=1}^{4} P_i l_i = 2.4$ bit/sym $\therefore \eta_s = 76.93\%$ & $R_{\eta_s} = 23.07\%$	2 2 3	7	20

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1st IA QUESTION PAPER SCHEME (2020-21)

		Entropy of the source $H(S) = \sum_{i=1}^{4} p_i \log 1/p_i =$ $= 1/2 \log 2 + 1/4 \log 4 + 2[1/8 \log 8]$ $= 0.5 + 0.5 + 0.75 = 1.75$ bits/sym	03		
	b)	IIIrd extension of the basic source with 4 symbols will have $4^2 = 16$ symbols. $H(S^2) = \sum_{j=1}^{16} p_j \log \frac{1}{p_j}$ $= 1/4 \log 4 + 2[1/8 \log 8] + 8[1/16 \log 16] + 4[1/32 \log 32] + 4[1/64 \log 64]$ $= 3.5$ bits/sec $\therefore H(S^2) = 2H(S) = 2 \times 1.75 = 3.5$ bits/sec	04	07	
	c)	Extremal property of entropy: Let us consider source S with q symbols with probabilities $P = \{P_1, P_2 \cdots P_q\}$ $H(S) = \sum_{i=1}^{q} p_i \log 1/p_i$. $\log q - H(S) = \sum_{i=1}^{q} p_i \log q - \sum_{i=1}^{q} p_i \log 1/p_i$	03		
		$= \sum_{i=1}^{q} p_i \log q p_i$ $\log q - H(S) = \log_2 e \sum_{i=1}^{q} p_i \ln q p_i$		06	
		Entropy attains a max value when all the source symbols becomes equiprobable $H(S)_{max} = \log_2 q$ bits/sym	03		
4	a)	Given, Total number of pixels = 4×10^6. Total num of brightness Levels = 8 $\therefore$ Total num of diff frames $N = 8$	01	06	20
		Frames are equiprobable $\therefore H(S) = H(S)_{max} = \log_2 N$ $= \log_2 8 = 12 \times 10^6$ bits/frame	01		

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1st IA QUESTION PAPER SCHEME (2020-21)

$R_s = H(S) * r_s$

$r_s = 1/4$ frames/sec.

$\therefore R_s = 12 \times 10^6 \times 1/4$

$= 3 \times 10^6$ bits/sec — 4

b) — 08

(i)

S_1	1/2	0	1
S_2	1/8	100	3
S_3	1/8	110	3
S_4	1/16	1110	4
S_5	1/16	1111	4

$\therefore \eta = 97.25\%$ 4

$*H(S) = \sum_{i=1}^{5} p_i \log 1/p_i$

$= 1.9455$ bits/sym } 3

$*L = \sum_{i=1}^{5} p_i l_i$

$=$ 2 bits/symbol } 1

$R_\eta = 2.75\%$

(ii)

S_1	1/2	00	2
S_2	1/4	01	2
S_3	1/8	10	2
S_4	1/16	110	3
S_5	1/16	111	3

$*H(S) = 1.9455$ bits/sym } 3

$L = 2.1611$ bits/sym

$\eta_c = 89.8\%$, $R_\eta = 10.2\%$ } 1

c) — 06

Total num of pixels in one frame $= 525 \times 525 = 2,75,625$ pixels — 02

Total number of diff frames possible $= (256)^{2,75,625}$ frames

The net max information conveyed per frame is — 04

$I = H(S)_{max} = \log_2 9 = 22.05 \times 10$ bits/frame

$r_s = 30$ frames/sec

$\therefore R_s = r_s \times I = 66.15 \times 10^5$ bits/sec

5 a) — 10 — 10

B 0.95

A 0.05

Code table

Code	length of l_i in bits
1	1
0	1

Average length $L = \sum_{i=1}^{2} p_i l_i$

$=$ 1 bit/symbol

Entropy $H(S) = \sum_{i=1}^{2} p_i \log \frac{1}{p_i}$ 2

$=$ 0.2864 bits/symbol

$\therefore \eta_c = \frac{H(S)}{L} = \frac{0.2864}{1} = 28.64\%$

This efficiency is less than the given efficiency of 65%. 3

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1st IA QUESTION PAPER SCHEME (2020-21)

		* Now let us consider the 2nd extension of the given source Avg length $L_2 = 1.1475$ binit/sym $H(S^2) = 2H(S) = 0.5728$ bit/sym $\eta_c^{(2)} = \frac{H(S^2)}{L} = \frac{0.5728}{1.1475} = 49.92\%$ $\eta_c < 65\%$ * Now let us consider the 3rd extension of the given code $L_3 = 1.29975$ binit/sym $H(S^3) = 3H(S) = 0.8592$ bit/symbol $\eta_c^{(3)} = 66.11\%$	05		
		OR			
6	a)	W.K.T by the def^n of self information with respect to nats, bits and decits is given by $I = \log_{10} \frac{1}{p}$ Hartleys $I = \log_2 \frac{1}{p}$ bits, $I = \log_e \frac{1}{p}$ nats 1 Hartley $= \frac{\log_p 10}{\log_p e} = \log_e 10 = 2.3$ nats Thus 1 Hartley $= \log_2 10$ bits 1 Hartley $= 3.32$ bits 1 bits $= \log_e 2$ nats $= \ln 2 = 0.693$ nats 1 nats $= 0.43$ Hartleys	1.5 4.5	06	10
	b)	Kraft – McMillan inequality given by $\sum_{k=1}^{N} r^{-l_k} \leq 1$ $\sum_{k=1}^{N} r^{-l_k} = (1 \times r^{-1}) + (4 \times r^{-2}) + (4 \times r^{-3}) + (4 \times r^{-4}) + (6 \times r^{-5}) \leq 1$ Let $r = 2$, then $\sum_{k=1}^{N} r^{-l_k} = 2.4 > 1$ $\therefore$ r cannot be 2 Consider $r = 3$, we get $\sum_{k=1}^{N} r^{-l_k} = 0.695 < 1$ $\therefore r = 3$	01 03	04	

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INTERNAL ASSESSMENT TEST BOOK

NAME OF THE STUDENT : Kaveri. C.B.

YEAR : 2021-2022 BRANCH : ECE (5th sem) SECTION : V th sem.

ROLL/UNIVERSITY SEAT NUMBER : HBP19EC007.

SUBJECT : Information Theory and Coding [18EC54].

	DATE	MAX. MARKS	MARKS OBTAINED	TEACHER'S INITIAL	REMARKS
FIRST TEST	26/11/21	~~25~~ 50	45		
SECOND TEST	28/12/21.	~~25~~ 50	31		
THIRD TEST	05/01/22.	25	44		
FINAL TEST	Average	~~25~~ 50 30	40 24		

Total 24/30 + 10/10 = (34/40)

FINAL TEST MARKS IN WORDS : Thirty Four only

Signature Staff HOD Principal

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1st Internal

6) a) Consider self information for BIT, NATS & DECI

$$I = \log_2 \frac{1}{P} \text{ BITS} \quad \text{---(1)}.$$

$$I = \log_e \frac{1}{P} \text{ NATS} \quad \text{---(2)}.$$

$$I = \log_{10} \frac{1}{P} \text{ DECITS} \quad \text{---(3)}.$$

Relation b/w DECITS & NATS.

from equ (3)

$$1 \text{ DECITS} = \frac{I}{\log_{10}\left(\frac{1}{P}\right)}$$

substitute (2) in (1)

$$1 \text{ DECITS} = \frac{\log_e \frac{1}{P}}{\log_{10} \frac{1}{P}} = \frac{\log_e P}{\log_{10} P}$$

$$= \frac{\log_P e}{\log_P 10} = \log_e 10 \qquad \left[\because \log_a b = \frac{1}{\log_b a}\right]$$

$$\boxed{1 \text{ DECITS} = 2.303 \text{ NATS}}$$

Relation b/w DECITS & BITS.

$$\left[\because \log_a b = \frac{1}{\log}\right.$$

$$1 \text{ DECITS} = \frac{I}{\log_{10}\left(\frac{1}{P}\right)} = \frac{\log_2 \frac{1}{P}}{\log_{10} \frac{1}{P}} \quad [\because \text{from eq}$$

$$1 \text{ DECITS} = \frac{\log_2 P}{\log_{10} P} = \frac{\log_P 2}{\log_P 10} = \log_2 10$$

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$\therefore$ 1 DECITS = 3.321 BITS.

Relation b/w NATS in BITS.

from equ ③

$$1 \text{ NATS} = \frac{I}{\log_e 1/p} = \frac{\log_2 1/p}{\log_e 1/p}$$

$$= \frac{\log_b p}{\log_e p} = \log_2 e = 1.4426$$

$\therefore$ 1 NATS = 1.4426 BITS.

6)

a) $w = (1, 4, 4, 5)$.

b) $l = [1, 2, 3, 4, 5]$.

$\therefore q = 1+4+4+4+5 = 18$ symbols.

Consider crafts inequality:

$$\sum_{i=1}^{q} r^{-l_i} \leq 1$$

No. of code words [w]	code length [l]
1	no. of code length 1
4	no. of code length 2
4	no. of code length 3
4	no. of code length 4
5	no. of code length 5

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when $r=2$

$$\sum_{i=1}^{18} r^{-l_i} = 1\times 2^{-1} + 4\times 2^{-2} + 4\times 2^{-3} + 4\times 2^{-4} + 5\times 2^{-5}.$$

$$\therefore \sum_{i=1}^{18} r^{-l_i} \leq 1.$$

$$\therefore 2.406 > 1.$$

$\therefore$ Kraft inequality is not satisfy for the smallest value $r=2$.

$\therefore r=3$

$$\sum_{i=1}^{18} r^{-l_i} = 1\times 3^{-1} + 4\times 3^{-2} + 4\times 3^{-3} + 4\times 3^{-4} + 5\times 3^{-5}.$$

$$0.9917 \leq 1.$$

when $r=3$ Kraft inequality is satisfy

$$X = \{0, 1, 2\}.$$

3. a). i). Self Information: The information source is inversely proportional to probability of occurance.

$$I_K \propto \frac{1}{P_K} \Rightarrow \boxed{I_K = \log \frac{1}{P_K}}$$ bits

ii). Information Rate: (Rs): The source is emmitted at fixed time r_s symbols/seconds & product of average information content / symbo.

and message symbol/second

$$\therefore R_S = H(S) \times r_s$$

(ii) Zero-memory source:- (Entropy).

Zero memory source (discrete memoryless source) which is output of information is emmitted by current signal is not depedent on the previous signal

$$H(S) = \sum_{i=1}^{q} p_i \log \frac{1}{p_i}$$

→ Average self information content.

2) b) consider the source alphabet $S = \{s_1, s_2\}$ & with probability $P = \{P_1, P_2\}$ respectively

$$\therefore P_1 + P_2 = 1$$

$$P_1 + P_2 = 1 \quad - (1)$$

* 2nd Extension of zero memory source is given by

$= 2^2 = 4$ symbols.

$s_1 s_1$ is occuring with probabity $= P_1 P_1 = P_1^2$.

$s_1 s_2$ is occuring with probability $= P_1 P_2 = P_1 P_2$

$s_2 s_1$ is occuring with probability $= P_2 P_1 = P_2 P_1$

$s_2 2$ is occuring with probability $= P_2 P_2 = P_2^2$

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The sum of total no. of probability of 2nd order extension is given by $= P_1^2 + P_1P_2 + P_2P_1 + P_2^2$.

$$= P_1^2 + 2P_1P_2 + P_2^2$$

$$= (P_1 + P_2)^2$$

Entropy of source is given by

$$H(S) = \sum_{i=1}^{q} P_i \log \frac{1}{P_i}$$

III^ly, Entropy of 2nd extension is given by

$$H(S^2) = \sum_{j=1}^{q} P_j \log \frac{1}{P_j}$$

$$H(S^2) = P_1^2 \log \frac{1}{P_1^2} + P_1P_2 \log \frac{1}{P_1P_2} + P_2P_1 \log \frac{1}{P_2P_1} + P_2^2 \log \frac{1}{P_2^2}$$

$$H(S^2) = P_1^2 \log \frac{1}{P_1^2} + \left[\underbrace{2P_1P_2 \log \frac{1}{P_1P_2}}_{\text{By splitting the terms as 2+}} \right] + P_2^2 \log \frac{1}{P_2^2}$$

$$H(S^2) = P_1^2 \log \frac{1}{P_1^2} + 2P_1P_2 \log \frac{1}{P_1} + 2P_1P_2 \log \frac{1}{P_2} + P_2^2 \log \frac{1}{P_2^2}$$

6

$$H(S^2) = 2P_1 \left[P_1 \log \frac{1}{P_1} \right] + P_2 \log \frac{1}{P_1} + 2P_2 \left[P_1 \log \frac{1}{P_2} \right] + P_2 \log \frac{1}{P_2}$$

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$$2P_1(P_1+P_2)\log\frac{1}{P_1} + 2P_2(P_1+P_2)\log\frac{1}{P_2}$$

$$2P_1(1)\log\frac{1}{P_1} + 2P_2(1)\log\frac{1}{P_2}$$

$$2\underbrace{\left[P_1\log\frac{1}{P_1} + P_2\log\frac{1}{P_2}\right]}_{H(S)} \quad [\because \text{from eqn (1) we get}]$$

$$\boxed{H(S^2) = 2 \cdot H(S)}$$

iii). The 3rd extension of Entropy is given by

$$\boxed{H(S^3) = 3 \cdot H(S)}$$

iii).

:

nth Extension of zeromemory source is given by

$$\boxed{H(S^n) = n \cdot H(S)}$$

Proved.

4) a) Given: No. of pixels in a picture = 4×10^6.

No. of pixels in facsimile in picture = $4 \times$

No. of Brightness levels for neccary pixels = 8 [illegible] pixel

$P(S) = ?$.

No. of equiprobability levels are 8.

$H(S)_{max} = \log_2(8)$ $= \log_2 8$

$= 4 \times 10^6 \log_2(8)$

$H(S)_{max} = 12 \times 10^6$ trans/symbols. / bits/symbols.

$\therefore$ for every 4 second

$= \frac{1}{4} \times 10^8 = 250$

$= \frac{1}{4} = 0.25$

$\therefore R_S = H(S)_{max} \times r_s = 12 \times 10^6 \times 0.25$

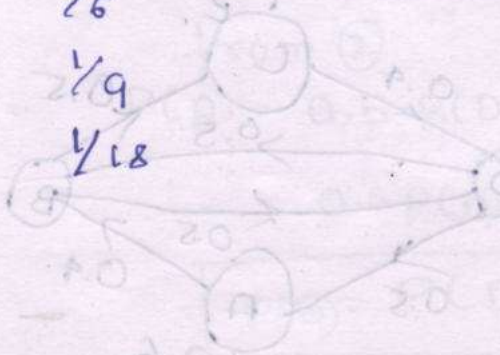
$R_S = 3 \times 10^6$ Bits/seconds or fro

4).

b). $S = \{S_1\ S_2\ S_3\ S_4\ S_5\}$.

$P = \{\frac{1}{2}, \frac{1}{6}, \frac{1}{6}, \frac{1}{9}, \frac{1}{18}\}$.

S_1	$1/2$
S_2	$1/6$
S_3	$1/6$
S_4	$1/9$
S_5	$1/18$



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4).

c).

Given:-

The Black & white Consists of 525 lines.

$= 525 \times 525 = 27.5625$ Pixels/frame

No. of possible Brightness levels are = 256 Pixels

$r_s = 30$ frame/sec.

The average information sources is given by.

Soln:-

$H(s)_{max} = \log_2 q$

$H(s)_{max}$ = No. of total pixels $H(s)_{max} = \log_2 (256)^{27.5}$

$= 275625 \log_2 (25$

$\therefore H(s)_{max} = 2.205 \times 10^6$ pixels

$\therefore H(s)_{max} = 2.205 \times 10^6$ pixels/frame/symbols (or) (BPS)

$H(s)_{max} = 2.205 \times 10^6$ Pixels/frame. = BPS.

$R_s = H(s)_{max} \times r_s = 2.205 \times 10^6 \times 30$

$R_s = 66.15 \times 10^6$ pixels/sec. or Bits

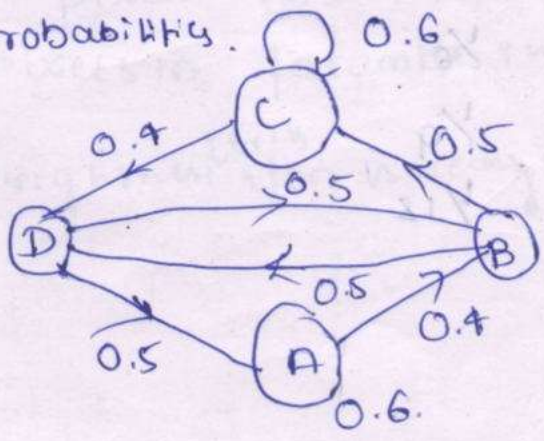
//

2).

c).

i). State probability.

Given:-



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first we have to write state equ2.

for state (1).

$$P(A) = 0.6\,P(A) + 0.5\,P(D) + \quad \text{—(1)}$$

$$P(B) = 0.5\,P(D) + 0.4\,P(A) \quad \text{—(2)}$$

$$P(C) = 0.6\,P(C) + 0.5\,P(B) \quad \text{—(3)}$$

$$P(D) = 0.5\,P(B) + 0.4\,P(C) \quad \text{—(4)}$$

from equ2 (1).

$$P(A) = 0.6\,P(A) = 0.5\,P(D)$$

$$0.4\,P(A) = 0.5\,P(D)$$

$$\boxed{P(A) = 1.25\,P(D)} \quad \text{—(4)}$$

from equ2 (2).

$$P(B) = 0.6\,P(C) = 0.5\,P(B)$$

$$0.4\,P(C) = 0.5\,P(B)$$

$$P(C) = \frac{1}{0.4}\,1.25\,P(B). \quad \text{—(5)}$$

from (2)

$$P(B) = 0.5\,P(D) + 0.4\,(1.25)\,P(D)$$

$$0.5\,P(D) + 0.5\,P(D)$$

$$\boxed{P(B) = P(D)} \quad \text{—(6)}$$

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~~from~~

Equn ⑥ in ⑤

$$P(C) = 1.25\ P(D) \quad -(7)$$

$$\therefore P(A) + P(B) + P(C) + P(D) = 1$$

$$1.25P(D) + P(D) + 1.25P(D) + P(D) = 1$$

$$P(D)\ [1.25 + 1 + 1.25 + 1] = 1$$

$$P(D) = 2/9.$$ ✓

$$P(C) = 1.25\ (2/9) = \frac{5}{18}$$

$$P(B) = 2/9.$$

$$P(A) = 1.25\ (2/9) = 5/18$$

∴ ij. State probabilities =

$P(A) = 5/18$ ✓

$P(B) = 2/9.$ ✓

$P(C) = 5/18.$ ✓

$P(D) = 2/9.$ ✓

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ii). State Entropies.

$$H(B) = \sum_{i=1}^{q} P_i \log \frac{1}{P_i}$$

$$= 0.6 \log \frac{1}{0.6} + 0.4 \log \frac{1}{0.4}$$

$$= 0.4421 \text{ Bits/symbols}$$

$$= 0.9709 \text{ Bits/symbols}$$

$$H(B) = \sum_{i=1}^{q} P_i \log \frac{1}{P_i}$$

$$= 1 \text{ BITS/symbols}$$

$H(A) = 0.9709$ Bits/symbol

$H(D) = 1$ Bits/symbol

$H_T = H(A) + H(B) + H(C) + H(D)$

$H_T = 0.9709 + 1 + 0.9709 + 1 = 3.9418$ Bits/Symbol

iii). $H(S) = \sum_{i=1}^{q} P_i H_i = P_A \times H_A + P_B \times H_B + P_C \times H_C + P_D \times H_D$

$H(S) = 1.4705$ Bits/symbols.

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47. b)

Source symbols	Pi	Codewords	Code lengths
S_1	1/2	0	1
S_2	1/6	10	2
S_3	1/6	110	3
S_4	1/9	110	3
S_5	1/18	1111	4.

=> $\eta = \frac{H(S)}{L}$

;).

~~H(S)~~

~~H(S) = 1/2~~

Entropy of the source is given by.

$$H(S) = \sum_{i=1}^{q} P_i \log \frac{1}{P_i}$$

$$H(S) = \sum_{i=1}^{5} P_i \log \frac{1}{P_i}$$

$$= \frac{1}{2}\log_2(2) + \left[\frac{1}{6}\log_2(6)\right]2 + \left[\frac{1}{9}\log_2(9)\right] + \frac{1}{18}\log_2(18)$$

$H(S) = 1.727$ Bits /symbols.

$$L = \sum_{i=1}^{q} P_i l_i$$

$$L = \sum_{i=1}^{5} P_i l_i = 1/2 \times 1 + 1/6 \times 2 + 1/6 \times 3 + 1/9 \times 3$$

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$L = 1.888$ Bits/symbol

$$\eta_c = \frac{H(S)_{max}}{L} = \frac{1.727}{1.888} = 91.47\%$$

$$R_{\eta c} = 100 - \eta_c = 91.47\%$$

$$= 8.53\%$$

source symbols	P_i	codeword	l_i
s_1	1/2	00	2
s_2	1/6	01	2
s_3	1/6	10	2
s_4	1/9	110	3
s_5	1/18	111	3

$$H(S) = 1.727 \text{ bits/symbol}$$

$$L = \frac{1}{5} \times \sum_{i=1}^{q} P_i l_i$$

$$= \sum_{i=1}^{5} 1/2 \times 2 + 1/6 \times 2 + 1/6 \times 2 + 1/9 \times 3 + 1/18 \times 3$$

$L = 2.166$ Bits/symbol

$$\eta_c = \frac{1.727}{2.166} = 0.7973$$

79.73%

$\therefore \eta_c = 0$

$R_{\eta c} = 100 - \eta_c$

$R_{\eta c} = 100 - 79.73\%$

$R_{\eta c} = 20.27\%$

90%

45/50

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USN :

Bearys Institute of Technology

Mangalore

Department of Mechanical Engineering

I - Internal Assessment

Semester: 4-CBCS 2018
Subject: KINEMATICS OF MACHINES (18ME44)
Faculty: Prof Imran Mokashi

Date: 29 Jun 2022
Time: 10:00 AM - 11:30 AM
Max Marks: 50

Instructions to Students :

Draw neat and appropriate diagrams where ever necessary.

PART A

Answer any1 question(s)

Q.No			Marks	CO	BT/CL
1	a	Define the following, giving one example for each: 1. Kinematic chain 2. Mechanism 3. Structure 4. Inversion 5. Degree of freedom	10	CO1	L2
	b	Derive an expression for necessary condition of correct steering and explain Ackermann steering gear with neat sketch	10	CO1,CO2	L3
2	a	Write a brief note on Gruebler's Criteria. Also state Kutzbach Equation for degree of freedom of a knematic chain	10	CO1	L2
	b	Five binary links of lengths 5cm, 8cm, 15cm, 19cm and 28cm are available for constructing a crank-rocker mechanism. Select four links for the construction of this mechanism. Sketch the mechanism and clearly show the fixed link, crank and rocker.	10	CO1,CO2	L3

PART B

Answer any1 question(s)

Q.No			Marks	CO	BT/CL
3	a	Draw a neat proportionate "Peaucellier Mechanism". Indicate the geometric relations among the links and show the point tracing the straight line. Prove that the point traces a straight line perpendicular to the fixed link.	12	CO1,CO2	L3
	b	Explain with neat sketch Geneva mechanism	8	CO1,CO2	L2

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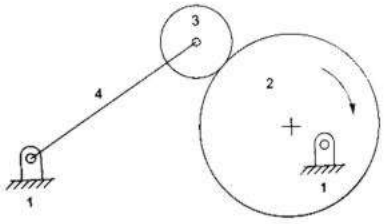
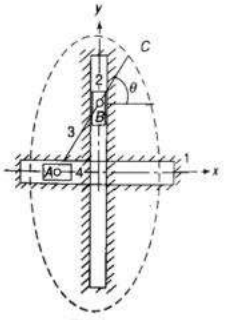
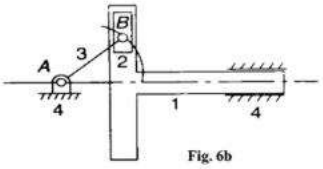
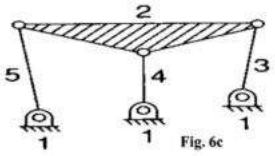
4	a	Explain with a neat sketch crank and slotted lever quick return motion mechanism.	12	CO1,CO2	L3
	b	Explain with neat sketch Pantograph and state its application	8	CO1,CO2	L2

PART C

Answer any1 question(s)

Q.No			Marks	CO	BT/CL
5		Find the degrees of freedom for the following mechanisms shown in figures below, (NOTE: Discuss all three cases)  Fig. 5a	10	CO1,CO2	L3
6		Find the degrees of freedom for the following mechanisms shown in figures below,  Fig. 6a  Fig. 6b  Fig. 6c	10	CO1,CO2	L3

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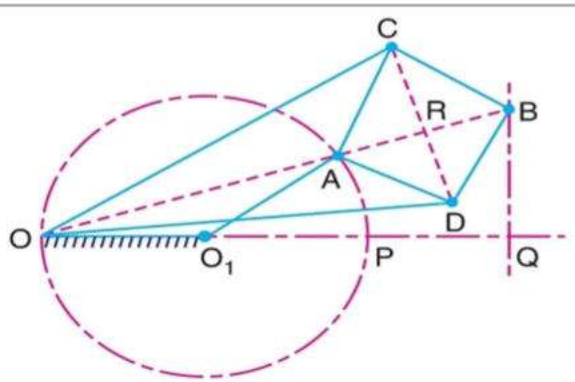
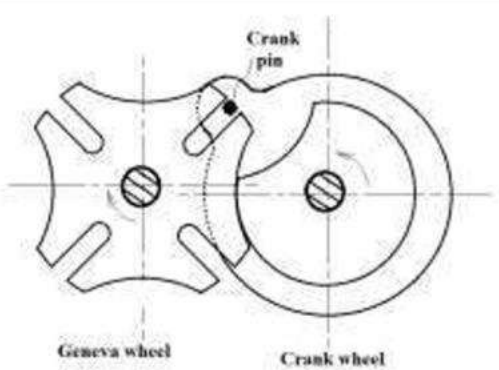
BEARYS INSTITUTE OF TECHNOLOGY
MECHANICAL ENGINEERING DEPARTMENT

Bearys Knowledge Campus, Lands End, Innoli, Near Mangalore University, Mangalore - 574153

1st IA SCHEME Of EVALUATION

Subject: Kinematics of Machines | **Subject code: 18ME44**
Class : 4th Semester | **Marks : 50 marks**
Faculty: Dr. Imran Mokashi | **Date : 29-06- 2022**

Sl. No.	Solution	Mark	CO	PO	BTL
	PART-A				
1a	Each definition 2 marks	10	CO1	PO1	L2
1b	Diagram Explanation	05 05	CO1, CO2	PO1, PO2	L3
	OR				
2a	Grubler criteria explanation DOF= 3(n-1)-2p-h Kutzbach equation DOF=3(n-1)-2p	10	CO1	PO1	L2
2b	Conditions for crank and rocker mechanism 1. Link adjacent to short link must be fixed 2. Sum of short and long link is less than the sum of other two links Links selected are 5cm, 15cm, 19cm and 28cm $\therefore$ 5+28<15+19 Thus, Crank = 5cm, Fixed link = 19cm, Connecting rod = 28cm and Rocker = 15cm	10	CO1, CO2	PO1, PO2	L3
	PART-B				
3a	 Proof	05 07	CO1, CO2	PO1, PO2	L3
3b		08	CO1, CO2	PO1, PO2	L2

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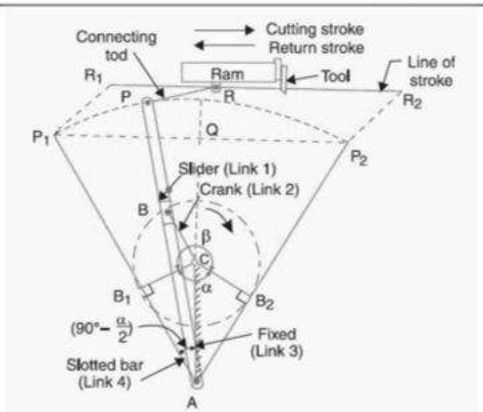
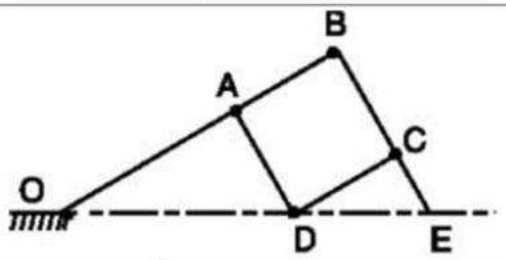
1st IA SCHEME Of EVALUATION

	OR				
4a		12	CO1, CO2	PO1, PO2	L3
4b		08	CO1, CO2	PO1, PO2	L2
	PART-C				
5	Case 1: Link 2 and 3 form a higher pair n=4, p=3 and h=1 F = 3(n-1)-2p-h = 3(4-1)-(2*3)-1 = 2 Case 2: Link 2 and 3 from a lower pair n=4, p=4 and h=0 F = 3(4-1)-(2*4) = 1 Case 3: Link 4 and 3 are one n=3, p=2 and h=1. F = 3(3-1)-(2*2)-1 = 1	10	CO1, CO2	PO1, PO2	L3
6	a) n=4, p=4 and h=0 F=3(4-1)-(2*4)-0 =1 b) n=4, p=4 and h=0 F=3(4-1)-(2*4)-0 =1 c) n=5, p=6 and h=0 F=3(5-1)-(2*6)-0 =2	10	CO1, CO2	PO1, PO2	L3

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INTERNAL ASSESSMENT TEST BOOK

NAME OF THE STUDENT : MD ZAHED EQUBAL

YEAR : 2nd BRANCH : MECHANICAL SECTION : IV th

ROLL/UNIVERSITY SEAT NUMBER : 4BP20ME004

SUBJECT : KINEMATICS OF MACHINE (KOM)

	DATE	MAX. MARKS	MARKS OBTAINED	TEACHER'S INITIAL	REMARKS
FIRST TEST	29/06/22	25/50	49	29/06/22	
SECOND TEST	02/08/22	25/50	50	02/08/22	
THIRD TEST	30/08/22	25/50	48	30/8/22	
FINAL TEST		25			

FINAL TEST MARKS IN WORDS : .....

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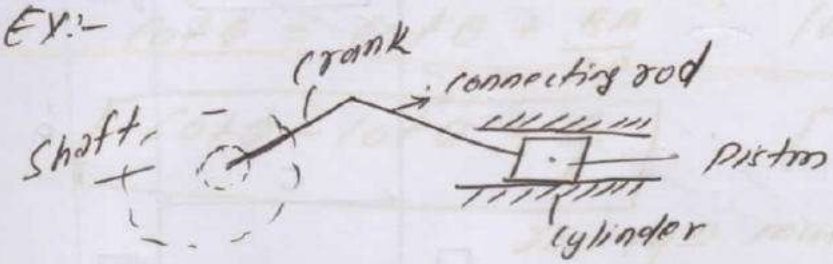
Signature Staff HOD Principal

PART:- A

11d) (1) Kinematic chain :- It is defined as the combination of kinematic pair such that each link forms a part of two pair and having a relative motion. Ex: IC Engine.

Ex:-



(2) Mechanism :- It is the combination of ~~resistant~~ rigid body so formed & well connected move ~~each other over other~~ over each other and having a definite relative motion.

Ex:- Crank-Crank mechanism.

(3) Structure :- It is the group of resistant ~~body~~ link having no relative motion between them. It is only used for carries load.

Ex:- Railway track.

(4) Inversion :- In a mechanism one of the link is fixed of kinematic chain to get inversion. To obtain the different inversion by fixing the different link of same kinematic chain

Ex:- Four bar mechanism like Ackermann Steering gear.

(5) Degree of freedom :- It is the number of independent coordinates ~~to~~ requires to determine the position/location of body in space.

Ex:-

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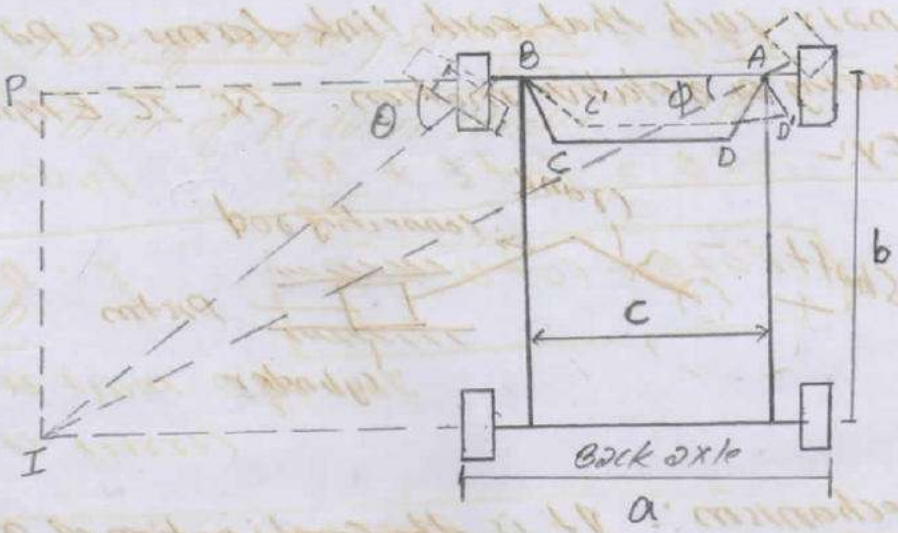
2(b) Acake Ackermann steering gear



* Ackermann steering gear has a four bar crank chain AB in the back of front wheel.
* The All the parts are turning pair & AD & BC is the shorter pair which is equal in size inclined to the axel of front wheel.
* ~~Pair~~ AB & CD is the longer pair which is not equa

The position of correct steering

(I) When the vechicles move in straight path. Then the longer pair is parallel to each other & shor pair AD & BC is inclined to the ~~o~~ longitudinal axis of vechicles.

(II) When the vechicles steer left then

let a = Wheel track
b = base of vehicle
c = distance b/w the two pivot A & B of th
Φ = Angle of outer wheel
θ = Angle of inner wheel.

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Now. In $\triangle IBP$

$$\cot\theta = \frac{PB}{IP} \quad -(1)$$

In $\triangle IAP$

$$\cot\phi = \frac{PA}{IP} = \frac{PB+BA}{IP} = \frac{PB}{IP} + \frac{BA}{IP}$$

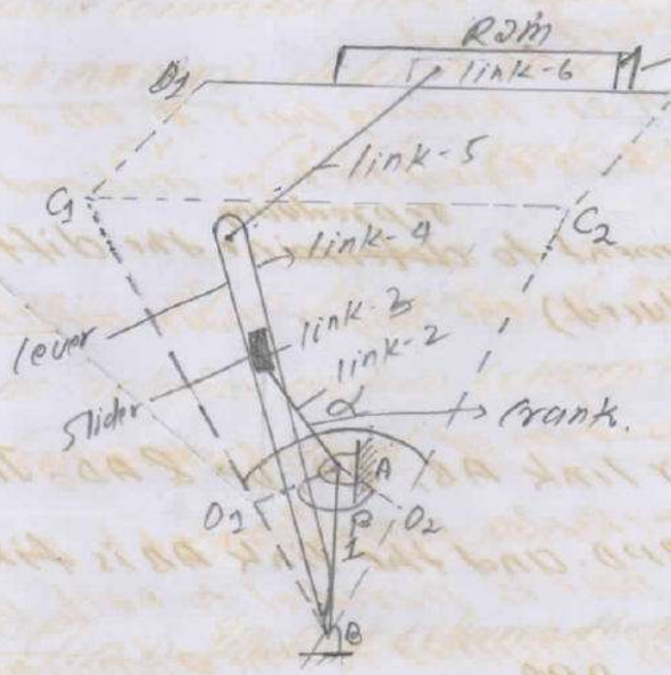
$$\cot\phi = \cot\theta + \frac{BA}{IP} \quad \text{(using eqn (1))}$$

$$\boxed{\cot\phi - \cot\theta = \frac{c}{b}} \quad [\because AB = c \ \& \ IP = b]$$

This eqn must be satisfied for correct steering.

PART:-B

4(a)



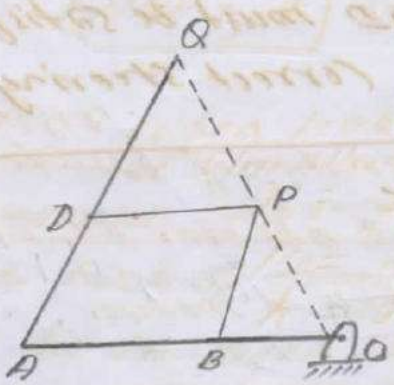
Construction:- It consist of 6 links in which link 1 is fixed. link 2 is consider as crank. link 4 is lever inside the link 3 which is slider to slides within the lever when crank is moved / rotate. link-5 which connect the lever to Ram (link-6). That ram is connected with cutting tool.

Working:- This mechanism is basically used for cutting the material purpose. In this when crank is rotate the slider inside the levers moves ~~on~~ ~~lever~~ due this movement

Ram is start move Right & left. The ram is moov moves left by angle of α & it return back with angle of β.

$$\therefore \frac{\text{Time of cutting stroke}}{\text{Time of Return stroke}} = \frac{\alpha}{\beta} = \frac{360^\circ - \beta}{\beta}$$

4(b) Pantograph



Pantograph

* It is an instrument to ~~determine~~ reproducing the different scale (enlarged or reduced)

* Construction:

It consist of bar link AB, BP, DP & AD. This form the parallelogram ABPD and the link AB is fixed at 'O' when it extended.

$\therefore \triangle^{le}$ AQO & $\triangle$ BPO ~~DNAB~~ BPO is similar triangle

So, $\frac{PB}{QO} = \frac{DO}{AQ} = \frac{QP}{QO} = \frac{DP}{AO}$

$$\frac{BP}{AQ} = \frac{DO}{QO} = \frac{AO}{OB}$$

Hence, Q reproduces of P on enlarge scale

P reproduces of Q on reduced scale.

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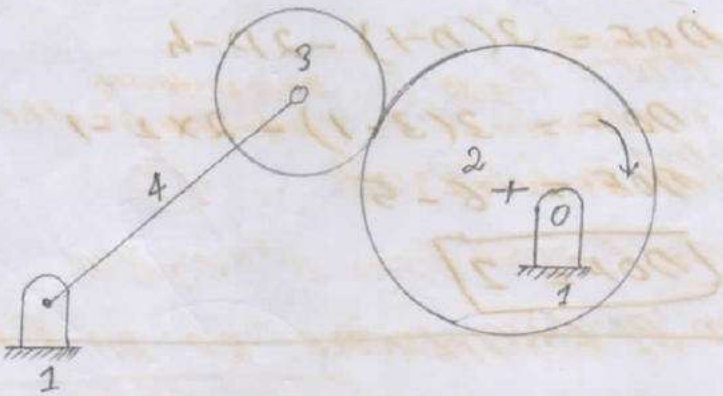
Application of Pantograph

* To produce the accurated scale of different dimension

PART:-C

DEGREE OF FREEDOM



Case I : Slip is allowed between the roller

Then

no. of link, $n = 4$

no. of lower pair, $P = 3$

no. of higher pair, $h = 1$

$\therefore DOF = 3(n-1) - 2P - 1h$

$= 3(4-1) - 2 \times 3 - 1$

$= 9 - 7$

$DOF = 2$

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Case II :- When slip is not allowed b/w the roller Then

$n = 4$

$p = 4$

$h = 0$

$\therefore DOF = 3(n-1) - 2p - h$

$= 3(4-1) - 2\times 4 - 0$

$= 9 - 8$

$\boxed{DOF = 1}$

Case III :- When link 4 & 3 considered as single link Then & slip allowed Then

$n = 3$

$p = 2$

$h = 1$

$\therefore DOF = 3(n-1) - 2p - h$

$DOF = 3(3-1) - 2\times 2 - 1$

$DOF = 6 - 5$

$\boxed{DOF = 1}$

49/52

30/06/22

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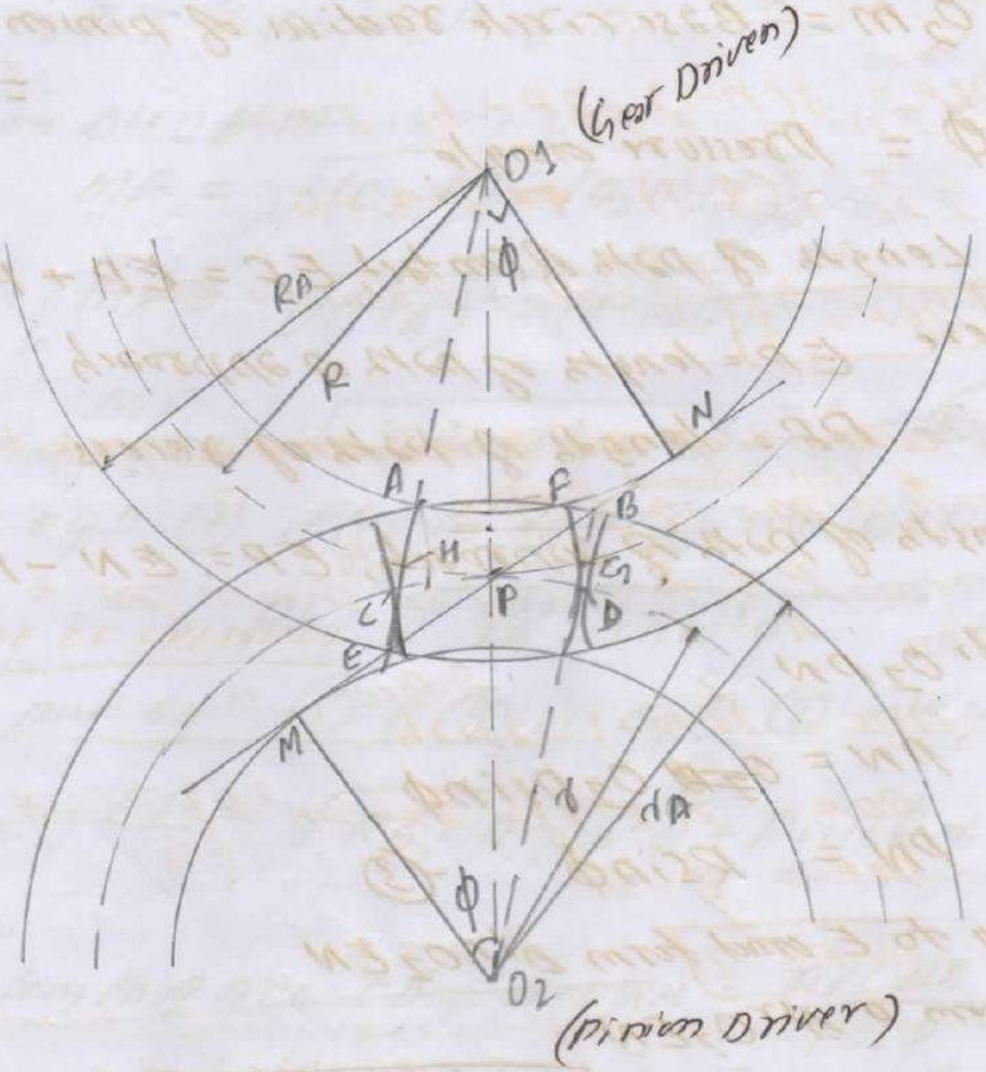
2nd IA

PART :- A

1(a) Derivation of length of arc of contact.



From the fig. MN is the common tagent to the base circle. It is equal to the common normal at a point of contact of two tooth. The addendum circles cut the common tangent MN at point E & F. In other words the contact of two tooth begin at E & ends at F.

let O_1P = pitch circle radius of Gear = R

O_1E = Addendum circle radius of Gear = R_A

O_1N = Base circle radius of Gear = $O_1P \cos\phi = R\cos\phi$

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Similarly O_2P = Pitch circle radius of pinion = r

O_2F = Addendum circle radius of pinion = r_A

O_2M = Base circle radius of pinion = $O_2P\cos\phi$

$= r\cos\phi$

ϕ = Pressure angle.

Now Length of path of contact, $EF = EP + PF$ — (1)

Where EP = length of path of approach

PF = length of path of recess

$\therefore$ Length of path of approach, $EP = EN - PN$ — (2)

From $\Delta^{le} O_1PN$

$PN = O_1P\sin\phi$

$PN = R\sin\phi$ — (3)

Joint O_1 to E and form $\Delta^{le} O_1EN$

From $\Delta^{le} O_1EN$

$$EN = \sqrt{(O_1E)^2 - (O_1N)^2}$$

$$EN = \sqrt{(R_A)^2 - (R\cos\phi)^2}$$

$$EN = \sqrt{(R_A)^2 - R^2\cos^2\phi} \quad -(3)(4)$$

Put eq^n (3) & (4) in eq^n (2) we get

$$EP = \sqrt{(R_A)^2 - R^2\cos^2\phi} - R\sin\phi \quad -(5)$$

Again

length of path of Recess $PF = MF - MP$ — (6)

From $\Delta^{le} O_2PM$

$$MP = O_2P \sin\phi$$

$$MP = r \sin\phi \quad -(7)$$

Joint O_2 to F to form $\Delta^{le} O_2FM$

From $\Delta^{le} O_2FM$

$$MF = \sqrt{(O_2F)^2 - (O_2M)^2}$$

$$MF = \sqrt{(r_A)^2 - (r\cos\phi)^2}$$

$$MF = \sqrt{r_A^2 - r^2\cos^2\phi} \quad -(8)$$

Put eq^n (7) & (8) in eq^n (6) we get

$$PF = \sqrt{r_A^2 - r^2\cos^2\phi} - r\sin\phi \quad -(9)$$

Now put eq^n (5) & (9) in eq^n (1) we get

$$EF = \sqrt{R_A^2 - R^2\cos^2\phi} - R\sin\phi + \sqrt{r_A^2 - r^2\cos^2\phi} - r\sin\phi$$

Now

length of Arc CD = Arc GH = $\frac{\text{Arc AB}}{\cos\phi}$

but Arc AB = length of path of contact, EF

$$\therefore \text{length of Arc CD} = \frac{\text{length of path of contact}}{\cos\phi}$$

$$\boxed{LAC = \frac{LPC}{\cos\phi}}$$

~~Proof of the~~ Proof

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7(b) Given Data

$\phi = 20°$

$G = 3$

$m = 3mm$

$a = 1.1m = 1.1 \times 3 = 3.3mm$

$n_1 = 120$ rpm

addendum constant of Gear = 1.1mm = aw

Sol:- (a) Minimum number of teeth on each wheel to avoid interference

(a) minimum number of teeth on pinion gear to avoid interference

$$t = \frac{2aw}{G\left[\left[1 + \frac{1}{G}\sin^2\phi\right]\left\{\frac{1}{G}\sin\phi + 2\left\{\frac{T}{2} - 1\right\}\right\}\right]}$$

$$t = \frac{2 \times 1.1}{3\left[1 + \frac{1}{3}\sin^2(20)\left\{\frac{1}{3}\sin 20 + 2\right\}^{1/2} - 1\right]}$$

$$t = \frac{2.2}{3\left[1.0389 \times 1.4539 - 1\right]}$$

$$t = 17$$

(b) minimum number of teeth on Gear to avoid interference.

$$G = \frac{T}{t} \Rightarrow T = G \times t = 17 \times$$

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$T = 51$

(11) The number of pair of teeth of contact

Here $r = \frac{mt}{2} = \frac{3 \times 17}{2} = \frac{51}{2} = 25.5$ mm.

$R = \frac{mT}{2} = \frac{3 \times 51}{2} = 76.5$ mm

∴ Addendum radius of pinion $= r + a = 25.5 + 3.3$

$= 28.8$ mm

Addendum radius of Gear $= R + a = 76.5 + 3.3$

$= 79.8$ mm

∴ $LPC = LPA + LPR$

$LPC = \sqrt{R_A^2 - R^2\cos^2\phi} - R\sin\phi + \sqrt{r_A^2 - r^2\cos^2\phi} - r\sin\phi$

$LPC = \sqrt{(79.8)^2 - 76.5^2\cos^2 20} - 76.5\sin 20 + \sqrt{(28.8)^2 - (25.5)^2\cos^2 20} - 25.5\sin 20$

$LPC = 34.64 - 26.16 + 15.97 - 8.72$

$LPC = 15.73$

∴ Length $LPA = \frac{LPC}{\cos\phi} = \frac{15.73}{\cos 20} = 16.74$

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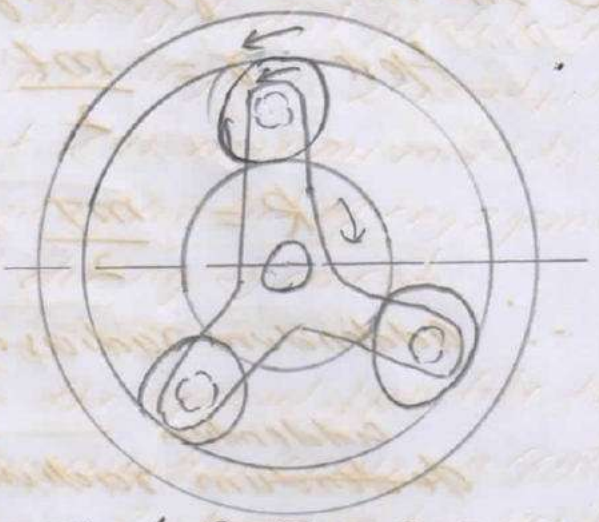
PART:-B



3(a) Given Data

$N_A = 300$ rpm & $N_S = 0$

$T_S = 80$

$N_a = 180$ rpm

To find the number of teeth on wheel P, $T_P = ?$

Solution — Suppose Gear S moves in clockwise

Table (Column)

S.l No.	Action	Arm 'a' N_a	Gear 'S' N_S	Gear 'P' N_P	Gear 'A' N_A
1	Arm 'a' is fixed and +1 rev to S	0	+1	$\frac{N_S}{N_P} = \frac{-T_P}{T_S}$ $= N_P = \frac{-T_S}{T_P}$	$\frac{N_P}{N_A} = \frac{-T_A}{T_P}$ $N_A = \frac{-T_P}{T_A} \times N_P$ $= \frac{-T_P}{T_A} \times \frac{T_S}{T_P}$ $N_A = -\frac{T_S}{T_A}$
2	Arm 'a' is fixed and +x rev to S	0	+x	$N_P = \frac{-T_S}{T_P} x$	$N_A = -\frac{T_S}{T_A} x$
3	Add +y rev to all	+y	+y	+y	+y
4	Add eqn 2 & 3	$N_a = y$	$N_S = x + y$	$y - \frac{T_S}{T_P} x$	$N_A = y - \frac{T_S}{T_A} x$

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(i) ~~N2 = 0~~

$N_2 = y$

$y = N_2 = 180$ rpm

(ii) $N_S = x + y$

$0 = x + y$

$\boxed{x = -180 \text{ rpm}}$

(iii) $N_A = y - \frac{T_S}{T_A} x$

$300 = 180 - \frac{80}{T_A}(-180)$

$\Rightarrow 120 = \frac{80 \times 180}{T_A \; 3}$

$\Rightarrow T_A = \frac{80 \times 180}{120 \; 2}$

$\boxed{T_A = 120}$

(iv) Now Assume the module of all the gear is same

then. $d_A = d_P + d_S + d_P$

$\Rightarrow m T_A = m T_P + m T_S + m T_P \quad \left[\because m = \frac{d}{T}\right]$

$\Rightarrow T_A = 2T_P + T_S$

$\Rightarrow 2T_P = 120 - 80$

$\Rightarrow \boxed{T_P = 20}$

Hence no. of teeth on the wheel 'P' is 20.

20

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PART.C

(5)

Involute	Cycloidal
* In the Involute profile the pressure angle is constant throughout the engagement i.e from the point of commencement to point of disengagement	* In the cycloidal profile the pressure angle is zero at pitch point & it is maximum at the point of contact of engagement and disengagement.
* In the involute profile, the small variation occur in the centre distance which does not effect the velocity ratio	* In the cycloidal profile, there is no variation occur in centre distance & it maintain very accurately.
* In the involute profile Interference is occur	* In the cycloidal profile there is no such interference occur.
* In this there is a radial plank	* In this there is a spreading flank
* In this the curve is a single curve which can be manufacture easily	* In this the curve is comprise two such as epicycloid & hypo cycloid. It is difficult to manufacture.
* In the Involute profile the two concave surface are in contact so that having more tear & wear	* In the cycloidal profile one concave surface is always in contact with one convex surface so there is minimum tear & wear
* Its tooth is weak Compare to cycloidal tooth	* It is comparatively strong tooth
* It is cheaper	* It is costly.

10

50/50

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3rd IA

PART:-A

~~Given Data~~

(2a) Given Data

Cam shaft diameter = 40mm

~~Radius of shaft =~~

Cam shaft radius = 20mm

least radius of cam = 25 mm

Diameter of roller = 25mm

Radius of roller = 12.5mm

$\phi_2 = 120°$

$\phi_d = 150°$

$h = 40mm$

$310 - 270 = 90°$

$\therefore \delta_1 = \delta_2 = 45°$

(i) Sol:- Displacement Diagram

Scale $10° = 5mm$

$\therefore$ (i) $\phi_2 = \frac{120°}{10°} \times 5 = 60mm$; $\frac{60}{\text{No. of div}} = \frac{60}{6} = 10mm$

(ii) $\phi_d = \frac{150°}{10°} \times 5 = 75mm$; $\frac{75}{\text{No. of div}} = \frac{75}{6} = 12.5mm$

(iii) $\delta_1 = \frac{45°}{10_2} \times 5 = 22.5mm$

(iv) $\delta_2 = \frac{45°}{10°} \times 5 = 22.5mm$.

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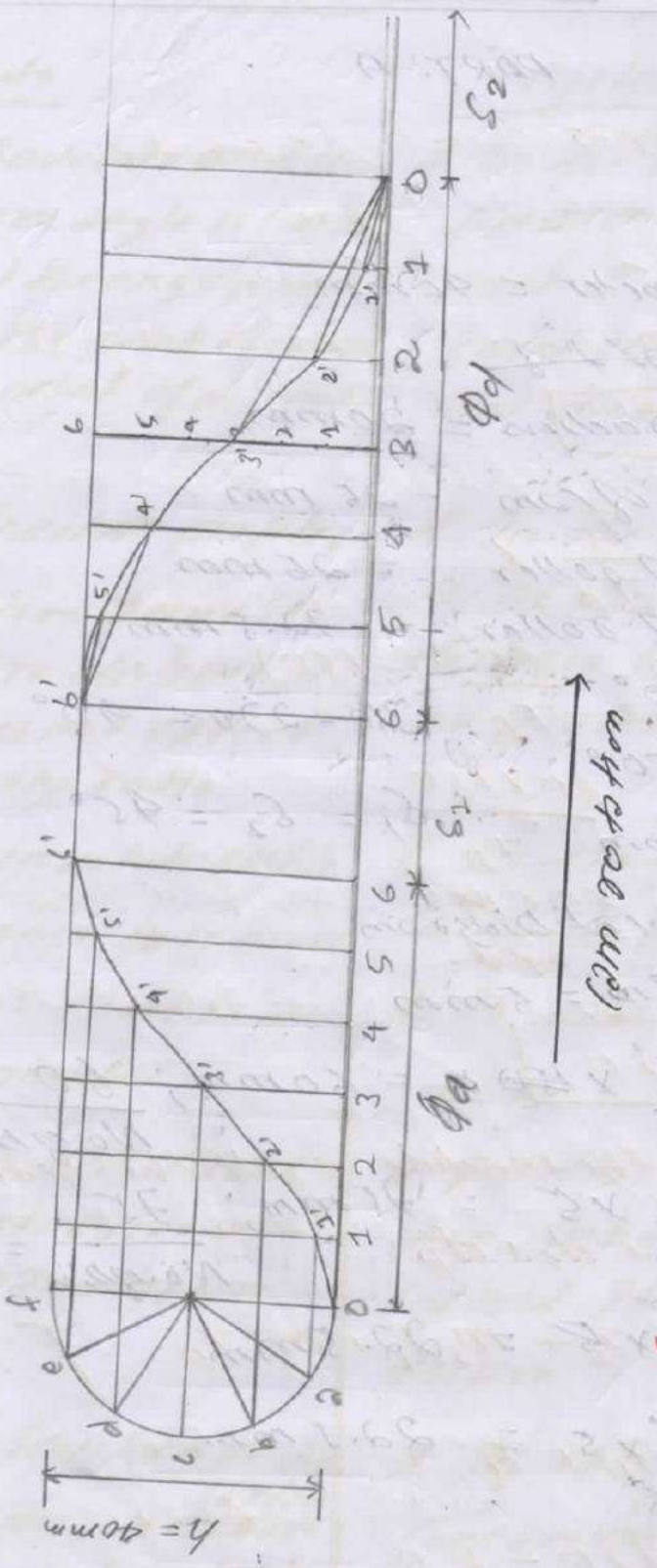

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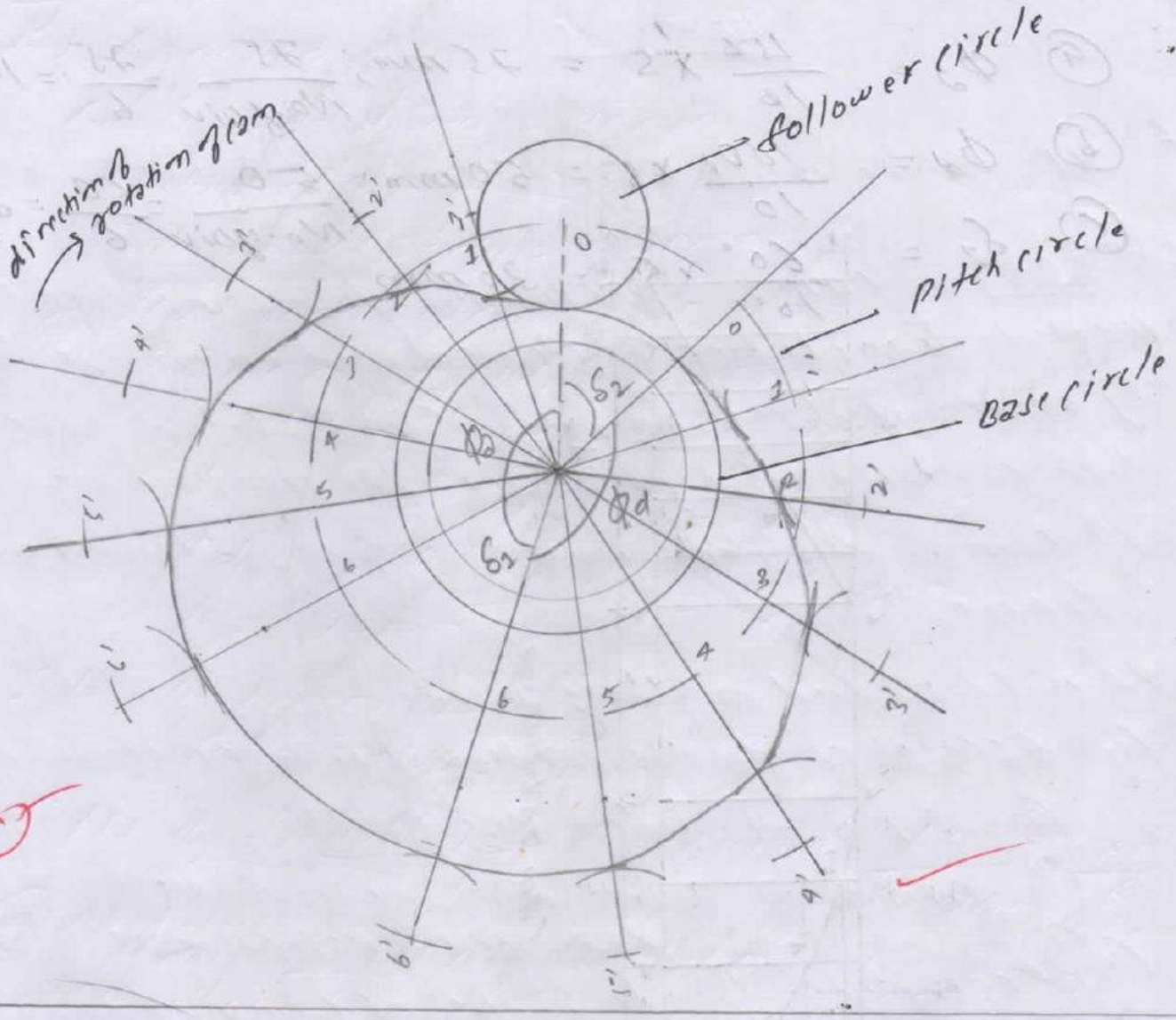
(iii) Cam profile



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PART: B

(4) Given data

$h = 30\,mm$

SHM, $\phi_2 = 150°$

$\delta_1 = 60°$

UV, $\phi_d = 100°$

$N = 120\,rpm$

$r = 25\,mm$

$\therefore \delta_2 = 360 - (150 + 60 + 100) = 50°$

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5. Solution

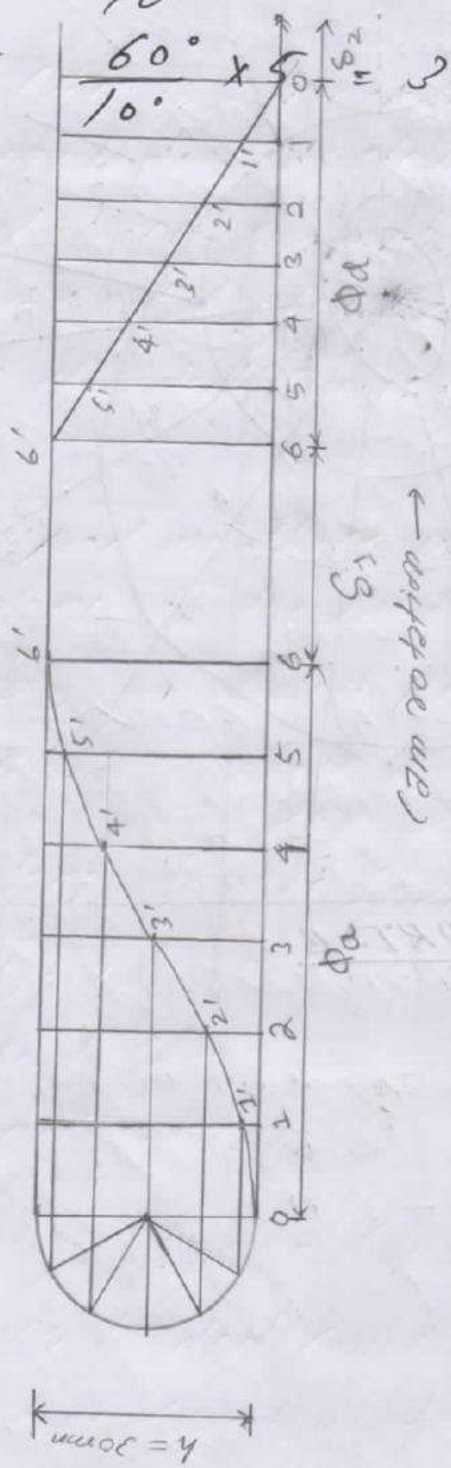
(i) Displacement Diagram

Scale $10° = 10mm$

∴ (a) $\phi_2 = \frac{150}{10} \times 5 = 75mm$; $\frac{75}{No.of\ div} = \frac{75}{6} = 12.5$ mm

(b) $\phi_4 = \frac{100}{10} \times 5 = 50mm$; $\frac{50}{No.of\ div} = \frac{50}{6} = 8.33$ mm

(c) $\delta_2 = \frac{60°}{10°} \times 5 = 30mm$



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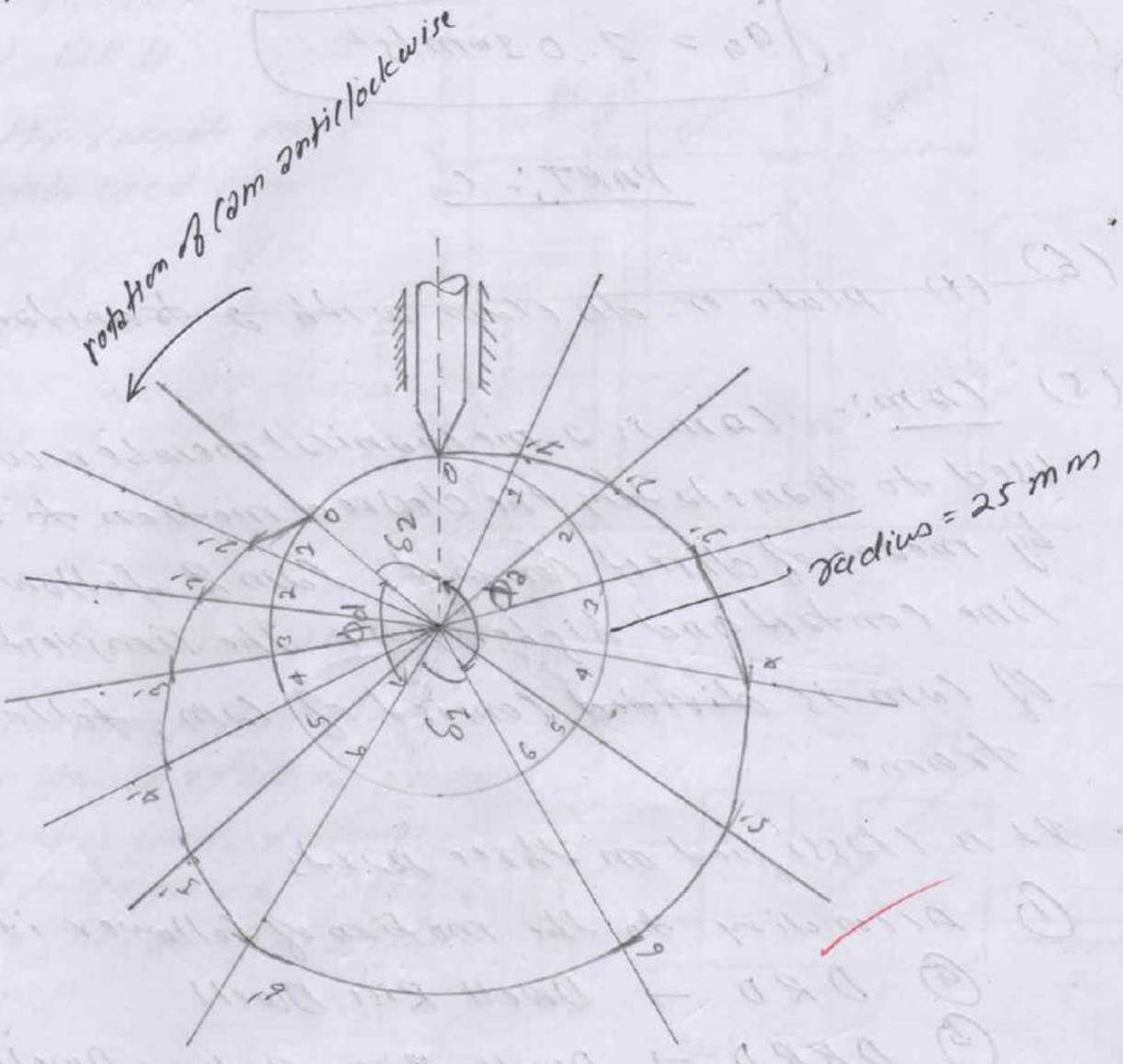
(2) cam profile



(3) maximum velocity during lift

$$V_2 = \frac{\pi \omega h}{2\theta_2}$$

Here $\omega = \frac{2\pi N}{60} = \frac{2 \times \pi \times 120}{60} = 12.56$ rad/sec

$$\therefore V_2 = \frac{\pi \times 12.56 \times 30}{2 \times 150^\circ}$$

$V_2 = 3.995$ mm/sec ~~or 399~~

maximum acceleration during lift

$$a_a = \frac{\pi^2 \omega^2 h}{2\theta_2^2} = \frac{\pi^2 \times (12.56)^2 \times 30}{2 \times (150)^2}$$

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$a_a = 2.03 mm/s^2$

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PART :- C

(6) ~~(i) plate or disc cam with a translating follow~~

(5) Cam :- Cam is a mechanical member which is used to translating the desired motion to the follow by means of direct contact. Cam & follow have a line contact and higher pair. The simplest mechanis of cam is ~~divided~~ consist of cam, follower and frame.

It is classified on three parts

(i) According to the motion of follower it classifies
   (a) DRD → Dwell Rise Dwell
   (b) DRRD → Dwell Rise - Return Dwell
   (c) RRR → Rise - Return Rise.

(ii) According to the shape of cam it classifies
   (a) Wedge cam
   (b) Radial cam
   (c) Cylindrical cam

(iii) According to the classification of constraint
   (a) Spring loaded constraint
   (b) Positive constraint.

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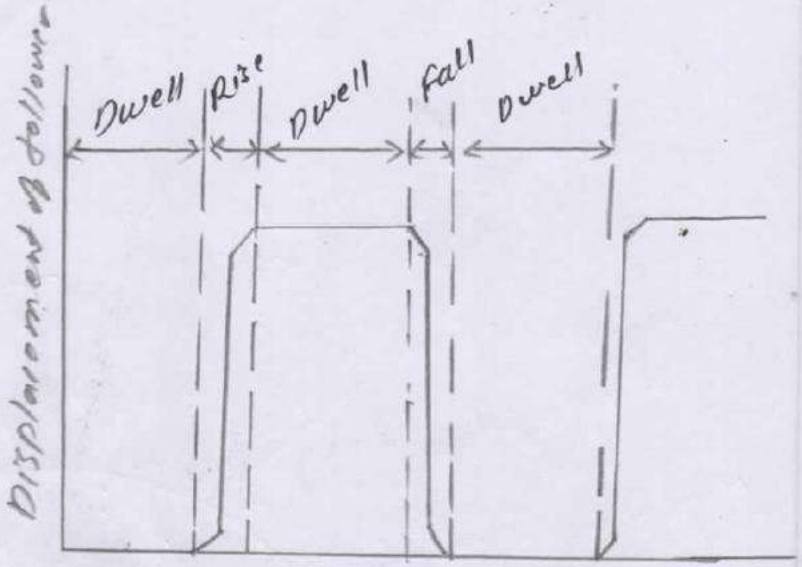
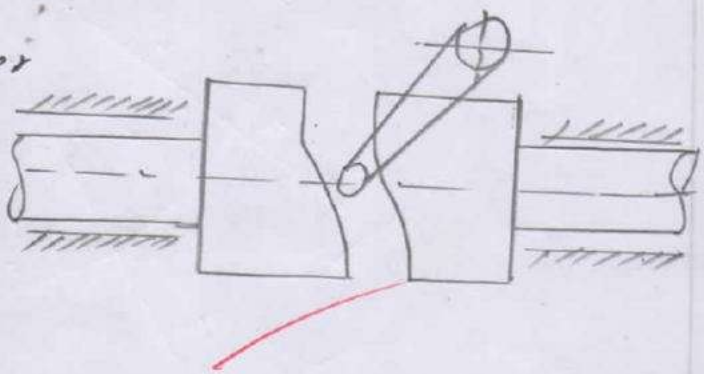
(2) DRD

It is the simple most commonly used cam



(11) (c) Cylindrical cam.

The circumferential cut in the surface of cylinder this cam is used. follower in on fixed on the there is no needs of external forces.



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