AISSMS
COLLEGE OF ENGINEERING
ज्ञानम् सकलजनहिताय
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Department of Civil Engineering
Assignment No – 2 (Unit IV, V& VI)

Class- TE
Sub: DRCS
Date of Assignment- 10 /05 /2023
Date of Submission – 20 /05 /2023

Batch	Question Nos
Roll No: 18CV027, 19CV086, 20CV053, 3,62, 41,44, 47,25, 15, 58, 17.	1,2,3
Roll No: 20CV016, 1, 32, 7, 34, 61, 28, 63, 35, 54, 64, 36.	4,5,6
Roll No: 20CV033, 24, 9, 57, 19, 4, 51, 21, 8, 6, 38, 40.	7,8,9
Roll No: 20CV010, 31, 37, 43, 60, 50, 52, 46, 42, 22, 13, 27.	10,11,12
Roll No: 20CV011, 14, 30, 5, 56, 18, 12, 55, 59, 20, 2, 49.	13,14,15
Roll No: 21CV0306, 301, 308, 307, 314, 309, 310, 312, 313, 302, 303, 311.	16,17,18
Roll No: 21CV0305, 304, 315, 20CV023, 29, 48.	19,20,21

CO Statement:

CO4: Design & detailing of dog legged and open well staircase.
CO5: Design & detailing of singly/doubly rectangular/flanged beams for flexure, shear, bond and torsion.
CO6: Design & detailing of short columns subjected to axial load, uni-axial/bi-axial bending and their footings.

Taxonomy Level: (For eg Remember/Understand/Apply/Analyze/Evaluate/Create)

Sr. No.	Question	Taxonomy Level	CO	Marks

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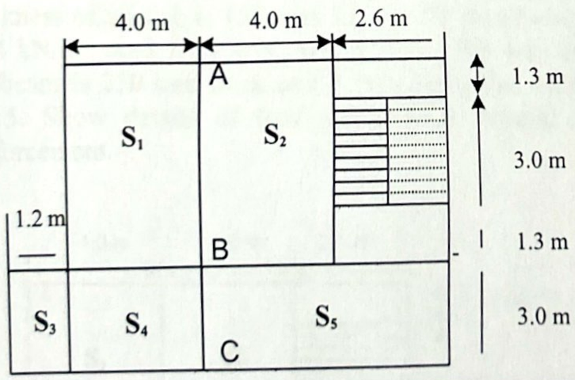
1	Continuous RC beam ABC of rectangular section is simply supported at A and C and continuous over support B. Span of AB =4.5 m and BC = 5.5 m. The beam carries D.L. of 20 kN/m (including its self-weight) and LL of 16 kN/m. The beam supports 120 mm slab on both sides. **Design** beam for span AB and BC for flexure and shear using 20 % redistribution of moments. Material used M25, Fe 500. Draw details of reinforcement	**Analyze, Create**	**CO4**	**05**
2	**Design** the reinforcement in a column of a 450 mm x 600 mm, subject to an axial load of 200 kN under service dead load and live loads. The column has an unsupported length of 3.0 m and is restrained in both directions. Use M20 Concrete and Fe 500 steel.	**Analyze, Create**	**CO5**	**05**
3	**Design** a footing for an axially loaded square column of 450 mm side, transmitting a load of Pu = 1000 kN and safe bearing capacity of soil is 300 kN/m². Use M20, Fe 415.	**Analyze, Create**	**CO6**	**05**
4	Design a continuous beam ABC for flexure and shear using 15% redistribution of moments using LSM. Thickness of all slab is 150 mm. LL and FF on all slabs are 4 kN/m². And 1.5 kN/m², respectively. The wall on this beam is 230 mm thick and 2.75m high, Use M20, Fe415. Show details of load calculations, layout of reinforcement. 	**Analyze, Create**	**CO4**	**05**
5	**Design** a short reinforced concrete column of rectangular section to carry an ultimate load of 600 kN and ultimate moment 100 $kN.m$ acting about an ais bisecting the depth of the column. Assume the effective length of the column equal to 4.5 m, width of the supported beam is 300 mm. Use M20, Fe 415. Provide equal steel on both tension and compression sides. $L_{eff\,x}$ = 4.5 m and $L_{eff\,y}$ = 3.5 m.	**Analyze, Create**	**CO5**	**05**

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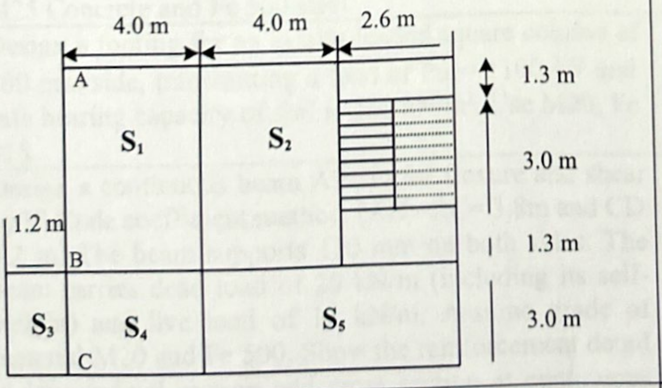
6	A column carries axial load Pu = 1500 Kn. **Design** an isolated rectangular footing for the column, safe bearing capacity of soil is 250 kN.m². The column size is 300 mm x 500 mm. Use M20, Fe 415. **Draw** sectional elevation and plan showing reinforcement details.	**Analyze, Create**	**CO6**	**05**
7	Design a continuous beam ABCD for flexure and shear by IS Code coefficient method. (AB =BC=CD 4.2 m) The beam supports 120 mm on both sides. The beam carries dead load of 18 kN/m (including its self-weight) and live load of 10 kN/m· Take material M20 and Fe 500, Show the reinforcement detail in longitudinal section and cross section at continuous support and at mid span	**Analyze, Create**	**CO4**	**05**
8	A corner column (400 mm x 400 mm) located in the lowermost storey of a system of braced frames, is subjected to factored loads Pu = 1300 *kN*, Mux = 190 *kN. m* and Muy = 110 *kN. m* . the unsupported length of column is 3.5 m. **Design** the reinforcement in the column, assuming M25 concrete and Fe 415.	**Analyze, Create**	**CO5**	**05**
9	Design a square footing for a 400 mm x 400 mm size column, carrying a direct load of 800 kN and subjected to a moment of 70 kN.m. The safe bearing capacity of soil is 150 kN/m². Use M20, Fe415.	**Analyze, Create**	**CO6**	**05**
10	Design a continuous beam ABC for flexure and shear using 15% redistribution of moments using LSM. Thickness of all slab is 150 mm. LL and FF on all slabs are 4 kN/m². And 1.5 kN/m², respectively. The wall on this beam is 230 mm thick and 2.75m high, Use M20, Fe415. Show details of load calculations, layout of reinforcement.  	**Analyze, Create**	**CO4**	**05**
11	**Design** a short concrete column to carry an ultimate axial load of 90 *kN* and ultimate moment of 30 *kN. m* acting	**Analyze, Create**	**CO5**	**05**

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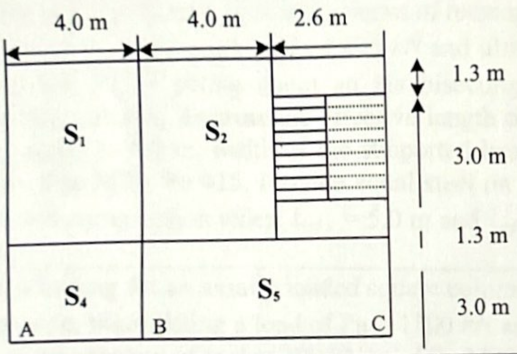
	an axis bisecting the width of column. Use Concrete M20 and steel Fe 415, Assume Moderate Environment			
12	A column carries axial load Pu = 1600 Kn. **Design** an isolated rectangular footing for the column, safe bearing capacity of soil is 230 kN.m². The column size is 400 mm x 600 mm. Use M20, Fe 415. **Draw** sectional elevation and plan showing reinforcement details.	**Analyze, Create**	**CO6**	**05**
13	Design a continuous beam ABC for flexure and shear using 15% redistribution of moments using LSM. Thickness of all slab is 150 mm. LL and FF on all slabs are 4 kN/m². And 1.5 kN/m², respectively. The wall on this beam is 230 mm thick and 2.75m high, Use M20, Fe415. Show details of load calculations, layout of reinforcement. 	**Analyze, Create**	**CO4**	**05**
14	**Design** the reinforcement in a column of a 500 mm x 650 mm, subject to an axial load of 220 *kN* under service dead load and live loads. The column has an unsupported length of 3.5m and is restrained in both directions. Use M25 Concrete and Fe 500 steel.	**Analyze, Create**	**CO5**	**05**
15	**Design** a footing for an axially loaded square column of 500 mm side, transmitting a load of Pu = 1100 *kN* and safe bearing capacity of soil is 280 kN/m². Use M20, Fe 415.	**Analyze, Create**	**CO6**	**05**
16	Design a continuous beam ABCD for flexure and shear by IS Code coefficient method. (AB =BC= 3.8m and CD 4.2 m) The beam supports 130 mm on both sides. The beam carries dead load of 20 kN/m (including its self-weight) and live load of 12 kN/m. Assume grade of material M20 and Fe 500, Show the reinforcement detail in longitudinal section and cross section at continuous support and at mid span	**Analyze, Create**	**CO4**	**05**
17	**Design** a short concrete column to carry an ultimate axial load of 110 *kN* and ultimate moment of 40	**Analyze, Create**	**CO5**	**05**

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	$kN.m$ acting an axis bisecting the width of column. Use Concrete M20 and steel Fe 415, Assume Mild Environment.			
18	A column carries axial load Pu = 1800 kN. **Design** an isolated rectangular footing for the column, safe bearing capacity of soil is 250 kN.m². The column size is 400 mm x 500 mm. Use M20, Fe 415. Draw sectional elevation and plan showing reinforcement details.	**Analyze, Create**	**CO6**	**05**
19	**Design** a continuous beam ABCD for flexure and shear by IS Code coefficient method. (AB =BC=CD= 5.0 m) The beam supports 150 mm on both sides. The beam carries dead load of 21 kN/m (including its self-weight) and live load of 15 kN/m· Take material M25 and Fe 500, Show the reinforcement detail in longitudinal section and cross section at continuous support and at mid span	**Analyze, Create**	**CO4**	**05**
20	**Design** a short reinforced concrete column of rectangular section to carry an ultimate load of 800 kN and ultimate moment 150 $kN.m$ acting about an ais bisecting the depth of the column. **Assume** the effective length of the column equal to 4.0 m, width of the supported beam is 300 mm. Use M20, Fe 415. Provide equal steel on both tension and compression sides. $L_{eff\,x}$ = 5.0 m and $L_{eff\,y}$ = 4.5 m.	**Analyze, Create**	**CO5**	**05**
21	**Design** a footing for an axially loaded square column of 550 mm side, transmitting a load of Pu = 1500 kN and safe bearing capacity of soil is 300 kN/m². Use M20, Fe 500.	**Analyze, Create**	**CO6**	**05**

Remarks:

Course Coordinator   SRP Module Coordinator   PAC Coordinator   H.O.D.

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22-23 sem II

NAME : BHALSHANKAR SNEHA RAVI

ROLL NO : 21CV304

DIV : TE - CIVIL - A

sub - DRCS

9/10

ASSIGNMENT NO : 1.

Q25 What is partial safety factor used in the design of RCC section Why they are called as partial ? Give the partial safety factors for stresses in steel & concrete ?

Ans =

- safety of structure depends on the 2 principle design a factors like load & materials strength which are not the functions of each other
- Two different safety factors, one for load & other a for material strength are used instead of signle safety factor
- Partial safety factor for load (γ_F) & Design load (F_d) (cl-no. 36.4.1) Pg. 68.
  It takes into account unforce seen possible increase in load
  Inaccoate assessment of load
- Partial safety factor for materials is the ratio of strength to design strength of material

$$\gamma_m = \frac{F_{ck}}{F_d}$$

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Material	Limit state		
	collapse	Deflection	local damage
- concrete	1:50	1:00	1:00
- steel	1:15	1:00	1:00

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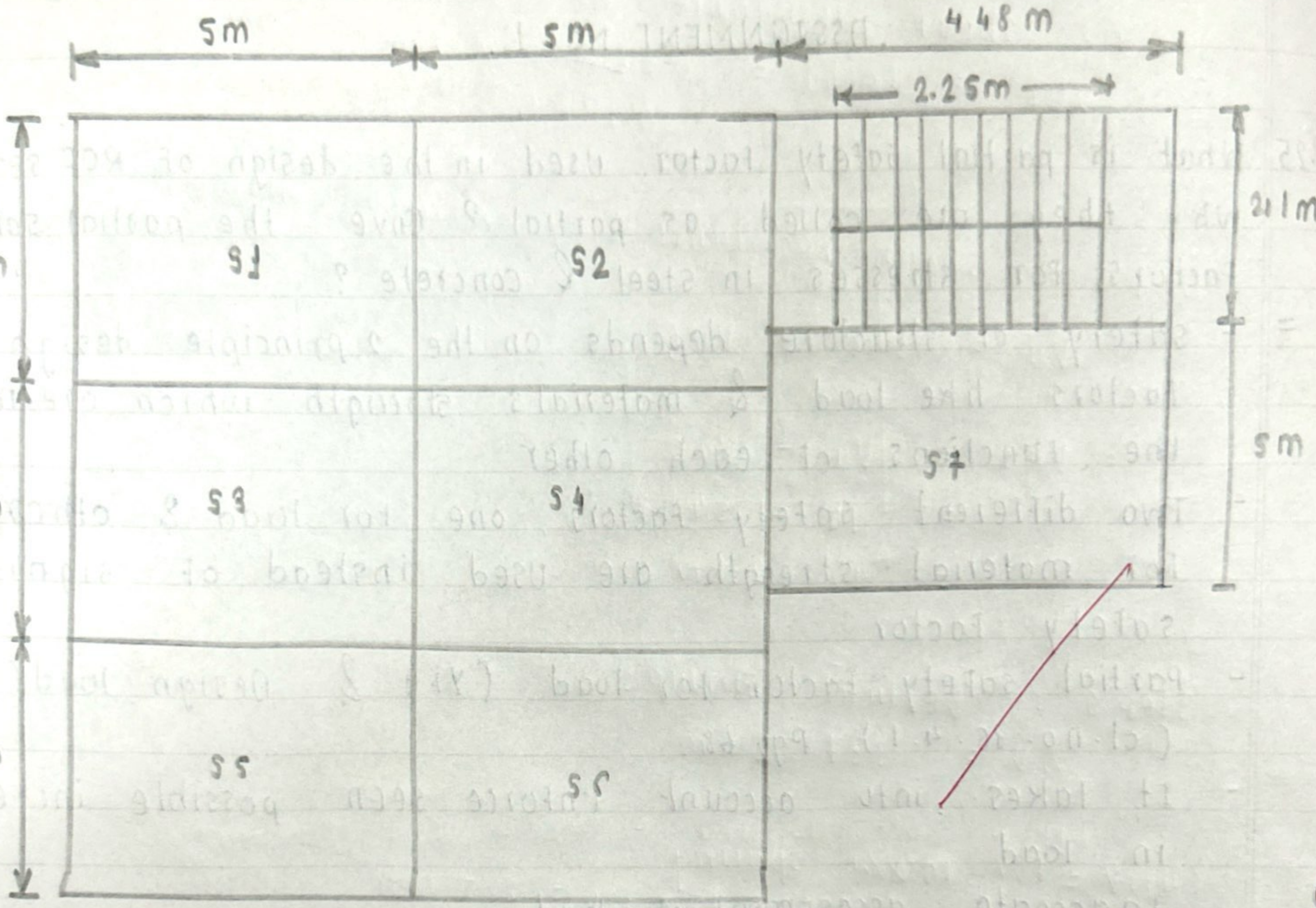

Fig : 1

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Q26 The central line plan of building is as shown in Fig. 1 classify the slabs structurally & Design the S1 & S2 only for flexure by L.S.M. Draw neat sketches show details of reinforcement. Take live load = 4 KN/m^2 Floor finish = 1.5 KN/m^2 Materials = M25 grade of concrete Fe 415 grade of reinforcement Assume suitable data if required.

=

Design of slab S1 & S2

Step 1 : Type of slab

$$\frac{Ly}{Lx} = \frac{5}{4} = 1.25 < 2$$

Design a two way slab

Step 2: Effective span & trial depth

Assume pt% = 0.3% for Fe 415

∴ MF = 1.5

$$d = \frac{4000}{20 \times 1.5} = 133.33 \text{ mm}$$

$$D = d + c.c + \phi/2$$
$$= 133.33 + 15 + 8/2$$
$$= 152.33 \approx 160 \text{ mm}$$

$$d = D - c - \phi/2$$
$$= 160 - 15 + 8/2$$
$$= 141 \text{ mm}$$

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step 3: Load calculations

i) Dead load = 25 X D = 25 X 0.16 = 4 kN/m^2

ii) Floor Finish = 1.5 kN/m^2

iii) Live load = 4 kN/m^2

Total load = W = 9.5 kN/m

Wu = 15.25 kN/m

step 4 : Factored bending moment

$M_{ux} = \alpha_x W_u (l_x)^2$ & $M_{uy} = \alpha_y W_u (l_x^2)$

$W_u (l_x^2)$ 14.25 X 4^2 = 228

Two way slab S1 & S2 is case 4 as two adjecent edges are discontinuous (table 26 c/s D.1.1 Pg. 90)

Material	α_x			α_y	M_{ux}	M_{uy}
	1.2	1.3	1.25			
Negative	0.060	0.065	0.0625	0.047	14.25	10.72
Positive	0.045	0.049	0.047	0.035	10.72	8

Mumax = 14.25 kN.m

step 5: Main reinforcement

i) steel along support (continuous edge) short span

$$A_{st x} = \frac{0.5 \times 20}{415}\left(1 - \sqrt{1 - \frac{4.6 \times 14.25 \times 10^6}{20 \times 1000 \times 141^2}}\right) \times 1000 \times 141$$

$= 292.7 \text{ mm}^2$

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$$s = \frac{1000 \times \pi/4 \times 8^2}{292.7}$$

$= 171.7 \cong 160$ mm < 300 or $3d$

provide 8mm ϕ @ 160 mm c/c

ii) Steel at mid span of short span & support of long span

$$Ast_x = \frac{0.5 \times 20}{415}\left(1 - \sqrt{1 - \frac{4.6 \times 10.72 \times 10^6}{20 \times 1000 \times 141^2}}\right) \times 1000 \times 141$$

$= 217.65$ mm^2

$$s = \frac{1000 \times \pi/4 \times 8^2}{217.65}$$

$= 230$mm $\cong 220$ mm $< 3d$ or 300 mm

ii) steel at mid span of long span

$$Ast_x = \frac{0.5 \times 20}{415}\left(1 - \sqrt{1 - \frac{4.6 \times 8 \times 10^6}{20 \times 1000 \times 133^2}}\right) \times 1000 \times 133$$

$= 171.25$ mm^2

$$s = \frac{1000 \times \pi/4 \times 8^2}{171.25}$$

$= 293.5 \cong 280$mm < 300 or $3d$

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i) Ast pro = 314.25 mm^2
ii) Ast pro = 228.5 mm^2
iii) Ast pro = 179.5 mm^2

step 5 = check for depth by Mu lim

Mulim = $0.138 \times Fck\ bd^2$
= $0.138 \times 20 \times 1000 \times d^2$
= $2760\ d^2$

∴ Equate Mux & (Md)

d req : 71.85mm < 141mm

∴ safe

step 7 : check for Deflection

$pt\ pro = \frac{100 \times Ast\ P}{bd}$

$= \frac{100 \times 228.2}{1000 \times 141}$

= 0.16 %

$Fs = 0.58\ Fy \times \frac{Ast\ req}{Ast\ pro}$

$= 0.58\ Fy \times \frac{415 \times 217.7}{228.5}$

= 229.3 ≅ 230 N/mm^2

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MF = 1.7 (From Fig 4 pg. 38)

$\therefore$ Depth req = $\frac{4000}{20 \times 1.7}$ = 117.65 mm < 160 mm

safe

Step 8 : Design of Torsional steel

$A_{st} = \frac{3}{4} A_{st}\ d$

$= \frac{3}{4} \times 228.5$

$= 171\ mm^2$

$s = \frac{1000 \times \pi/4 \times 8^2}{171}$

$= 293.5 \simeq 200$ mm

Step 9 : Design of Distribution steel

$A_{st} = 0.12\%\ bd = \frac{0.12}{100} \times 1000 \times 160$

$= 192\ mm^2$

$s = \frac{1000 \times \pi/4 \times 8^2}{192} = 261.5 \simeq 250$ mm

It is provided in the edge strip of width

$\frac{1}{8} l_x = \frac{1}{8} \times 4000 = 500$ mm

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$\frac{1}{8} l_y = \frac{1}{8} \times 5000 = 625\ mm$

step 10 : check for shear

$V_d = W_u (0.5\ l_x - d)$

$= 14.25 (0.5 \times 4 - 0.141)$

$= 26.5\ kN$

$\tau_v = \frac{V_d}{bd} = \frac{26.5 \times 10^6}{1000 \times 141} = 0.19\ N/mm^2$

$\tau_c = 0.29\ N/mm^2$

$k = 1.28$

$\tau_c = 1.28 \times 0.29$

$= 0.37\ N/mm^2$

$\tau_c > \tau_v$

$\therefore$ safe

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Q.27 Design Flight I of the stair case as shown in Fig I for the following data :

i) Floor to Floor height = 3.2 m
ii) Rise = 160 mm
iii) Tread = 250 mm
iv) Width of loading = 1.115 m
v) Width of stair = 1m
vi) Gap betⁿ flights = 100 mm

= Step I : Preliminary data

- Ht of each flight = $H = \frac{3200}{2} = 1600$ mm

- No. of riser = $R = \frac{H}{rise} = \frac{1600}{160} = 10$

- No. of treads = T = R - 1 = 10 - 1 = 9

- Going = G = 9 X 250 = 2250 mm

- Landing on each side = 1.115 m

L1 = 2250 + 1115 = 3365 mm

Step 2 : Depth of waist slab based on servisibility

Assume % pt = 0.4 %

$f_s = 0.58 \times f_y$
$= 0.58 \times 500$
$= 290$ mpa

MF = 1.1

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$d = \frac{3365}{1.1 \times 20} = 153\ mm$

$D = d + c + \phi/2$

$= 153 + 15 + 10/2$

$= 173\ mm \cong 180\ mm$

$d = 180 - 15 - 10/2$

$= 160\ mm$

Step 3 : Effective span

$L_{eff} = 3365 + 160$

$= 3.52\ m$

Step 4 : Load calculations

DL of waist slab $= \gamma \times D \times \left(\frac{\sqrt{T^2 + R^2}}{T}\right)$

$= 20 \times 0.18 \times \left(\frac{\sqrt{250^2 + 160^2}}{250}\right)$

$= 4.27\ KN/m^2$

$LL = 4\ KN/m^2$

$FF = 1.5\ KN/m^2$

$W_1 = 9.77\ KN/m^2$

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S.W of step $= \gamma \times R/2 = 20 \times \frac{0.16}{2}$

$= 1.6\ KN/m^2$

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$W_2 = W_1 + DL$ step

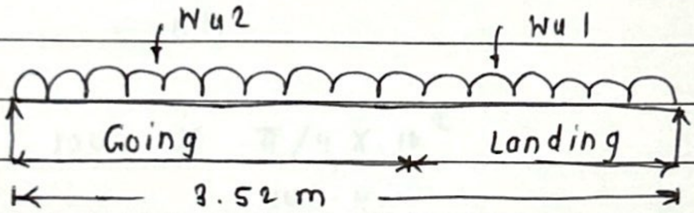
$= 9.77 + 1.6$

$= 11.37$ KN.m

Step 5 : Factored load

$W_{u1} = 1.5 \times 9.77 = 14.65$ KN/m

$W_{u2} = 1.5 \times 11.37 = 17.65$ KN/m



Step 6: Factored bending moment

$$M_u = \frac{W_u l^2}{8} = 17.05 \times 3.52^2 / 8$$

$$= 26.41 \text{ KN·m}$$

Step 7 : Depth req for max bM

$M_u = M_{ulim}$

$M_{ulim} = 0.133 \times 20 \times 1000\ d^2$

$$d = \sqrt{\frac{26.41 \times 10^6}{0.133 \times 20 \times 1000}}$$

$= 102.46$ mm < 160 mm ∴ ok

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Step 6 : Longitudinal steel

$$A_{st} = \frac{0.5 \times 20}{500}\left(1 - \sqrt{1 - \frac{4.6 \times 26.41 \times 10^6}{20 \times 1000 \times 160^2}}\right) \times 1000 \times 160$$

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$= 406.4\ mm^2$

$Ast\ min = \frac{0.12}{100} \times 1000 \times 180$

$= 216\ mm^2$

Ast > Ast min

∴ ok

$s = 1000 \times \frac{\pi/4 \times 10^2}{406.4}$

$= 193.25 \approxeq 190\ mm$

∴ Provided 10 mm ϕ bar @ 190 mm c/c

step 9 : Distribution steel

$Astd = Ast\ min = 216\ mm^2$

$s = 1000 \times \frac{\pi/4 \times 6^2}{216}$

$= 130\ mm$

∴ provide 6mm ϕ bar @ 130 mm c/c

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step 10 : check for deflection

$Ast\ pro = 1000 \times \frac{\pi/4 \times 10^2}{190}$

$= 413.36\ mm^2$

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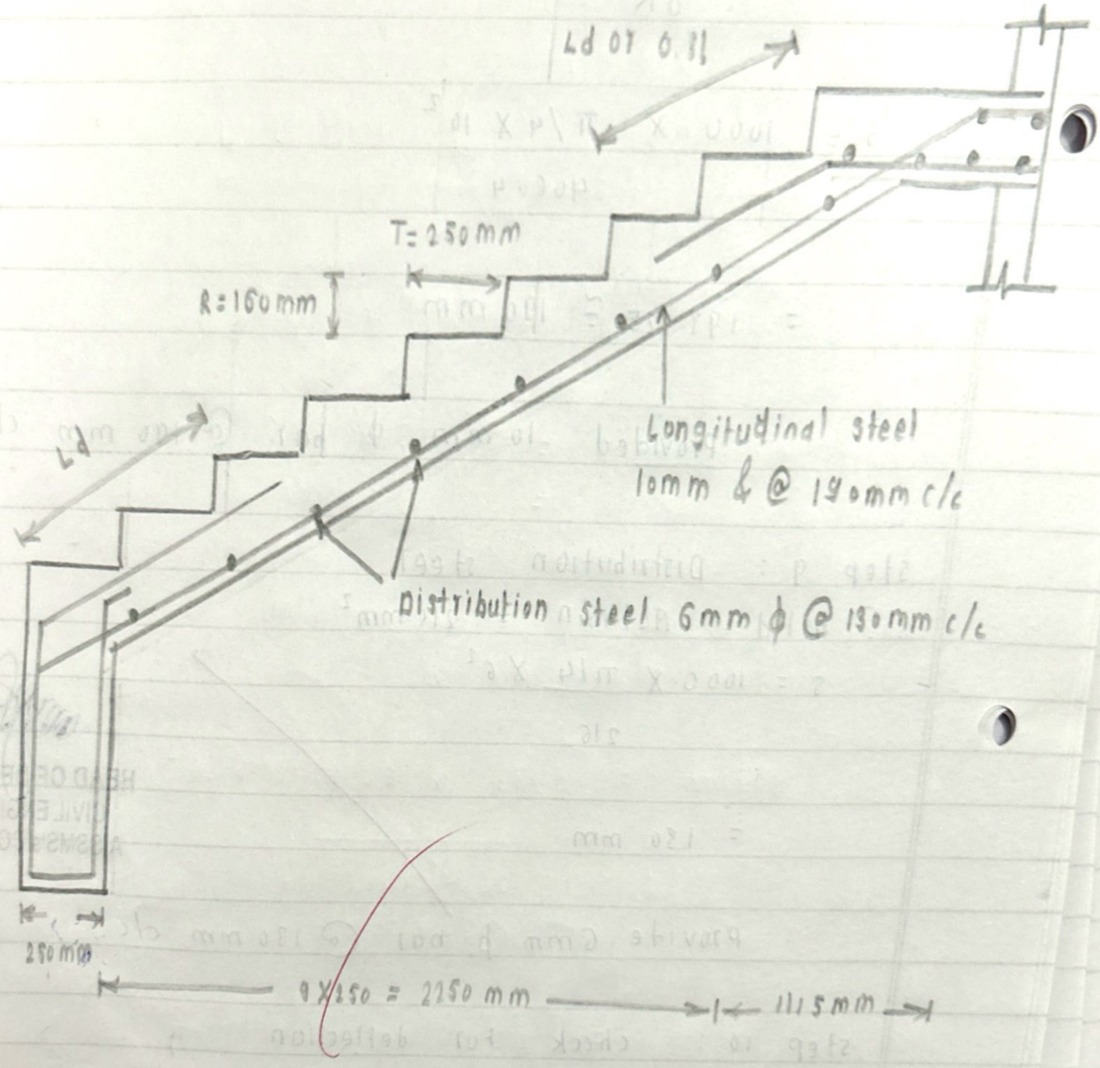
• Reinforcement Detailing :



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$$fs = 0.58 \times 500 \times \frac{406.4}{413.36}$$

$$= 285\ MPa \simeq 290\ mpa$$

$$\%\ pt = \frac{100 \times 413.36}{1000 \times 160}$$

$$= 0.25\ \%$$

M. F = 1.4 (from table 4 pg . 38)

$$d = \frac{l}{MF \times BV}$$

$$= \frac{3520}{1.4 \times 20}$$

$$= 125.71\ mm < 160\ mm$$

d deflection < d provided

∴ safe

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Q.28. A RC beam 230 mm wide & 430 mm deep is reinforced with 3 no - 20 mm bars of grade 415 on the tension side with an eff cover of 50 mm. Design shear reinforcement (only 2 no. 20 mm bars are available the bar being curtailed) consisting only of vertical stirrups. Assume M20 grade ultimate shear force = 95 KN

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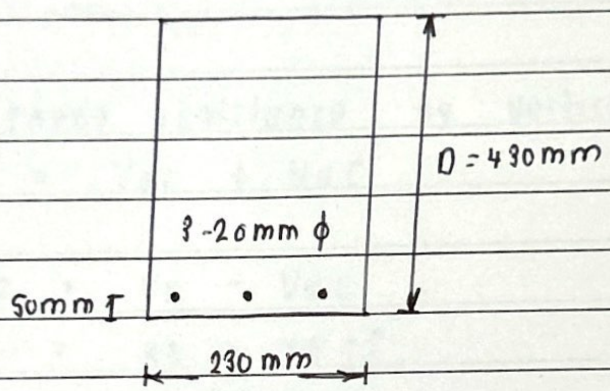

$V_u = 95$ KN

$A_{st} = 3 \times \frac{\pi}{4} 20^2 = 942.5 \text{ mm}^2$

Eff depth = D - eff. cover = 430 - 50 = 380 mm

step 1 : Nominal shear stress

$\tau_v = \frac{V_u}{bd} = \frac{95 \times 10^3}{230 \times 380} = 1.08 \text{ N/mm}^2$

step 2 : Design shear st. in concrete (τ_c)

% Pt of steel = $\frac{100 \times 942.5}{230 \times 380} = 1.00$ %

τ_c for M20 & % Pt = 1 form table 19. Pg 73

$\tau_c = 0.62 \text{ N/mm}^2$

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Step 3: Maximum shear stress $\tau_{c\,max}$

For M20 $\tau_{c\,max}$ = 2.8 N/mm²

Since $\tau_v > \tau_c < \tau_{c\,max}$

shear reinforcement is req

Step 4: Shear resistance by concrete (V_{uc})

$V_{uc} = \tau_c bd = 0.62 \times 230 \times 380$

$= 54.18$ KN

Step 5: Shear resistance by vertical stirrups

$V_u = V_{uc} + V_{us}$

$V_{us} = V_u - V_{uc}$

$= 95 - 54.18$

$= 40.82$ KN

Step 6: Vertical stirrups

$S_v = 337.82$ mm

Check for max spacing

i) $S_v = 0.75 \times d = 0.75 \times 380 = 285$ mm

ii) $S_v = 300$ mm

iii) $S_v = 394.52$ mm

$S_{v\,max} = 285$ mm (min ① ② & ③)

$S_v = 330 > S_{v\,max}$

∴ Provide 8 mm ϕ two legged vertical stirrups at 285 mm c/c

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Rainbow

Name - Sanjot Nitin Beldar 2022-23 (sem II)
Roll NO - 20CV010
08/10
Assignment NO - 02
DRCS.

Q 10]
⟹

Given :- Slab thickness = 150mm
Live Load = 4.0 kN/m²
Floor finish = 1.5 kN/m²
wall thickness = 230 mm
wall height = 2.75 mm
fck = 20 MPa . Fy = 415 MPa
Redisbution of moment = 15 %.

Step - ① Preliminary data :-
Depth of beam d = $\frac{span}{d} = \frac{5800}{12} = 483mm$

Assume cover 25 mm & diameter of bar 20mm

overall depth $D = d + c + \frac{\phi}{2} = 483 + 25 + \frac{20}{2}$

$= 518 \approx 520m$

$d = 520 - 25 - 10 = 485mm$

∴ Provide beam of size 230mm x 520mm

Step - ② Load calculation
Dead Load on Beam AB
Surface Load = (self weight of slab + F.F)
$w = (0.15 \times 25 * 1.5) = 5.25 \ kN/m^2$

i) equivalent Load from two way slab on beam AB ($l_x = 4m$)

$= \frac{w l_x}{2}\left[1 - \frac{1}{3\beta^2}\right]$

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when $\beta = \frac{ly}{lx} = \frac{5.6}{4} = 1.4$

$= \left[\frac{5.25 \times 4}{2}\left\{1 - \frac{1}{3 \times 1.4^2}\right\}\right] \times 2$

$= 17.43$ kN/m

ii] Dead Load of wall

$= \gamma w \times tw \times h = 20 \times 0.23 \times 2.75$

$= 12.65$ kN/m

iii] Self weight of beam $= \gamma \cdot b\,(D - ts)$

$= 25 \times 0.23\,(0.52 - 0.15) = 2.1275$ kN/m

∴ Dead Load on beam AB $= 17.43 + 12.65 + 2.12$

$= 32.2$ kN/m

Live Load on AB $= 17.43 + 12.65 + 2.1275$

$= 32.2$ kN/m

$= \left[\frac{w\,lx}{2}\left\{1 - \frac{1}{3\beta^2}\right\}\right] \times 2$

$LL = \frac{4 \times 4}{2}\left[1 - \frac{1}{3 \times (1.4)^2}\right] \times 2 = 13.3$ kN/m

Check for Load case requirment

L.L > $\frac{3}{4}$ (D.L) 13.3 > $\frac{3}{4}$ (32.2)

1.33 ≯ 24.15

L.L ≯ $\frac{3}{4}$ DL, No Load cases are required

D.L on beam of span BC ($lx = 3m$)

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$$W_{eq} = \left[\frac{w l_x}{2} \left\{ 1 - \frac{1}{3\beta^2} \right\} \right] \times 2$$

where $\beta = \frac{l_y}{l_x} = \frac{4}{3} = 1.33$

$$= \frac{5.25 \times 3}{2} \left[1 - \frac{1}{3 \times 1.33^2} \right] \times 2 = 12.8 \text{ kN/m}$$

D.L on span BC = 12.8 + 12.65 + 2.175 = 27.6 kN/m

LL on BC $= \frac{4 \times 3}{2} \left[1 - \frac{1}{3 \times 1.33^2} \right] \times 2 = 9.75$ kN/m

$L.L > \frac{3}{4} DL$ — $9.75 > \frac{3}{4}(27.6)$ — $9.75 \ngtr 20.7$

Load cases does not required

In such cases, considered maximum Load on each span,

Span AB — $W_{u max} = 1.5(DL + LL)$

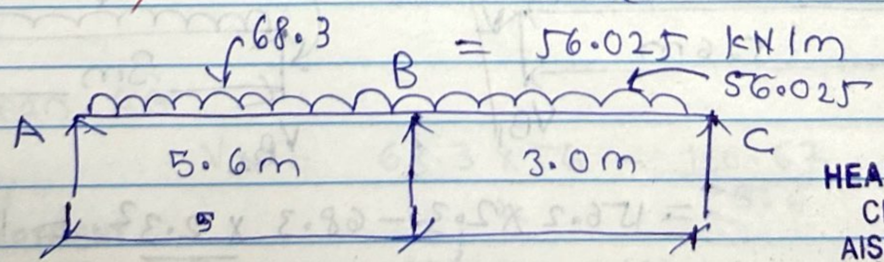
$= 1.5(32.2 + 13.33)$

$= 68.3$ kN/m

Span BC — $W_{u max} = 1.5(DL + LL)$

$= 1.5(27.6 + 9.75)$

$= 56.025$ kN/m



Joint	member	K	ΣK	DF = K/ΣK
B	BA	0.75 EI/L = 0.75 EI/5.6 = 0.133 EI	0.383	0.35
	BC	0.75 EI/L = 0.75 EI/3 = 0.25 EI		0.65

SN	Roll No.	
		GODBHARLE V ...
1	20CV038	GUNJAL VEDANT MILIND

$$FEM = M_{AB} = \pm \frac{wL^2}{12} = \pm \frac{68.3 \times 5.6^2}{12} = \mp 178.5\ kN\text{-}m$$

$$M_{BC} = \mp \frac{wL^2}{12} = \mp \frac{56.025 \times 3^2}{12} = \mp 42\ kN\text{-}m$$

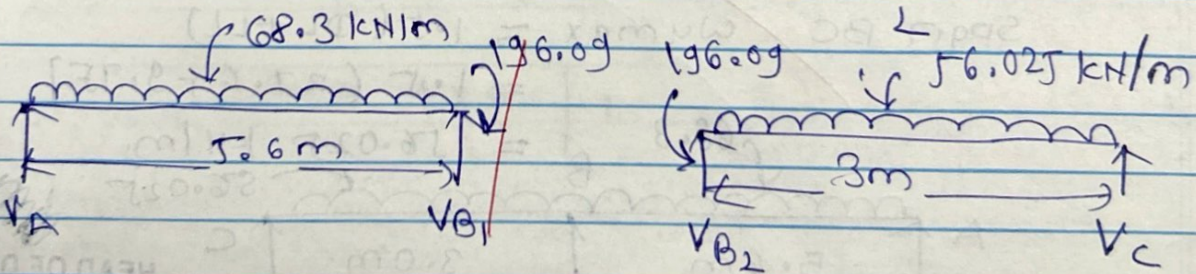
	A	0.35 B	0.65	C
FEM	-178.5	+178.5	-42	+42
Balance	+178.5 —CO→	89.25	-21 ←	-42
moment	0	267.75	-63	0
balance		-71.66	-133.09	
	0	196.09	-196.09	0

Support reaction

$$V_A = \frac{wL}{2} - \frac{M}{L} = \frac{68.3 \times 5.6}{2} - \frac{196.09}{5.6} = 156.2\ kN$$

$$x_{max} = \frac{V_A}{w} = \frac{156.2}{68.3} = 2.3\ m$$

$$M_{max} = V_A \cdot x_{max} - \frac{w \cdot x^2_{max}}{2}$$



$$= 156.2 \times 2.3 - 68.3 \times \frac{2.3^2}{2} = 178.6\ kN\text{-}m$$

Point of contraflexure $x = \frac{2V_A}{w} = \frac{2 \times 156.2}{68.3}$

$= 4.6m.$

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Span BC $(L = 3m)$

$$V_C = \frac{wL}{2} - \frac{M}{L} = \frac{56.025 \times 3}{2} - \frac{196.09}{3}$$

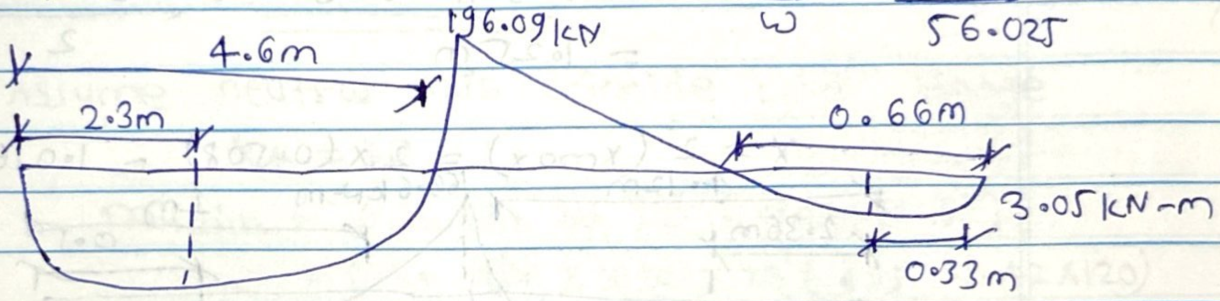
$$= 18.67 \text{ kN}$$

$$X_{max} = \frac{V_C}{w} = \frac{18.67}{56.025} = 0.333 \text{ m}$$

$$M_{max} = V_C \cdot X = 18.67 \times 0.333 - \frac{56.025 \times 0.33^2}{2}$$

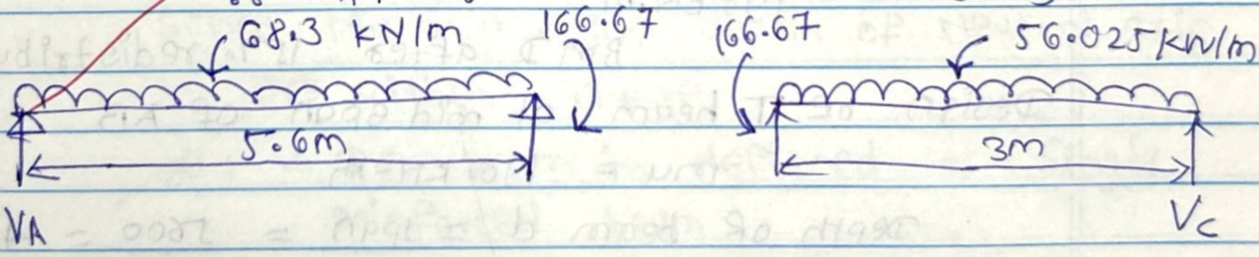
$$= 3.05 \text{ kNm}$$

Point of contraflexure $x = \frac{2V_C}{w} = \frac{2 \times 18.67}{56.025} = 0.66 m$



Bending moment after 15% redistribution

$\therefore$ support moment $= 0.85 \times 196.09 = 166.67$



Span AB

$$V_A = \frac{68.3 \times 5.6}{2} - \frac{166.67}{5.6} = 161.5 \text{ kN-m}$$

$$X_{max} = \frac{V_A}{W} = \frac{161.5}{68.3} = 2.36 m$$

$$M_{max} = V_A X_{max} - \frac{W \cdot x^2_{max}}{2}$$

$$= 161.5 \times 2.36 - \frac{68.3 \times 2.36^2}{2} = 190.93 \text{ kN-m}$$

$$x = \frac{2V_A}{w} = 2(2.636) = 4.72 m$$

Span BC

$$V_C = \frac{56.025 \times 3}{2} - \frac{166.67}{3} = 28.5 \text{ kN}$$

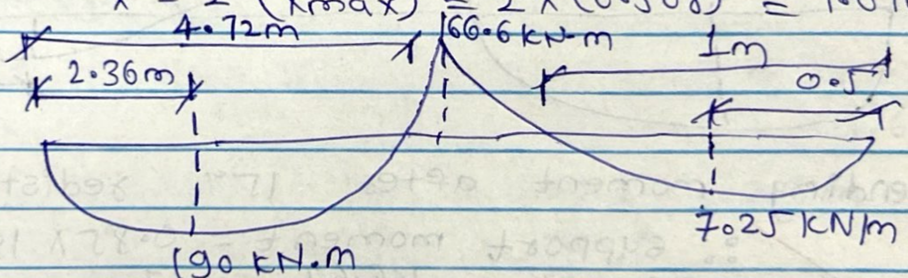
$$X_{max} = \frac{V_C}{w} = \frac{28.5}{56.03} = 0.508 m$$

$$M_{max} = V_C \times X_{max} - \frac{w \cdot x^2_{max}}{2}$$

$$= 28.5 \times 0.508 - \frac{56.03 \times 0.508^2}{2}$$

$$= 7.25 m$$

$$x = 2(x_{max}) = 2 \times (0.508) = 1.016 m \text{ from C}$$



BMD after 15% redistribution

Design of T beam at mid span of AB

$$m_u = 190 \text{ kN-m}$$

$$\text{Depth of beam } d = \frac{\text{span}}{12} = \frac{5600}{12} = 466.67 mm$$

Assume cover 25 mm and diameter of bar is 20 mm.

$$D = d + c + \frac{\phi}{2} = 466.67 + 25 + \frac{20}{2} = 501.66 \approx 500$$

$$d = 500 - c - \frac{\phi}{2} = 500 - 25 - \frac{20}{2} = 465 mm$$

Assume depth of slab $D_f = 120$ mm and

width of rib = 230 mm

effective flange width

$b_f = \frac{L_0}{6} + b_w + 6 D_f = \frac{0.7 \times 5600}{6} + 230 + 6 \times 120$

$= 1603.33$ mm ≈ 1610 mm

Check for width of flange.

$B_f \not> b_w + \left(\frac{L_1 + L_2}{2}\right) = 0.23 + \left(\frac{5.6 + 3}{2}\right) = 4.53$

$1.6 \not> 4.53$ m.

Assume neutral axis coincide with flange

$x_u = D_f$

$M_{u\,lim} = 0.36 f_{ck} b_f D_f (d - 0.42 D_f)$

$= 0.36 \times 20 \times 1610 \times 120 (465 - 0.42 \times 120)$

$= 576.72 \times 10^6$ N.mm $= 576.72$ kN.m

Since $M_u < M_{u\,lim}$ depth of Neutral axis ~~lies~~ within flange.

~~$x_u < D_f$~~ beam is designed as singly Reinforced beam.

Area of Steel $A_{st} = \frac{0.5 f_{ck}}{f_y} \left[1 - \sqrt{1 - \frac{4.6 M_u}{f_{ck} b d^2}}\right] bd$

$= \frac{0.5 \times 20}{415} \left[1 - \sqrt{1 - \frac{4.6 \times 190 \times 10^6}{20 \times 230 \times 465^2}}\right] \times 230 \times 465 = 1679.9 \text{ mm}^2$

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Provid 2-bars of 20 mm ϕ and 3 bars of 25 mm ϕ

$$A_{st} = 3 \times \pi/4 \times 20^2 + 2 \times \pi/4 \times 25^2 = 1924\ mm^2$$

Ast provided > Ast required

Provide 3-20 mm ϕ bar & 2 * 25 mm ϕ bars are curtailed

Designed of rectangular section at supports (B)

$$M_B = 166.66\ kN\text{-}m < M_{u,lim}.$$

∴ The Beam is designed as a simply supported beam,

Area of steel $A_{st} = \frac{0.5 f_{ck}}{f_y}\left[1 - \sqrt{1 - \frac{4.6 M_u}{f_{ck} b d^2}}\right] bd$

$$A_{st} = \frac{0.5 \times 20}{415}\left[1 - \sqrt{1 - \frac{4.6 \times 166.66 \times 10^6}{20 \times 230 \times 465^2}}\right] \times 230 \times 465$$

$$= 1343 mm^2$$

Number of 20 mm ϕ

$$n = \frac{A_{st}}{A_\phi} = \frac{1343}{314.15} = 4.27 \approx 5\ bars$$

Provide 5 - 20 mm ϕ bar

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12]

⟹ Given :-

$b = 400mm$ $D = 600mm$

$P_u = 1600 kN$. $SBC = 230 kN.m^2$

$f_{ck} = 20 N/mm^2$ $f_y = 415 N/mm^2$

Step-① Load on footing.

Assume self weight of footing 10% of load on column

Load on footing $W_f = 1.1 \times W_u = 1.1 \times 1600$

$= 1760 kN$.

step-② Area of footing

Area of footing = $\frac{\text{Factored load on footing}}{\text{SBC of soil}}$

$A_f = \frac{1760}{230} = 7.65 m^2$

Step-③ Size of footing

$\frac{b}{D} = \frac{B}{L}$

$\frac{400}{600} = \frac{B}{L}$

$B = 0.667 L$

Area of footing - $A_f = BL$

$7.65 = 0.667 L \times L$

$L^2 = 11.46 m$

$L = 3.38 m$

$B = 0.667 \times 3.38 = 2.25 m$

$L = 3 m$ $B = 2 m$

Area of footing Provided

$$A_{Fp} = BL = 2 \times 3 = 6\,m^2$$

Step-4 Upward soil pressure

$$P = \frac{\text{Factored Load on column}}{\text{Area of footing provided}}$$

$$= \frac{1.5 \times 1600}{6} = 400\ KN/m^2$$

Step-5 - Depth of footing for Bending moment.

$$M_x = P\frac{(L-D)}{2} \times \frac{1}{2}\left(\frac{L-D}{2}\right) \times B$$

$$= P\frac{B}{8}(L-D)^2 = \frac{250 \times 2}{8}(3-0.45)^2$$

$$= 406.4\ KN.m$$

$$M_y = P\frac{(B-b)^2 \times L}{8} = \frac{250 \times 3(2-0.3)^2}{8}$$

$$= 270.94\ KN\text{-}m.$$

∴ maximum bending moment

$$M_{max} = 406.4\ KN.m$$

Limiting moment of Resisting

$$M_{u\,lim} = 0.138\, f_{ck} b d^2$$

$$406.4 \times 10^6 = 0.138 \times 20 \times 1000 d^2$$

$$\boxed{d = 384\,mm}$$

Cover for footing - Cl. 26.4.2.2 P No. 46

Assume cover for footing = 50 mm &

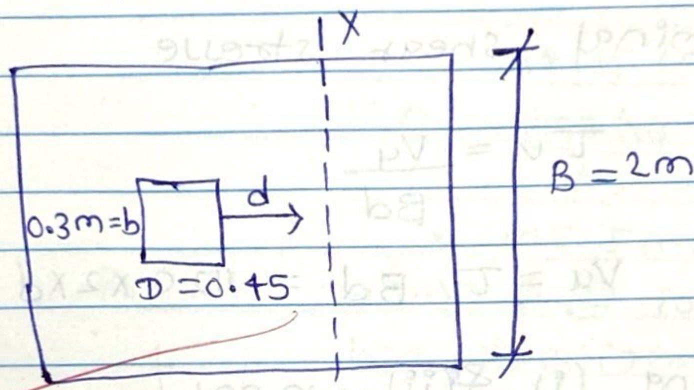
Diameter of bar = 8 20 mm

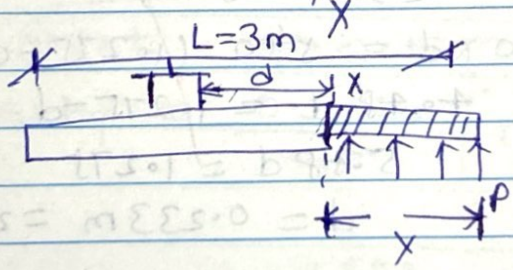
overall depth $D = d + c + \phi/2 = 384 + 50 + 20/2$

$= 444 \text{ mm} \approx 450 \text{ mm}$

effective cover $d = 450 - \frac{20}{2} - 50 = 390 \text{ mm}$

Step - 6 : check for depth in one way shear





Shear force at critical section

V_u = Upword soil pressure x Area of strip

$V_{ux} = PB\left[\left(\frac{L-D}{2}\right) - d\right]$

$= 250 \times 2\left[\left(\frac{3-0.45}{2}\right) - d\right]$

$= 500(1.275 - d)$ —— (i)

$\tau_c \ngtr k_s \tau_c$

$k_s = 0.5 + \beta_c = 0.5 + \frac{b}{D} = 0.5 + \frac{0.3}{0.45} = 1.16 > 1$

$k_s = 1$

$\tau_c = 0.25\sqrt{f_{ck}} = 0.25\sqrt{20} = 1.12$

$\tau_v = 1 \times 1.12 = 1.12 MPa = 1120 kN/m^2$

Nominal shear stresse

$\tau_v = \frac{V_u}{Bd}$

$V_u = \tau_v Bd = 1120 \times 2 \times d$ ---- (ii)

Equating (i) & (ii), we get,

$2240 \times d = 550(1.275 - d)$

$4.48 d = 1.275 - d$

$5.48 d = 1.275$

$d = 0.233 m = 233 mm < 390 mm$

Depth of footing provided is safe in one-way shear.

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Step-7 Reinforcement

In long direction $M_u = 406.4$ kN.m

$$A_{st_x} = \frac{0.5 f_{ck}}{f_y}\left[1 - \sqrt{1 - \frac{4.6 M_u}{f_{ck} b d^2}}\right] Bd$$

$$= \frac{0.5 \times 20}{415}\left[1 - \sqrt{1 - \frac{4.6 \times 406.4 \times 10^6}{20 \times 1000 \times 440^2}}\right] 1000 \times 440$$

$$= 2977.6 \text{ mm}^2$$

Spacing for 20mm ϕ bar $A_\phi = \frac{\pi}{4}(20)^2$

$$= 314.15 \text{ mm}^2$$

$$S = \frac{1000 A_\phi}{A_{st}} = \frac{1000 \times 314.15}{2977.6}$$

$$= 105.5 \text{ mm} \approx 100 \text{ mm c/c}$$

Provide 20mm ϕ @ 100 mm c/c along long direction.

~~In~~ Short direction – $M_u = 270.94$ kN.m

$$A_{st_y} = \frac{0.5 \times 20}{415}\left[1 - \sqrt{1 - \frac{4.6 \times 270.94 \times 10^6}{20 \times 1000 \times 420^2}}\right] \times 1000 \times 420$$

$$= 1982 \text{ mm}^2$$

Spacing for 20mm ϕ bars.

$$S = \frac{1000 \times 314.15}{1982} = 158.5 \text{ mm} \approx 150 \text{ mm}$$

Provide 20mm ϕ @ 150 mm c/c

Reinforcement in the central band of short direction.

$$\frac{\text{Reinforcement in central band width}}{\text{Total Reinforcement in short direction}} = \frac{2}{\beta+1}$$

$$\beta = \frac{\text{Longer side of footing}}{\text{shorter side of footing}} = \frac{L}{B} = \frac{3}{2} = 1.5$$

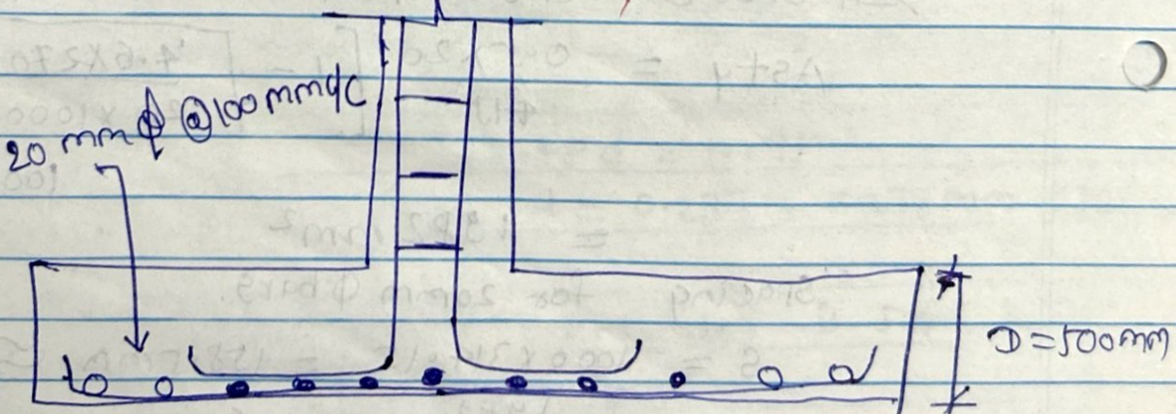
$$\frac{Ast_{cb}}{1982} = \frac{2}{1.5+1}$$

$$Ast_{cb} = \frac{2 \times 1982}{2.5} = 1585.6\ mm^2$$

spacing of 20 mm ϕ bar

$$S = \frac{1000 \times 314.15}{1585.6} = 198.13\ mm \simeq 190\ mm$$

Provide 20 mm ϕ @ 190 mm c/c in centre band of short direction



Elevation.

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Department of Civil Engineering
Assignment No – 1 (Unit I, II& III)

Class- TE **Sub: DRCS**

Date of Assignment- 10/04/2023 **Date of Submission -**

Batch	Question Nos
Roll No:18CV027, 19CV086, 20CV053, 3,62, 41,44, 47,25, 15, 58, 17.	1,2,3,4
Roll No: 20CV016, 1, 32, 7, 34, 61, 28, 63, 35, 54, 64, 36.	5,6,7 & 8
Roll No: 20CV033, 24, 9, 57, 19, 4, 51, 21, 8, 6, 38, 40.	9, 10, 11 & 12
Roll No: 20CV010, 31, 37, 43, 60, 50, 52, 46, 42, 22, 13, 27.	13, 14, 15 & 16
Roll No: 20CV011, 14, 30, 5, 56, 18, 12, 55, 59, 20, 2, 49.	17, 18, 19 & 20
Roll No: 21CV0306, 301, 308, 307, 314, 309, 310, 312, 313, 302, 303, 311.	21, 22, 23 & 24
Roll No: 21CV0305, 304, 315, 20CV023, 29, 48.	25, 26, 27 & 28

CO Statement:

CO1: Apply relevant IS provisions to ensure safety and serviceability of structures, understand the design philosophies and behavior of materials: steel & concrete.

CO2: Recognize mode of failure as per LSM and evaluate moment of resistance for singly, doubly rectangular, and flanged sections.

CO3: Design & detailing of rectangular one way and two-way slab with different boundary conditions

Taxonomy Level: (For eg Remember/Understand/Apply/Analyze/Evaluate/Create)

Sr. No.	Question	Taxonomy Level	CO	Marks
1	Draw stress strain curves for concrete in LSM and **explain** stress and strain values associated with curves.	Understand	CO1	2
2	A RCC Beam of size230mm x 450mm is reinforced with 4 nos' of 16mm diameter having effective span of	Evaluate	CO2	4

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	4.5m and clear cover to reinforcement is 30mm, **determine** the safe UDL excluding self wt the beam can carry using LSM. Use M20 and Fe415.			
3	**Design** the first flight of a dogged legged staircase of residential building with following data Floor to floor height – 3.3m Rise = 150mm, Tread = 300mm Width of Landing = 1.25m Material M20 and Fe415 Assume suitable data if required Draw details of reinforcement.	Create	CO3	4
4	A RC beam, 230mm wide and 450mm deep is reinforced with 3nos- 16mm bars of grade Fe415, on the tension side, with an effective cover of 50mm. **Design** shear reinforcement (for full tension steel available), consisting only of vertical stirrups. Assume M20 grade of concrete, ultimate shear force = 70kN.	Create	CO3	5
5	**Explain** situations where Doubly reinforced beam become necessary and what is the role of compression reinforcement.	Understand	CO1	2
6	A simply supported one way slab is to be designed for an effective span of 3.5m, the superimposed load including finishing is 5 kN/m², assuming the MF = 2.3. **design** the slab and draw the sectional elevation showing details of reinforcement.	Create	CO2	4
7	**Design** the second flight of a dogged legged staircase of residential building with following data Floor to floor height – 3.3m Rise = 150mm, Tread = 300mm Width of Landing = 1.25m Material M20 and Fe415 Second flight start from midlanding level to first floor level. Assume suitable data if required Draw details of reinforcement.	Create	CO3	4
8	A RC beam, 230mm wide and 450mm deep is reinforced with 3nos- 16mm bars of grade Fe415, on the tension side, with an effective cover of 50mm. **Design** shear reinforcement (only 2nos 16mm bars are available, the bar being curtailed), consisting only of vertical stirrups. Assume M20 grade of concrete, ultimate shear force = 75kN.	Create	CO3	5
9	**Explain** Under reinforced, over reinforced and Balanced section with suitable stress diagram used in LSM.	Understand	CO1	2
10	**Design** a RC slab for a store room having clear dimensions as 4.77 x 3.77m. the slab is to be casted	Create	CO2	4

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	monolithically over the 230mm wide beam with corners of slab held down. The slab carries live load of $3kN/m^2$ and floor finish of $1\ kN/m^2$. Use M20 and Fe415, show details of reinforcement.			
11	**Design** dog legged staircase for plinth level to the midlanding level for the following data: Floor to floor height = 3450mm Rise = 150mm; Tread = 300mm No. of risers in first flight = 11 Width of stair = 1m Clear landing width at midlanding and first floor level = 1m At plinth level, plinth beam is provided below first step. Show detailed load calculations and reinforcement details.	**Create**	**CO3**	**4**
12	A RC beam, 230mm wide and 450mm deep is reinforced with 3nos- 20mm bars of grade Fe415, on the tension side, with an effective cover of 50mm. **Design** shear reinforcement (only 2nos 20mm bars are available, the bar being curtailed), consisting only of vertical stirrups. Assume M20 grade of concrete, ultimate shear force = 85kN.	**Create**	**CO3**	**5**
13	**Explain** the term 'moment of resistance' and its significance in the design of flexural member.	**Understand**	**CO1**	**2**
14	A reinforced concrete rectangular section of size 300 × 600 mm effective depth is reinforced by 3 bars of 20 mm diameter. The effective span of the beam is 6 m. **Find** i) Depth of neutral axis. ii) Type of the section. iii) Moment of resistance. iv) Uniformly distributed ultimate load. Materials: M20 concrete Mix. and Fe415 grade reinforcement Method of Design: - L.S.M.	**Remember**	**CO2**	**4**
15	**Design**dog legged staircase for plinth level to the midlanding level for the following data: Floor to floor height = 3250mm Rise = 150mm; Tread = 250mm Width of stair = 1m At plinth level, plinth beam is provided below first step. Show detailed load calculations and reinforcement details.	**Create**	**CO3**	**4**
16	A RC beam, 230mm wide and 450mm deep is reinforced with 3nos- 20mm bars of grade Fe415, on the tension side, with an effective cover of 50mm. **Design** shear reinforcement (only 2nos 20mm bars are available, the bar being curtailed), consisting only of vertical stirrups. Assume M20 grade of concrete, ultimate shear force = 85kN.	**Create**	**CO3**	**5**

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17	**Explain** stress strain relationship for concrete according to the assumptions in limit state of collapse in flexure.		CO1	2
18	**Determine** the moment of resistance by LSM for flanged beam section detailed as below i) Effective flange width = 1200 mm. ii) Width of rib = 300 mm iii) Thickness of flange = 100 mm. iv) Effective depth = 560 mm. v) Tension steel = 4 No. 25 mm diameters Materials: - M20 grade of concrete. Fe415 grade of reinforcement.	Evaluate	CO2	4
19	**Design** dog legged staircase for midlanding level to the first-floor level by using following data: Floor to floor height = 300mm Rise = 150mm; Tread = 250mm Width of stair = 1m Landing is on both side. Show detailed load calculations and reinforcement details.	Create	CO3	4
20	A RC beam, 230mm wide and 450mm deep is reinforced with 3nos- 20mm bars of grade Fe415, on the tension side, with an effective cover of 50mm. **Design** shear reinforcement (for full tension steel available), consisting only of vertical stirrups. Assume M20 grade of concrete, ultimate shear force = 85kN.	Create	CO3	5
21	**Elaborate** stress strain distribution diagram with all parameters for the design of RCC section of flexural member using LSM.	Create	CO1	2
22	**Determine** the moment of resistance by LSM for flanged beam section detailed as below i) Width of rib = 230 mm ii) Effective flange width = 1250 mm iii) Thickness of flange = 120 mm iv) total Depth = 600mm with clear cover 25mm v) Tensile steel = 6 No. of 20mm diameter bars vi) Use M25 grade of concrete and Fe 415 grade of steel.	Evaluate	CO2	4
23	**Design** the second flight of a dogged legged staircase of residential building with following data Floor to floor height – 3.1m Rise = 150mm, Tread = 300mm Width of Landing = 1.25m Material M20 and Fe415 Second flight start from midlanding level to first floor level. Assume suitable data if required Draw details of reinforcement.	Create	CO3	4
24	A RC beam, 230mm wide and 450mm deep is	Create	CO3	5

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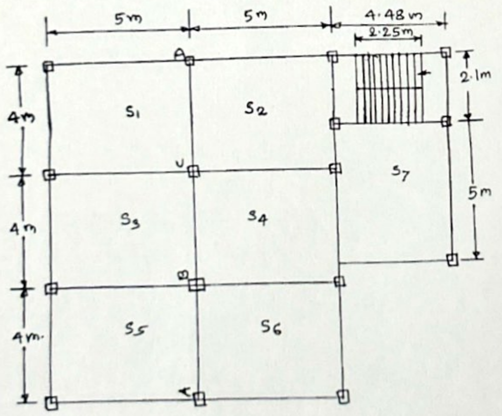
	reinforced with 3nos- 20mm bars of grade Fe415, on the tension side, with an effective cover of 50mm. **Design** shear reinforcement (for full tension steel available), consisting only of vertical stirrups. Assume M20 grade of concrete, ultimate shear force = 95kN.			
25	**What** is partial safety factor used in the design of RCC section? **Why** they are called as partial? Give the Partial safety factors for stresses in Steel and concrete	**Remember**	**CO1**	**2**
26	The central line plan of building is as shown in figure. 1 Classify the slabs structurally and **design** the slab S1 and S2 only for flexure by L.S.M. Draw neat sketches showing details of reinforcement. Take live load = 4 kN/m². Floor finish = 1.5 kN/m². Materials: - M25 grade of concrete Fe415 grade of reinforcement Assume suitable data if required.	**Create**	**CO2**	**4**
27	**Design** flight I of the stair case as shown in fig. 1 for the following data: a) Floor to floor height = 3.2 m. b) Rise = 160 mm, Tread = 250 mm. c) Width of landing = 1.115 m. d) Width of stair = 1m. e) Gap between flights = 100 mm. Show detailed load calculation and reinforcement details. At ground floor, plinth beam is provided below 1st step. Assume suitable data if required.  **Fig 1**	**Create**	**CO3**	**4**
28	A RC beam, 230mm wide and 450mm deep is reinforced with 3nos- 20mm bars of grade Fe415, on the tension side, with an effective cover of 50mm. **Design** shear reinforcement (only 2nos 20mm bars are available, the bar being curtailed), consisting only of vertical stirrups. Assume M20 grade of concrete, ultimate shear force = 95kN.	**Create**	**CO3**	**5**

Remarks:

HEAD OF DEPARTMENT

Course Coordinator | Module Coordinator | PAC Coordinator | H.O.D

HEAD OF DEPARTMENT
CIVIL ENGINEERING
AISSMS's COE, PUNE-1.

22-23

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Department of Computer Engineering
Assignment – II

Subject: 410243: Blockchain Technology Class: BE A & B

Date: 31/10/2022 Unit: 4,5,6

1. What is Crypto currency? Explain in brief.
2. State and explain the advantages and disadvantages of crypto currency.
3. Explain the concept of smart contracts. How it differs from traditional systems?
4. What are different types of access modifiers in solidity?
5. List and explain the applications of blockchain Technology.
6. How Blockchain technology can be used in finical and banking services.
7. Write short notes on

1. Metamask
2. DAapps
3. Use of Blockchain technology in Government

Subject Teacher
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H.O.D.
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Name - Atharva mahesh Jagtap.
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BE. computer (shift A).

Page No. 1
Date

19C0031

Blockchain Technology
Assignment - 2

26/30

① what is cryptocurrency? Explain in brief.

① Cryptocurrency is a kind of digital asset that enables safe, transactions using distributed ledger or blockchain technology.

② Digital or virtual currencies that operate on cryptographic principles are known as cryptocurrencies.

③ As implied by the name, they are not substantial or have no actual presence.

④ They are essentially, a collection of computer programming codes, but offers greater usefulness & security than many current currencies.

⑤ In case of cryptocurrencies, the ledger records of all transactions made & created using those currencies on the network. Each user on certain blockchain, will have distinct account Id or address. Currency is debited & credited to this account.

The cryptocurrency should be:

a) cost effective to issue.
b) Available immediately
c) Governed & regulated.
d) secure & immutable.
e) Trusted - backed by a lender of last resort.
f) Free from fractional reserve banking in crypto-form.
g) Have standards to enable interoperability.

② State & explain advantages & disadvantages of cryptocurrency.

Advantages –

① compared to current banking system, cryptocurrencies allow extremly quick transactions.

② There are no payment restrictions. The user is able to send money at any moment, from any location to any location.

③ transaction performed using cryptocurrencies should be anonymous, neither the person nor recipient can be determined.

④ Immediate asset availability – the cryptocurrency will be available immediately for consumers and business to spend without any waiting period.

⑤ It boosts the economic growth.

Disadvantages –

① Despite, the fact that demand for cryptocurrency is rapidly rising, several governments have not officially endorsed transactions involving cryptocurrency.

② Governments cannot regulate cryptocurrencies, but they may ban them & make transactions involving them unlawful.

③ Deflation is one of the drawback of cryptocurrency.

(3) Explain concept of smart contracts. How it differs from traditional system?

(1) The concept of smart contracts was proposed by Nick Szabo in 1994.

(2) smart contract is simple computer programme that makes is easier for two parties to exchange any asset. These contracts can created by any user on the Ethereum network.

(3) The terms & conditions that were mutually agreed upon parties make up the majority of the contract.

(4) A smart contract is computer protocol intended to digitally faciliate, verify or enforce the negotiation or performance of contract.

(5) The main advantage of smart contract is that they cannot be changed once they have been performed, & every transaction carried out on top of one is forever recorded - it is immutable.

(4) What are different types of access modifiers in solidity?

(1) Public -

The public element can be inherited & can accessed by external elements. All can access a public element.

(2) Private -

The private element doesn't get inherited & cant be access by external elements. It can be accessed from the current contract instance only.

③ Internal -
The internal element can be inherited but can't be accessed by external elements. only the base contracts & derived contract can access internal element.

④ External -
The external element can'tbe inheritaed but it can be accessed by external elements. current contract instance can't access external element, it can be accessed externally only.

⑤ List & explain application of blockchain technology.

① money transfer -
money transfer using blockchain technology is less expensive & faster than using existing money transfer services.

② Insurance -
Using smart contracts on a blockchain can provide greater transparency for customer & insurance providers. Using smart contracts can speed up process for claimants to recieve payments.

③ Real estate –
Real estate transactions require a ton of paperwork to verify financial information & ownership & titles to new user/owners. Using blockchain technology to record real estate transactions can provide more secure & accessible means of verifying ownership.

④ Healthcare –
Blockchain can have a big impact on healthcare using smart contracts. These smart contracts mean that a contract is made between 2 parties without needing any intermediary. Health records are encoded via blockchain so they accessible to primary healthcare providers with key.

⑤ online identity verification –
Blockchain can centralize the online identity verification process so users only need to verify their identity once using blockchain & they share this identity with service provider they want.

⑥ How blockchain technology can be used in financial & banking services?
① For the banking & financial services markets, the blockchain technologies provide various attractive features.
② Blockchain smart contracts or bitcoins are used in financial & banking services to make transactions secure.

a) Private securities –
It is very expensive to take company public. The stock exchanges list company shares for secondary market to function securely with trades settling & clearing in timely manner. These shares can then be purchased & sold in secondary market that sits on top of blockchain eg. medici, Block stream, Bitshares, etc.

b) Insurance –
Traditional insurance policies are often processed on paper contracts, which mean claims & payments are error prone & often require human supervision.
As a kind of distributed ledger of blockchain, it improves insurance industry efficiency from four aspects: fraud elimination, claim automation, data analysis with IOT & reinsurance.

(7) Write short note on –
a) metamask b) DApps c) Use of blockchain technology in govnnment.
a) metamask –
① metamask is a web browser add-on which enables anyone to run the Ethereum DApps without running the ethereum full node.

(2) metamask add-on for chrome can added from chrome web store or from 'metamask.io' website. This metamask add-on provides a user interface for interacting with blockchain.

(3) metamask provides a vault account for each user, this vault secures, stores & tightly controls access to tokens, password, certificates & overelements in blockchain apps.

(4) metamask will provide a group of 12 words known as wallet seed while installing it. It is user credential & must be stored somewhere safe.

b) DApps -

(1) DApps is a decentralized applications.

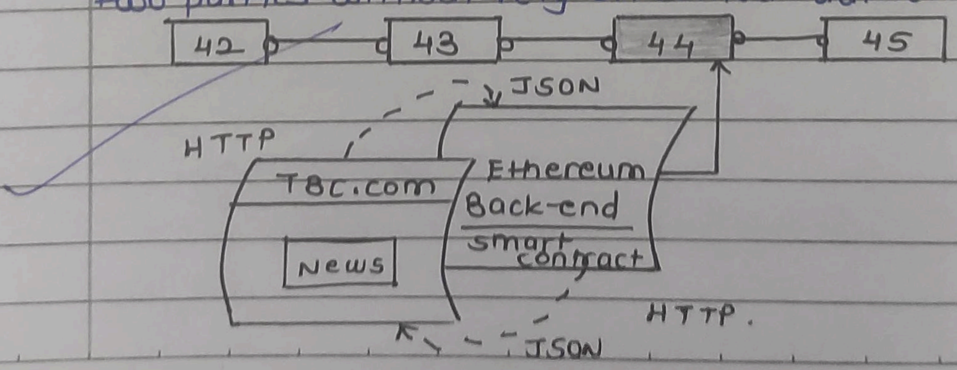
(2) DApps are programs exist & run on a blockchain or peer-to-peer network instead of single computer.

(3) DApps controls the single authority.

(4) DApps which often build on ethereum platform can be developed for variety of purposes including gaming, finance, & social media.

(5) with DApps users don't need to submit their personal information to use the function the app provides.

(6) DApps use smart contracts to complete transaction between two parties without rely on central authority.



c) Blockchain technology used in government-

1. Blockchain technology plays vital role in development of social & governmental activities for e-governance.
2. In government sector verifying authenticity of document can be done using blockchain which eliminates the need for centralized authority.
3. The document certification service helps in proof-of-ownership, proof-of-existence & proof-of-integrity of documents.
4. Blockchain technology used in goverment sector such as indivisual identity, land & property registry, birth marriage certificates, etc.

Sem II L2-2 assign.

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Department of Computer Engineering

Assignment I (AY: 2022-23 Term II)

Class: BE B **Course:** Deep Learning **Date of Display:** 15-03-2023 **Submission Date:** 28-03-2023

Mention Cognitive Level: Remember, Understand, Apply, Analyze, Evaluate, Create

Q ns No	Question	Connected CO	Cognitive Level
Q1	Define machine learning and deep learning with example.	CO1	Remember
Q2	Write short note on 1)Bias variance tradeoff 2)Hyper parameters	CO1	Understand
Q3	Explain Applications, advantage and challenges of deep learning.	CO1	Understand
Q4	Explain the Role of Activation Functions in a Neural 5 Understand Network?	CO2	Understand
Q5	Explain Back propagation?	CO2	Understand
Q6	Describe Vanishing and Exploding Gradients?	CO2	Understand
Q7	Write short notes on tiled convolution as a variant of convolution function.	CO3	Understand
Q8	Describe Pooling on CNN, and How Does It Work?	CO3	Understand

Q9	Explain CNN work procedure with components of CNN?	CO3	Understand

Note: A signed copy to be kept in the department as a specimen copy. Delete below part for student copy.

Course Teacher

Module Coordinator

Dept. Academic Coordinator

Head of Department

H.O.D.
Computer Engg Dept
AISSMS COE Pune

Tejas Nitin Shinkar | comp B.
19CS052
Deep Learning.

23/30

Assignment - 1.

Q.1) Define Machine Learning and deep with example.

→ Machine Learning:

- It is a form of computer science technology whereby, the machine itself has a complex range of knowledge that allows it to take certain data inputs and use complex statistics analysis strategies to create output values that fall within a specific range of knoowledge, data or information.
- Machine learning focuses on the development of computer programs that can access data and use it to learn for themselves.
- The goal is for computers to learn how to use data and information to be able to learn automatically, rather than requiring humans to intervence or assist with the learning process

Examples:

- Image Recognition.
- label an X-Ray as Cancerous or not
- Assign a name to a photographed face
- Recognise handwriting by segmenting a single letter into small images.

Deep Learning:

- To define deep learning is a big-challange for many because it has changed forms slowly

over the past decade one usefull definition. states that deep learning deals with "Neural network" with more than two layer.
- Neural network has to progress architecturally from earlier network styles.
- following are some of aspects of NN:
i) m-cops are more neurons than previous network.
ii) More complex ways of connecting layer/neurons in NN's.
iii) Explosions in amount of computing power available to train.
Examples:
To identity objects from satelites that locate areas of interest & identity safe or unsafe zones for troops.

3

2. Write short note on:
i) Bias- Variance tradeoff.
ii) Hyper parameters.

⟹

i) Bias- Variance - tradeoff:
Depending on model at hand, performance that lies b/w overfitting & underfitting is more desirable. This tradeoff is most integral aspect of machine learning models. fulfill thier purpose when they generalise well. Generalization is bound by two undesirable outcomes - high bias & high variance. Detecting whether model

suffers from either one is sole responsibility of the model developer.

2. Hyper parameters:
- Hyper parameters are parameters whose values control the learning process and determine values of model parameters so that a learning algorithm ends up learning.
- The prefix 'hyper' suggest that they are 'top-level' parameters that controls learning process and model parameters that results from it.
- Examples of Hyperparameters in ML:
3
i) Model architecture
ii) Learning route
iii) No. of ephocs
iv) No. of branches in decision tree.

Q.5) Explain applications, advantage & challanges of deep learning.

⟹

• Applications of deep learning:
- Computer vision: Used in image & video recognition, object detection & other computer vision task.
- Natural language processing: Used in natural language understanding, machine translation sentiment analysis & other NLP tasks.

- Speech recognition: Used in speech recognition, voice identication and voice synthesis.
- Predictive analysis: Used to analyse historical data & make predictions about future events.

• Advantages of deep learning:

i) Future Generation Automation:
- DL Algorithms can generate new feature from among a limited no. locate in training dataset.

ii) Better self learning capabilities:
- The multiple layers in deep neural networks allow models to become more efficient of learning complex features.

iii) Cost effectiveness: While training deep learning models can be cost intensive, once trained, it can help buisness cut down on unnecessary expenditure.

Challenges:
i) Lots of lots of data
ii) Overfitting in neural networks.
iii) Hyperparameter optimizatn
iv) Lack of flexibility & multitasking.

Q.4) Explain the role of Activation function in a neural networks.

- Also known as transfer function, used to map input nodes to o/p nodes in contain.
- The activation function is the most imp. factor in NN which decides whether or not a neuron will be activated or not and transferred to next layer.
- The input to the activation function is sum which is defined by the following equation.

Q.5) Explain Back propogation?

- Back propogation network algorithm is applied to multilayer feed forward networks consisting of processing elements.
- Networks connected to back propogation learning algorithm are called BPN.
- The basic concept for weight update is that where error is propogated back to hidden unit.
- Back propogation learning is applicable on any feed forward network architecture
- Slow rate of convergence & local minima problems are its weakness.

Q.6) Describe vanishing & exploding gradients.

i) Vanishing gradients:
This occurs when gradient is too small. As we go backwards during backpropogatn, the gradient continuos to become smaller, causing the earlier layers in network to learn more slowly than layers.

ii) Exploding Gradients:
— This happens when the gradients is too large. This create an unstable model.
— In this case, model weights will grow too large, model weights will grow lowercase a dimensional reductn technique & this helps to minimize complexity within the model.

Q.7) Write short note on tiled convolution as a variant of convolution function.

⟹ Tiled convolution is varient of convolution function commonly used in DL unlike traditional convolution. where the same filter is applied to entire i/p image. These regions are often reffered to as 'tiles' hence named tiled convolution. The main advantage of tiled convolution is that it allows neural network to learn diff. featureas as diff. loc. of I/p images

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Q.8) Describe pooling on CNN and how does it work?
⟹ Pooling is commonly used operation in convolutional neural network (CNN) used to down sample feature maps obtained from the convolutional layer. The main goal of pooling is to reduce the spatial dimensions of the feature while retaining important information.
- In pooling a small window typically 2x3 / 3x3 is applied to feature map & a pooling function is applied to values that windows.
- The most common pooling functions are max pooling value within the window is retained while in average pooling average values in window is taken.

3

- It also helps in reducing overfitting as it removes the reduction info. from feature maps.

Q.9) Explain CNN work procedure with component of CNN.
⟹ Convolutional Neural Networks (CNN's) are type of deep neural network that are widely used in computer vision tasks such as image classification, object detection & segmentation. The key components a CNN include convolutional layers, pooling layers, Activation functions & fully connected layers.

Working procedure:

i) Input
ii) Convolutional layers
iii) Activation functions
iv) Fully connected layers
v) Output.

√3

2022-23 -

AISSMS COLLEGE OF ENGINEERING

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Department of Electrical Engineering

Assignment No – 1 (Unit I & Unit II)

Class-BE

Sub: HVDC and FACTs

Date of Assignment- 07/09/2022

Date of Submission -16/09/2022

CO Statement:

CO1: Compare EHVAC and HVDC systems and to describe various types of DC links (Understand/Apply)

CO2: Analyze harmonics in HVDC systems and to list HVDC system layout (Analyze/Understand)

CO3: Discuss various methods for the control of HVDC systems (Create/Understand)

No.	Question	Marks
1	Explain rectifier operation in HVDC systems with ignition delay angle & commutation overlap angle. Derive equations for ΔV_d and V_d.	10
2	Explain inverter operation in HVDC systems with extinction angle and overlap angle. Derive necessary equations.	6
3	Compare CIA, CC and CEA controls of HVDC systems.	10
4	Give the schematic diagram of a 12-pulse converter and sketch the current waveform of the transformer secondary line current.	6
5	Draw schematics of multi-terminal HVDC & state applicability of each.	5
6	Explain protection against overvoltages in HVDC systems.	8
7	Compare current source converter & voltage source converters.	8
8	Compare classical HVDC system with VSC based HVDC system.	7

Remarks:

Course Coordinator　　Module Coordinator　　PAC Coordinator　　H.O.D

Head
Department of Electrical Engineering
AISSMS College of Engineering, Pune

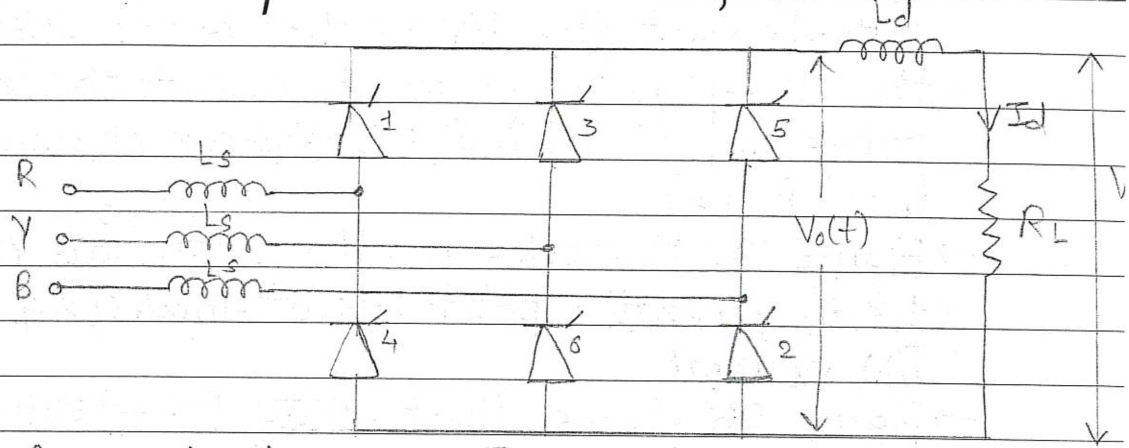
Marthili M. Balkawade. 2022-23 | 19EL003 |
19EL003 BE ELECTRICAL
SEM: VII

HVDC & FACTS

Assignment No:-01

Q.1) Explain rectifier operation in HVDC systems with ignition delay angle & commutation overlap angle. Derive equations for ΔV_d & V_d.

→



Schematic diagram of 6 pulse bridge converter.

→ The source reactance introduces overlap of currents due to simultaneous conduction of SCRs to be commutated during the commutation period 'u'.

→ During the commutation period, a pair of commutating valves V_1, V_3; V_3, V_5; V_5, V_1 conduct together in the positive group of the converter & V_2, V_4; V_4, V_6; V_6, V_2 conduct simultaneously in the negative group, where 'P' indicates the firing instant.

eg:- 'P_1' is firing instant of the valve '1'.

→ 'S' indicates end of a commutation & at S_5 the valve 5 stops conducting.

→ 'C' indicates instant of crossing of phase voltages. 'C_1' indicates positive crossing of B & R phases.

→ At instant P_1, when valve 'V_1' is fired, current in the valve '1' slowly increases & current in the valve '5'

②

slowly decreases because of inductance of the source. Valves 1 & 5 will be conducting simultaneously in the positive group in addition to valve '6' in the negative group.

→ During the commutation process, voltage of the cathode w.r.t. the T/M neutral is the average of the corresponding phase voltages of the conducting valves i.e, $(V_{nR}+V_{nB})/2$, which is shown in dotted line $(P_1 S_5)$.

→ Figure 2'a' illustrates positive potentials of the cathode (1,3,5) & negative potentials of anodes (2,4,6) w.r.t T/M neutral.

→ Figure 2'b' shows direct voltage $[V_0(t)]$ output waveform, which is combination of corresponding line to line voltages appearing on output side of bridge. The mean direct voltage is average of $V_0(t)$

→ The potential across valve 1 is shown in fig. 2'b'. When valve '1' completes a commutation to valve 3 at 'S_1', the voltage across it follows the line to line voltage (V_{RY}) betn R & Y phases from 'S_1', until 'P_4' is reached.

→ Betn P_4 & S_2, the commutation from valve '2' to valve '4' reduces to negative potential of 'R'-phase & causes the first voltage dent in the valve voltage by following the average voltage curve of

$$(V_{nB}+V_{nR})/2 - V_r = \frac{-3}{2} V_y$$

→ The firing of valve '5' at 'P_5' increases the potential of the common cathode to the average voltage of phases 'Y' & 'B'. This causes a second commutation dent at the end of which (at S_3) the common cathode follows the potential of 'B' due to conduction of valve '5' & voltage across the valve 'I' will follow V_{RB}.

→ Finally commutation from valve '4' to valve '6' (P_6 to P_4) increases the negative potential of anode of valve '1'. & produces another voltage dent.

→ Figure '2c' indicates AC line current in 'R-phase'. 2 'd, e' give valve currents from 1 to 6.

* For operation with overlap:-

There are 3 modes of operation:

$\mu < 60° \Rightarrow$ Mode 1 = T_2 & T_3 conducting

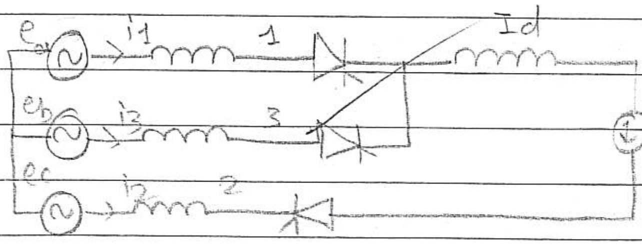
$\mu > 60° \Rightarrow$ Mode 2 = T_3 conducting

$\mu = 60 \Rightarrow$ Mode 3 = ~~T_3~~ & T_4 conducting.

i) Mode 1:- T_2 & T_3 are conducting.

→ When valve 3 is fired, then '3 will overlap with 1 & it will be 3 valve conduction periods i.e, 1, 2, 3

During overlap 1, 3 valve will conduct from top & 2 from bottom,



$$e_b - e_a = L_c \frac{di_3}{dt} - L_c \frac{di_1}{dt}$$

$$= L_c \left(\frac{di_3}{dt} - \frac{di_1}{dt} \right)$$

The LHS is called line commutating emf,

$$e_b - e_a = \sqrt{3}\, V_m \sin \omega t$$

$$\therefore \sqrt{3}\, V_m \sin \omega t = L_c \left(\frac{di_3}{dt} - \frac{di_1}{dt} \right)$$

During overlap,

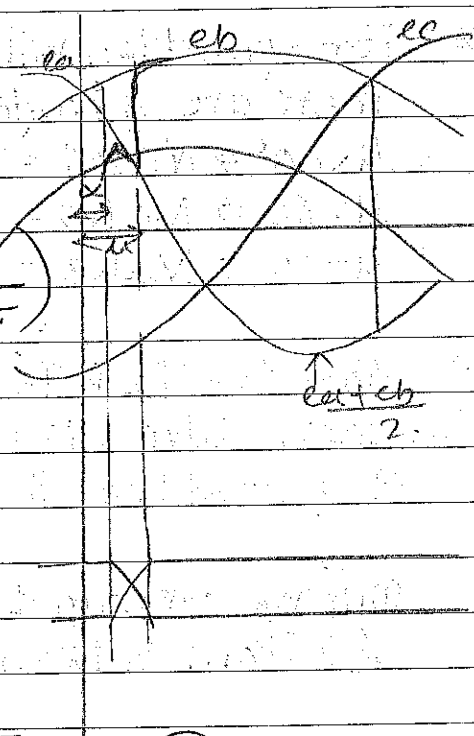
$$I_d = i_1 + i_3$$

$$0 = \frac{di_1}{dt} + \frac{di_3}{dt}$$

$$\frac{di_1}{dt} = -\frac{di_3}{dt}$$

$$\sqrt{3}\, V_m \sin \omega t = L_c \left(\frac{di_3}{dt} - \frac{di_1}{dt} \right)$$

$$\sqrt{3}\, V_m \sin \omega t = L\, 2 \frac{di_3}{dt}$$



On integrating bothsides,

$$\sqrt{3}\, V_m \int_{\alpha/\omega}^{t} \sin \omega t \, dt = 2 L_c \int \frac{di_3}{dt}$$

$$i_3 = \frac{\sqrt{3}\, V_m}{2 L_c \omega} \left[\cos \alpha - \cos \omega t \right] \quad \text{— (I)}$$

Average direct voltage,

$$V_d = \frac{3}{2\pi} \sqrt{2}\, E \left[\cos \alpha + \cos (\alpha + u) \right]$$

$$A = \int_{\alpha}^{\alpha+\mu} \left(\frac{e_b - e_c}{2}\right) d\omega t = \frac{\sqrt{3}\,V_m}{2}\left[\cos\alpha - \cos(\alpha+\mu)\right]$$

$$\Delta V_d = \frac{3}{\pi} A$$

$$\boxed{\Delta V_d = \frac{3\sqrt{3}}{2\pi} \cdot V_m\left[\cos\alpha - \cos(\alpha+\mu)\right]}$$

$$\therefore V_d = V_{do} \cdot \cos\alpha - \Delta V_d$$

$$= \frac{V_{do}}{2}\cos\alpha + \frac{V_{do}}{2}\cos(\alpha+\mu)$$

$$V_d = \frac{V_{do}}{2}\left[\cos\alpha + \cos(\alpha+\mu)\right] \quad \text{— (II)}$$

From (I) & (II),

$$\frac{I_d}{I_s} = \cos\alpha - \cos(\alpha+\mu)$$

$$\cos(\alpha+\mu) = -\frac{I_d}{I_s} + \cos\alpha$$

Substituting,

$$\therefore V_d = \frac{V_{do}}{2}\left[2\cos\alpha - \frac{I_d}{I_s}\right]$$

$$\boxed{V_d = V_{do}\cos\alpha - I_d R_c.}$$

(0)

Q. 2) Explain inverter operation in HVDC systems with extinction angle & overlap angle. Derive necessary equations.

→

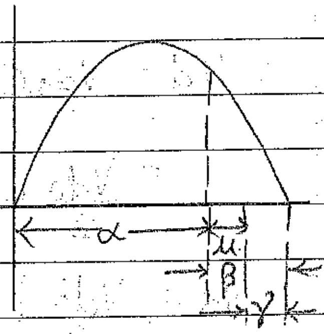
For an Inverter, It is usual to define an angle of advance 'β' as $\beta = \pi - \alpha$

— when 'α' is more than 90°

$$V_{dc} = -\frac{V_{doi}}{2}\left[\cos\alpha + \cos(\alpha+\mu)\right]$$

$$= -\frac{V_{doi}}{2}\left[\cos(\pi-\beta) + \cos(\pi-\gamma)\right]$$

$$V_{dc} = \frac{V_{doi}}{2}\left[\cos\beta + \cos\gamma\right] \quad \text{— (I)}$$



$\beta = \pi - \alpha$

$\gamma = \beta - \mu$

where, extinction angle(γ) is defined as $\gamma = \beta - \mu$

— μ → angle of overlap for rectifier.

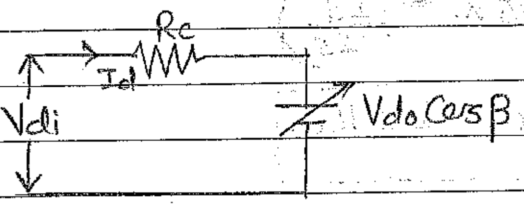
$V_{dr} = V_{do}\cos\alpha - R_c I_d$ — for rectifier

for inverter,

$$V_{di} = -(V_{do}\cos\alpha - R_c I_d)$$

$$= -\left[V_{do}\cos(\pi-\beta) - R_c I_d\right]$$

$$V_{di} = V_{do}\cos\beta + R_c I_d \quad \text{— (II)}$$



(a) Based on angle of advance

From eq^n (I),

$$\frac{2V_{di}}{V_{do}} = \cos\beta + \cos\gamma$$

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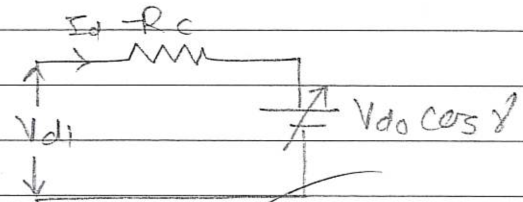
$$\Rightarrow \cos\beta = -\cos\gamma + \frac{2V_{di}}{V_{do}}$$

Substituting in eqn (II),

$$V_{di} = V_{do}\left\{\left[(-\cos\gamma) + \frac{2V_{di}}{V_{do}}\right] + R_c I_d\right\}$$

$$V_{di} = -V_{do}\cos\gamma + R_c I_d$$

$$\boxed{V_{di} = V_{do}\cos\gamma - R_c I_d} \quad \text{— (III)}$$



where,

$$R_c = \frac{3\omega L_c}{\pi}$$

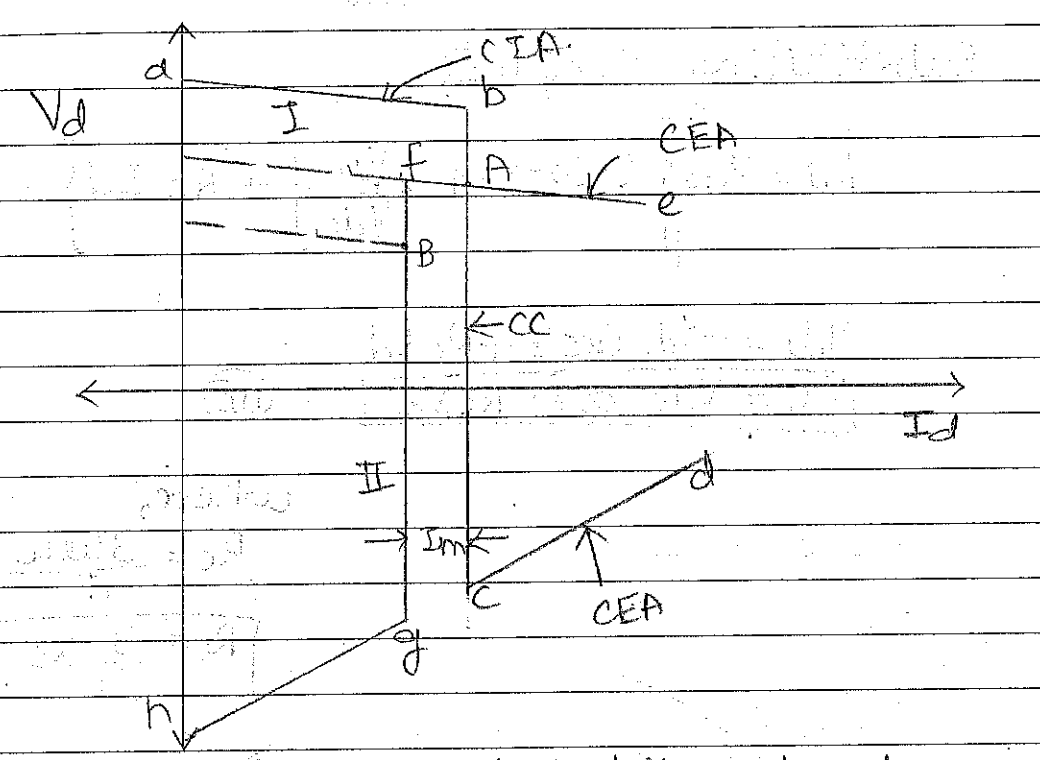
$$\boxed{R_c = \frac{3}{\pi} X_c}$$

(b) based on extinction angle

Q.3) Compare CIA, CC & CEA controls of HVDC system.

Station I	Station II	Type
ab	hg	minimum (α) [CIA]
bc	gf	constant current [CC]
cd	fe	minimum (γ) [CEA]

(6)



Converter Control Characteristics

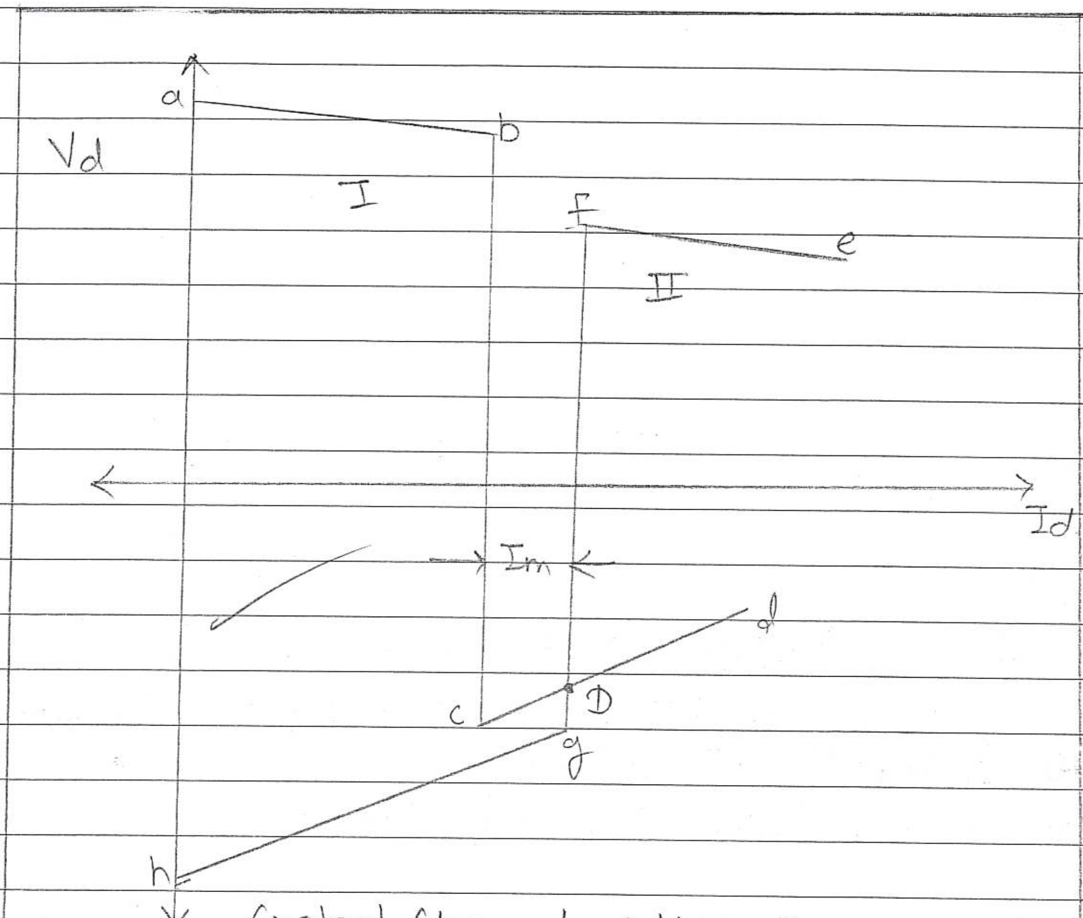
(I) There can be 3 modes of operation of DC link:-

i) CC at rectifier & CEA at inverter
⇒ Operating point 'A'
⇒ Normal operating condition.

ii) Slight decrease in AC vtg ⇒ Point of intersection drifts to 'C' ⇒ min 'α' at rectifier
⇒ min 'γ' at inverter

iii) Lower AC voltage ⇒ Mode of operation shifts to point 'B'
⇒ CC at inverter
⇒ min 'α' at rectifier

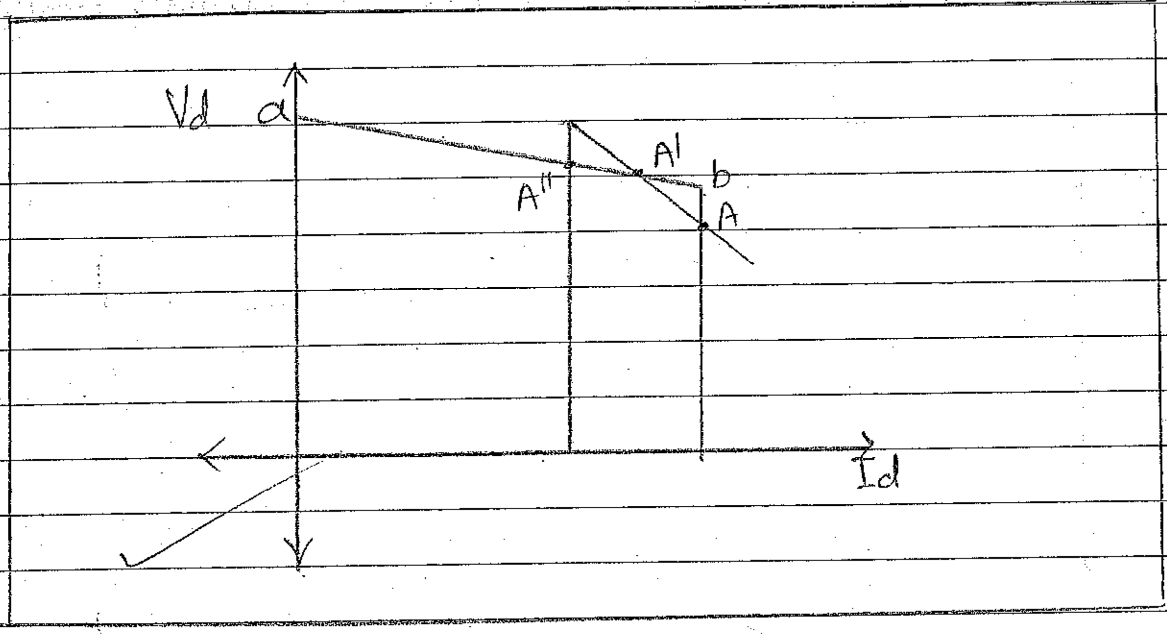
(II) If reference current of inverter is more than rectifier then,
Control characteristics for '-ve' current margin,



Control Characteristics from negative current margin

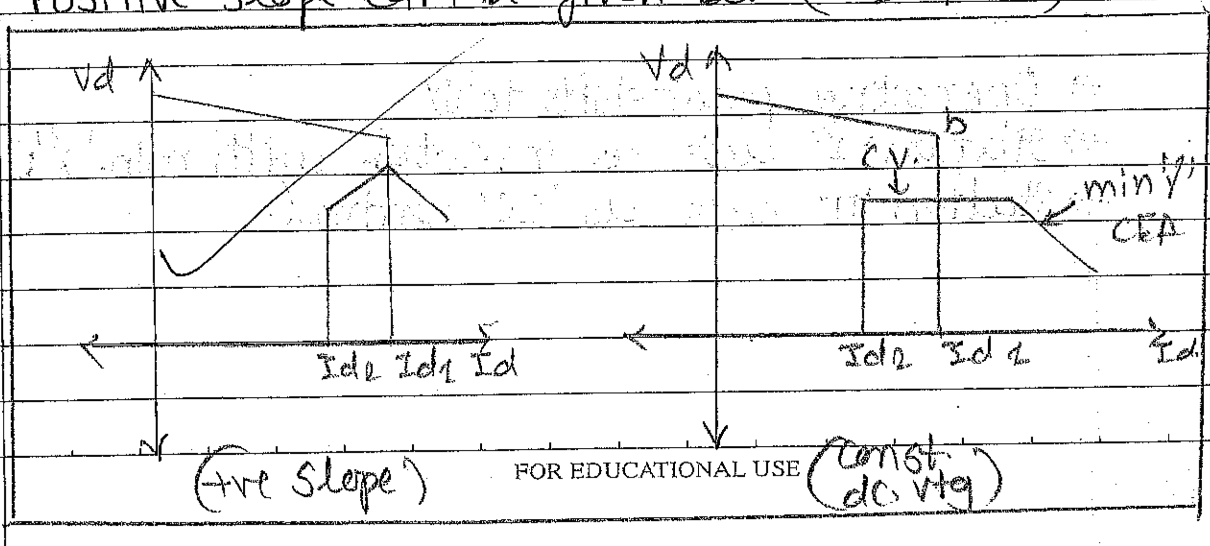
→ Operating point shifts to 'D'.
→ Station 'I' acts as inverter with min. 'γ' (CEA)
→ Station 'II' acts as 'CC' control.

* Modification of control characteristics:-

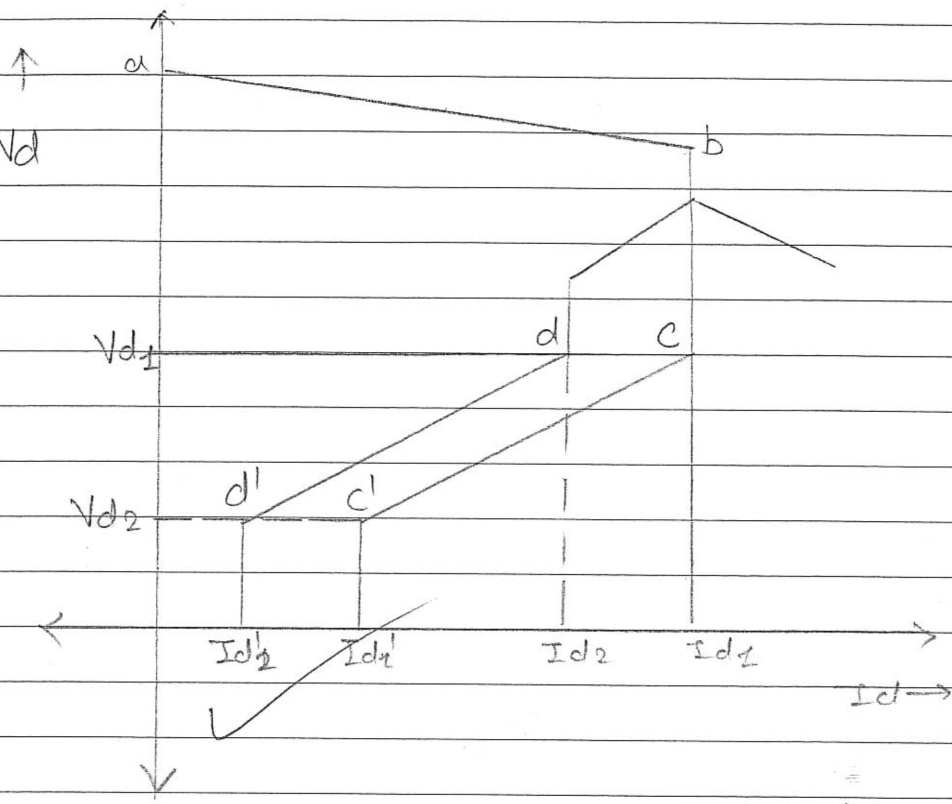


① If slope 'Fe' exceeds that of 'ab',
3 possible operating points A, A', A'' will happen
⇒ Instability of control
⇒ This can cause haunting effect.

① To eliminate this problem,
Positive slope can be given betn (Id1 & Id2)



* Voltage dependent current order limit:- (VDCOL)

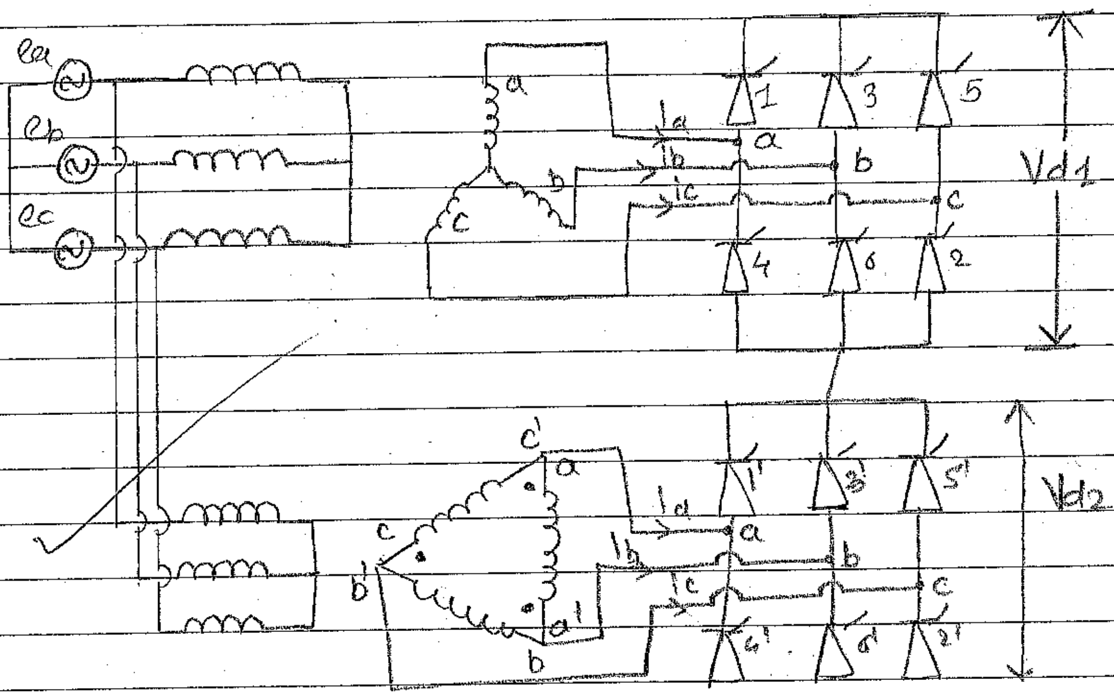


Control Characteristic (VDCOL)

→ IF low voltage is due to fault on rectifier side in 'AC', the system has to operate at very low PF, causing excessive consumption of reactive power which is undesirable.

→ Thus, it becomes useful to modify control characteristic to include vtg. dependent current order limit.

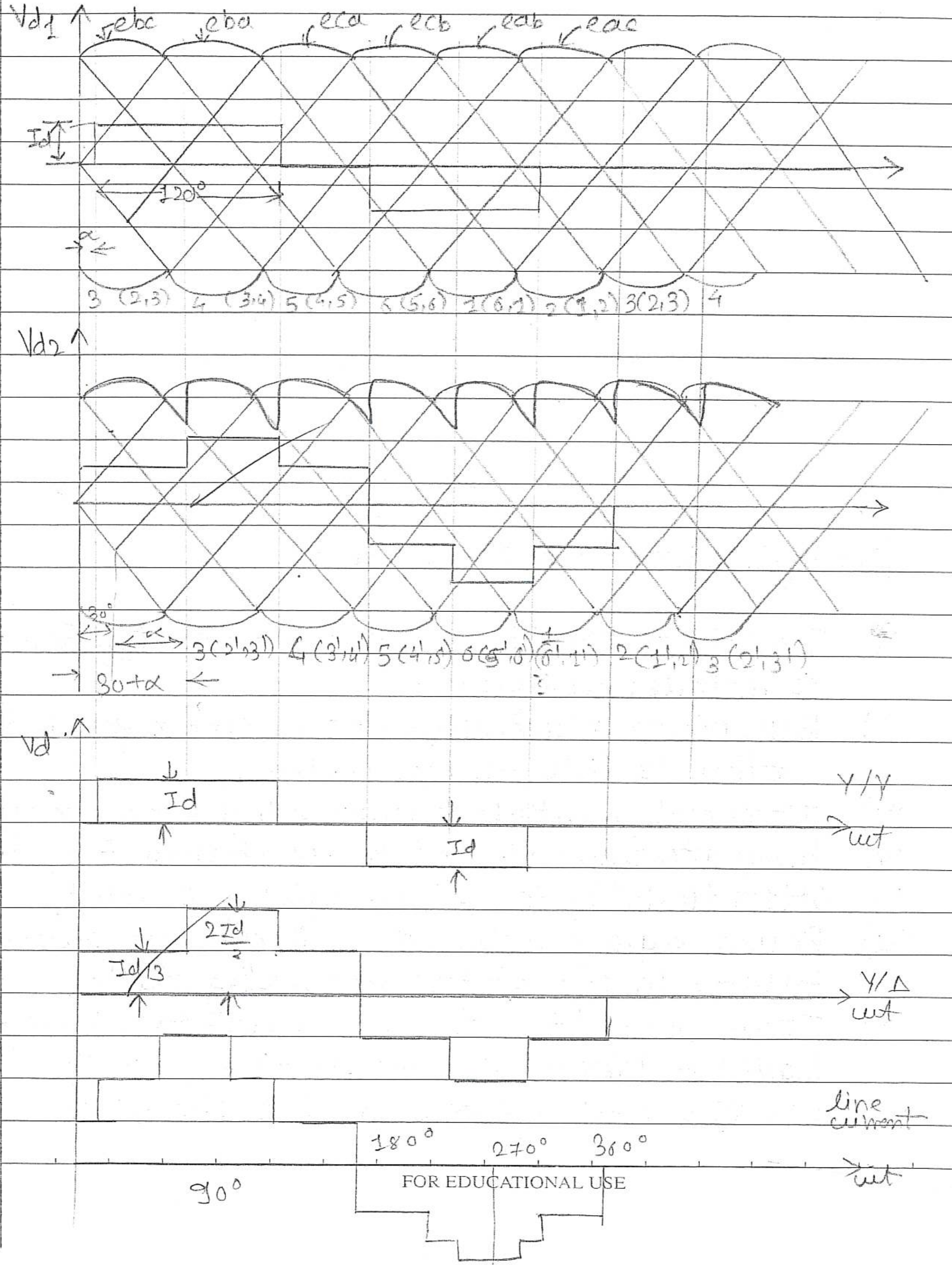
Q.4) Schematic diagram of 12-pulse converter & sketch current waveform.



12 Pulse Converter

Schematic Diagram

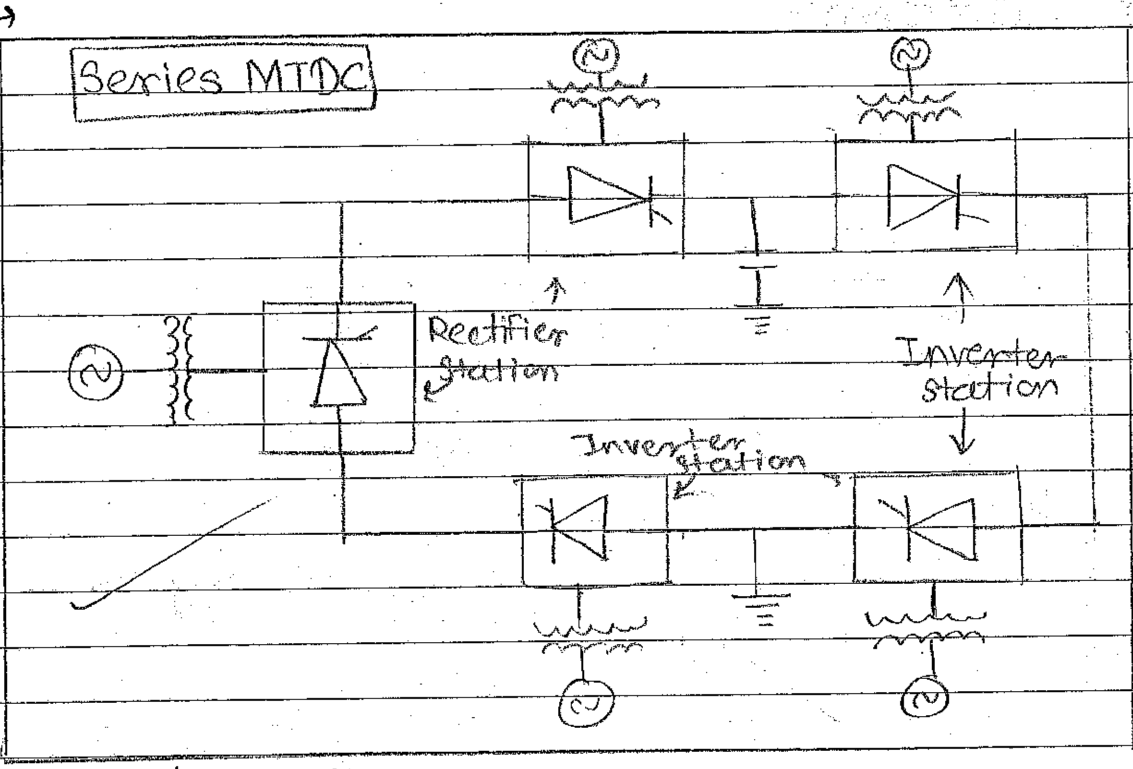
* Waveform:-


Vd1
ebc
eba
eca
ecb
eab
eac
Id
120°
α
Vd2
30°
30+α
Vd
Id
Y/Y
ωt
2Id
Id/3
Y/Δ
ωt
line current
180°
270°
360°
90°
ωt

Q.5) Draw Schematics of MTDC & applications.

→

(I)



(II) Applications of MTDC system:-

i) It connects multiple DC renewable energy farms to multiple power grids

ii) Bulk power transmission from remote generating Stations to different load centres

iii) It connects multiple offshore wind farms to grid

iv) Allow interconnecⁿ betn two asynchronous AC systems

v) Offers flexibility for power tapping at multiple joints.

vi) Power supply reallocation in case of power failures in one of the generating stations

vii) It can be used to offer more power to a heavily loaded AC N/W by using one rectifier & multiple inverters that injects power into the AC N/W.

Q.5) Explain protection against overvoltages in HVDC systems.

→

The typical arrangements of surge arresters in a converter station (For a pole).
For a system with two 12 pulse converters per pole, there are about 40 arresters per pole.

→ The arresters are selected with adequate energy dissipation capabilities which vary with the location of arresters.
eg:- The valve arrester protecting the commutation group ~~at~~ the highest potential can be subjected to higher energies than other arresters when a ground fault occurs between the valve & converter transformer in the upper bridge.

→ The closing of a bypass switch across a converter result in increasing the DC voltage across remaining converter. The converter unit arrester is stressed.

→ The protective firing of a valve is the backup protection that is available for overvoltages in forward direction.

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Q.7) Differenciate between CSC & VSC.

→

Sr. No	Parameters	CSC	VSC
1)	Device Type	Thyristor (Self-Commutation)	Thyristor (Self-commutation)
2)	Characteristic Symmetry	Symmetrical	Assymmetric
3)	Short-Circuit current	lower	Higher
4)	losses	Higher	Lower
5)	AC Capacitors DC Capacitors	Required Not required	Not required Required
6)	Rate of rise of fault current	Limited by DC reactor	Fast rise (dt. capacitor discharge)
7)	Inter face with AC system	More Complex	less Complex
8)	Reactive Power generation	Depends on current Flowing thro' energy storage	Independent of Energy storage

Q.8) Comparison betn Classical HVDC system with VSC based HVDC system.

→

Attributes	Classical HVDC	VSC-HVDC
Converter Technology	Thyristor valve, grid commutation	Thyristor valve (IGBT), self commutation
Max Converter rating	6400 MW, ± 800 kV [overhead line]	1200 MW, ± 320 kV [Cable]
Active Power Flow Control	Continuous ± 0.1 Pr to ± Pr.	Continuous 0 to ± Pr
Reactive Power demand	50% of power transfer	No reactive power demand
Reactive Power Compensation & Control	Discontinuous control (switched shunt banks)	Continuous control (PWM buit-in in converter control)
Independent 'Q' control	No	Yes
Scheduled Maintenance	Typically < 1%	Typically < 0.5%
Typical system losses	2.5-4.5%	4-6%

2022-23

Subject: Microcontrollers

Name - Priti kadam
Roll No - 21ET304

(12) ~~13~~

Assignment No. 1

Que.1. Explain the Intrrupt Structure of 8051

Ans.→

- The 8051 Starts execution at 0000H after Reset. Fig. Shows the intrrupt Structure of 8051.

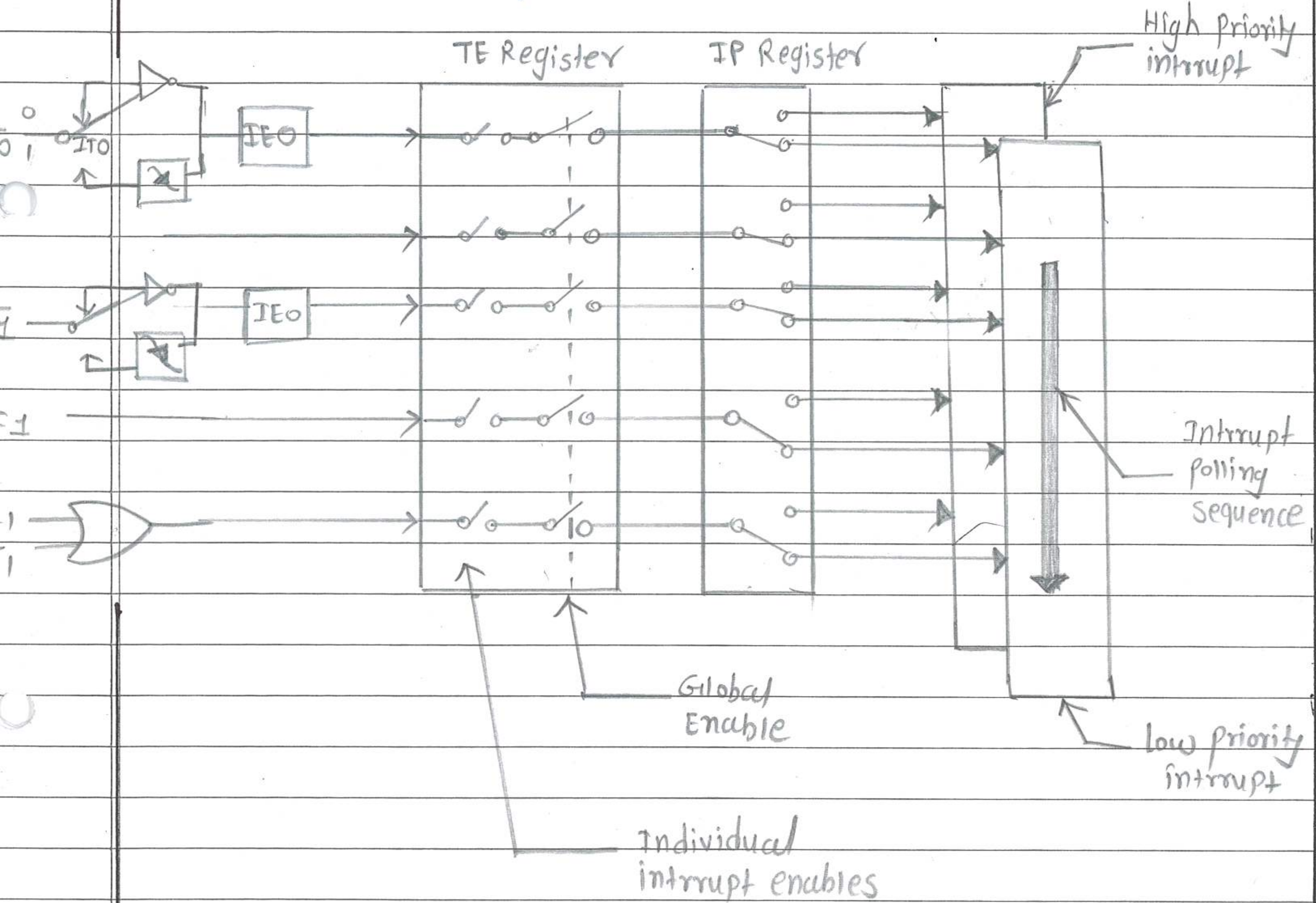

Fig. Intrrupt Structure

8051 Intrrupts and their priority-

- 8051 provides 5 intrrupt Sources: two external intrrupts and two timer intrrupts.

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- 5 intrrupts sources
- External intrrupt 0
- Timer 0
- External intrrupt 1
- Timer 1
- Serial port

- Each intrrupt type can be programmed to one of two priority levels.
- External intrrupts can be programmed for edge or level sensitivity.
- Software intrrupts can be generated when any of the intrrupt enable flag is set by program.

⊙ Vector Addresses of 8051 Intrrupts

- Each intrrupt type has a separate vector address.

Source	Address
E0	03H
TF0	0BH
IE1	13H
IF1	1BH
RI & TI	23H

⊙ Enabling and Disabling of Intrrupts

- The global intrrupt enable bit is used to enable or disables all the intrrupts while the individual intrrupts enable bits can be used to enable or disable a particular intrrupts. These intrrupt enable bits are in the intrrupt enable register.

- The fig. following shows structure of Intrrupt enable and intrrupt priority registers.

EA	—	—	ES	ET1	EX1	ET0	EX0

Enable bit = 1 enables the intrrupt

Enable bit = 0 disables it.

Symbol	Position	Function
EA	IE.7	Disables all intrrupts. If EA=0, no intrrupt will acknowledged. If EA=1 each intrrupt source individually enabled or disable by setting.
—	IE.6	reserved*
—	IE.5	reserved*
ES	IE.4	serial port Intrrupt enable bit
ET1	IE.3	Timer1 overflow Intrrupt enable bit
EX1	IE.2	External Intrrupt 1 enable bit
ET0	IE.1	Timer 0 overflow Intrrupt enable bit
EX0	IE.0	External Intrrupt 0 enable bit.

fig. Intrrupt Enable register (IE)

⊙ Intrrupt Priority-

- The intrrupt priority register is used to program the intrrupt in upper priority or lower priority blocks. In 8051 there are two intrrupt priority blocks.
- The upper or higher priority intrrupts have higher priority as the name says.

⊙ Timer flag Interrupt

- If data byte is received, an intrrupt bit, RI is set to 1 in the SCON register.
- When a data byte has been transmitted an intrrupt bit, TI is set in the SCON
- These flags are ORed together to generate the intrrupt Both of them should be reset to enable the next data communication operation.

⊙ Serial port Interrupt

- If data byte is received, an intrrupt bit, RI is set to 1 in SCON register.
- When a data type has been transmitted an intrrupt bit TI, is set in the SCON
- These flags are ORed together to generate intrrupt. Both of them should be reset to enable the next data communication operation.

⊙ External Interrupts

- pins $\overline{INT0}$ and $\overline{INT1}$ are used by external circuitry. Inputs on these pins can set the Interrupt flags IE0 and IE1. in the TCON register to 1 by two diffrent methods.
- when the input reaches 0 level
- When high-to-low transition on these pins depending on bits IT0 and IT1 in SFR register TCON.

⊙ Reset is a Non-Maskable Interrupts

- RST pin is Schmitt Trigger input
- External reset is asynchronous to internal clock
- RST pin must be high for at least two machine cycles while the oscillator is running.
- Internal RAM not affected by reset, but indeterminate on power up.
- Port pin in random state until oscillator starts & algorithm write 1's to them
- Reset sets PC to 0000

4

Que.② Draw a diagram of key and buzzer interfaced with microcontroller 8051 and write program to turn Buzzer ON after the switch is pressed.

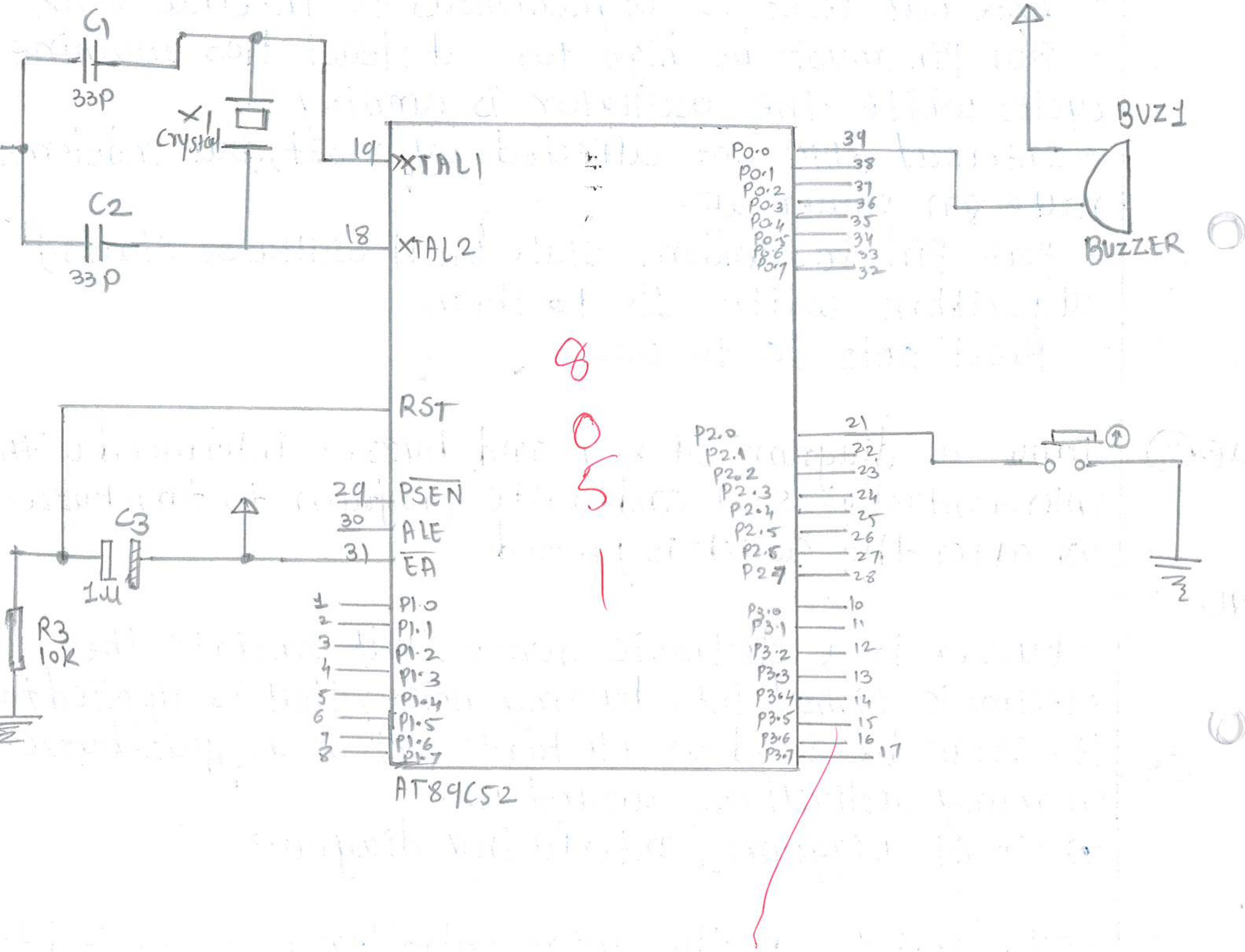
Ans.→

- Buzzer is a electronic device that converts the electronic signal into buzzing noise, that is applied to it. It can be used as electronic bell or as quiz buzzer in many applications around us.

⊙ Circuit Diagram / Interfacing diagram-

- The port 1 of the microcontroller is connected to buzzer.
- This type of connection is possible, if current requirements of buzzer is not more than 20mA. The output is in current source mode so that buzzer will turn ON when port is logic low. - Switch is connected to port3 which remains at logic High by pull up resistor.

4


C1
33p
X1
Crystal
C2
33p
19
XTAL1
18
XTAL2
RST
29
PSEN
30
ALE
31
EA
C3
1u
R3
10k
P1.0
P1.1
P1.2
P1.3
P1.4
P1.5
P1.6
P1.7
P0.0
P0.1
P0.2
P0.3
P0.4
P0.5
P0.6
P0.7
P2.0
P2.1
P2.2
P2.3
P2.4
P2.5
P2.6
P2.7
P3.0
P3.1
P3.2
P3.3
P3.4
P3.5
P3.6
P3.7
BUZ1
BUZZER
8051
AT89C52

Programme-

```
#include "REG52.h"
# define buz P1
sbit sw = P3^0;
long int i;
Void main()
{
while(1)
{
if (SW==0)
{
for(i=0;i<=90000;i++);
if (SW==0)
{
while (SW==0);
buz= 0X01;              //ON Buzzer
for (i=0;i<4500;i++);   // Delay
buz= 0X00;              // off buzzer
for (i=0;i<4500;i++);   // Delay
} }
} }
```

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Que③ State features of PIC, draw and explain the block schematic of PIC 18FXXX.

Ans.→ - Features of PIC 18F-series microcontrollers are:

- Program memory addressing up to 2 Mbytes
- Data memory addressing up to 4kbytes
- 77 instructions
- DC to 40 MHz operation
- 8 8 hardware multiplier
- Interrupt priority levels
- 16 bit-wide instructions, 8 bit wide data path
- PIC16 source code compatible
- Up to two 8-bit timers /counters
- Up to four external intrrupts
- It has RISC architecture
- It has Data EEPROM
- Includes Timers
- contains I/O port between 16 to 72 pins
- Includes USART PROTOCOL for PC communication

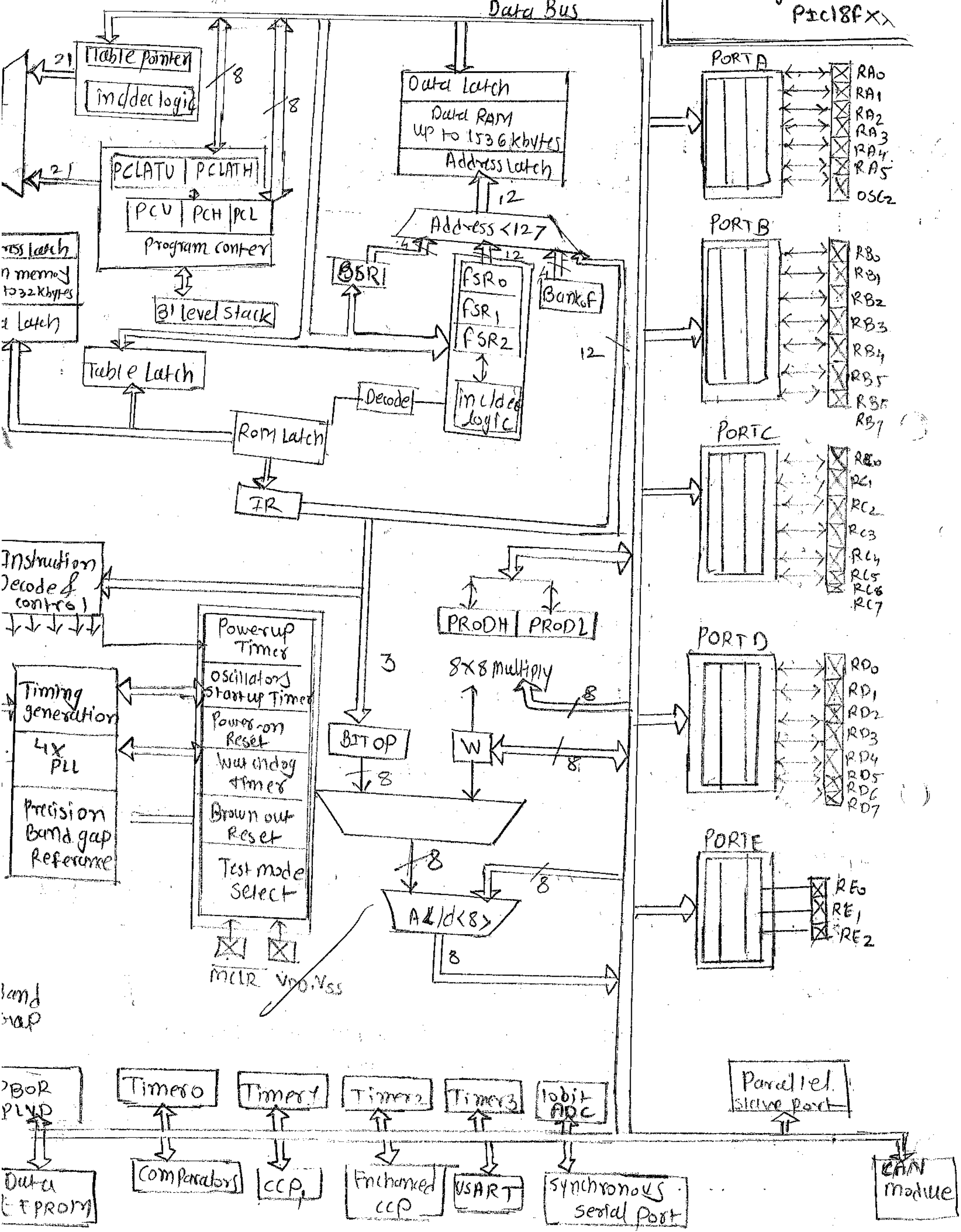
- Block schematic of PIC 18fxxx is as shown in the fig 1.1.

-

⊙ **Program Memory** -

- The program memory provides instructions. This Program memory is also connected to the instruction register through the ROM latch like system interface data bus.

Block diagram of PIC18FXX



31 level Stack

- A 31 level Stack is Provided for ~~providing~~ storing the return address in program counter, and hence the RAM is not be used for this purpose
- Since, the stack size is 31 levels, it can store upto 31 return addresses and hence upto 31 levels of the nested execution can be handled.

Data RAM

- Data RAM is provided whose data lines are connected to the system data bus, while the address is taken through a multiplexer that has three diffrent inputs.
- FSR0, FSR1 and FSR2 are file select registers that provide the 12 bit address required to access the RAM. The address may provided in instruction iteself hence the IR is also one of the inputs.
- A Bank select Register (BSR) is also connected.

3

Arithmatic and logic unit (ALU)

- The ALU gets one of the input oprand from W register or IR. The other oprand may be given either from a register or memory location, and hence the other input side of ALU is connected to internal data BUS.
- The task of ALU is to perform Arithmatic and the logical operations.

⊙ CPU Registers

- There are 7 CPU registers in PIC18Fxxx family;

CPU Registers

1) Working Register (WREG)
2) Status Register
3) File seletion Register (FSR)
4) Indirect through FSR (INDF)
5) Program Counter Latch Higher (PCLATH)
6) Program Counter Low Byte (PCL)
7) Program Counter latch Upper (PCLATU)
8) Program Counter Stack.

⊙ Working Register (WREG)

- It is 8 bits wide
- It serves as source for one/two operand instructions to be processed in the ALU. The result of operation may be stored in the W register
- It is not an addressable register.

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1

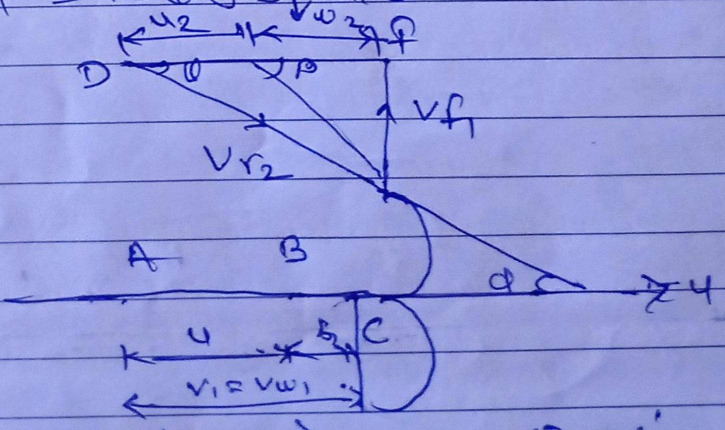
classmate
Date :
Page :

Assignment No. 1

Q. The Pykara Power house is equipped with impulse turbine of Pelton type each turbine deliver a maximum Power of 14000 kW when working under head of 840 m and running at 600 rpm find the least diameter of the jet and the mean dia. of wheel. what would be approximate dia. of orifice at the nozzle tip? Determine the value of the jet motion and state if it is within limits. Specify the no. of buckets for the wheel overall efficiency of the turbine at 89.2%. Assume $C_v = 0.988$ and $K_u = 0.45$

→ Given $P = 1400\ kW$, $C_v = 0.988$,
$H = 840\ m$, $K_u = 0.45$,
$N = 600\ rpm$, $m = ?$
$d_j = ?$, $\eta_o = 89.2\% = 0.892$
$D = ?$, $K_u = \frac{u}{V_1} = 0.45$

Soln :- $V_1 = C_v\sqrt{2gH} = 0.988\sqrt{2 \times 9.81 \times 840}$
$V_1 = 126.83\ m/s$



$K_u = \frac{U}{V_1} \Rightarrow U = 0.45 \times V_1$

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i) Wheel diameter :-

$u = \frac{\pi D N}{60} \Rightarrow 57.07 = \frac{\pi \times D \times 600}{60}$

$\therefore \boxed{D = 1.8165 \text{ m}}$

ii) Jet diameter (d_j) ;

W.K.T.

$\eta_o = \frac{P}{\rho g Q H} \Rightarrow 0.892 = \frac{14000 \times 10^3}{1000 \times 9.81 \times Q \times 820}$

$\therefore Q = 1.9046 \text{ m}^3/\text{s}$

$Q = \frac{\pi}{4} \times d_j^2 \times V_1$

$1.9046 = \frac{\pi}{4} d_j^2 \times 126.83$

$\therefore \boxed{d_j = 0.1382 \text{ m}}$

iii) Jet ratio ;

$m = \frac{D}{d_j} = \frac{1.8165}{0.1382} = 13.13$

The value of jet ratio varries betⁿ 11 to 15

Hence m = 13.13 is within limit

iv) No. of buckets ;

$z = 15 + 0.5 m$

$= 15 + 0.5 \times 13.13$

$\boxed{z = 22}$ buckets

v) Approximate dia meter of orifice :-

Dia of orifice should be greater than dia. of jet

$\therefore$ Dia of orifice $= d_1 = \sqrt{\frac{Q \sin\alpha}{2.66\, \mu\, C_V \sqrt{H}}}$

Assume $\mu = 0.84$, $\alpha = 84$

$\therefore d_1 = \sqrt{\frac{1.9046 \times \sin 84}{2.66 \times 0.84 \times 0.988 \sqrt{840}}}$

$\boxed{d_1 = 0.1719}$ m

Q.2 Steam impulse turbine wheel having a nozzle of 20° at a velocity of 450 m/s. The exit angle of the moving blade is 20° and relative velocity of steam may be assumed to remain constant over the moving blade. If the blade speed is 180 m/s and mass flow rate of steam is 2.5 kg/s Determine.

1) Blade angle at inlet,
2) work done per kg of steam.
3) Total power developed by the turbine
Diagram efficiency.

→ Given

$\alpha = 20°$ $\quad V_1 = 420$ m/s

$\phi = 20°$ $\quad V_{r_2} = V_{r_1}$

$u = 180$ m/s $\quad \dot{m} = 2.5$ kg/s

Diagram ?

i) Blade angle at inlet θ

Consider inlet Δ ABCD,

$V_{w_1} = V_1 \cos\alpha = 450 \cos 20 = 422.86$ m/s

$V_{f_1} = V_1 \sin\alpha = 450 \sin 20 = 153.91$ m/s.

$BD = V_{w_1} - u = 422.86 - 180$

$= 242.86$ m/s

$\theta = \tan^{-1}\left(\frac{V_{f_1}}{BD}\right) = \tan^{-1}\left(\frac{153.91}{242.86}\right)$

$\boxed{\theta = 32.36^\circ}$

Also $V_{r_2} = V_{r_1} = \sqrt{(V_{f_1})^2 + (BD)^2}$

$= \sqrt{153.91^2 + 242.86^2}$

$= 287.52$ m/s

$\therefore V_{r_1} = V_{r_2} = 287.52$ m/s.

ii) Workdone per kg of steam, W

Consider outlet Δ BEF

$V_{f_2} = AF = FB - u = V_{r_2} \cos\phi - u$

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$= 287.52 \cos 20 - 180$
$= 90.18$ m/s.

$$w = \frac{(V_{w_1} + V_{w_2})u}{1000} \text{ kJ/kg}$$

$$= \frac{(422.86 + 90.18)180}{1000}$$

$= 92.3472$ kJ/kg.

iii) Total Power developed, $\dot{W}$.

$\dot{W} = \dot{m} w = 2.5 \times 92.3472$
$= 230.868$

iv) Diagram efficiency:

$$\eta_b = \frac{w}{V_1^2/2} = \frac{2w}{V_1^2}$$

$$= \frac{2 \times (92.3472 \times 1000)}{(450)^2}$$

$\eta_b = 0.9121 = 91.21\%$

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COLLEGE OF ENGINEERING

DEPARTMENT OF MECHANICAL ENGINEERING

Assignment 1 (Unit I & Unit II)
Course: Numerical and Statistical Methods
Class: TE Mechanical Sandwich (A Y: 2022-23)

Unit 1

Q.1	Draw the flow chart for Bi-section method
Q.2	Solve by Bisection Method $3x = \cos x + 1$ correct up to three decimal places
Q.3	Explain convergence and divergence in Newton Raphson method
Q.4	Solve using Newton-Raphson Method the equation $e^x \cos x - 1.4 = 0$. Find the value of the root up to the accuracy of 0.001.
Q.5	Find the positive root of $x^4 - x = 10$ by Newton-Raphson's correct to three decimal places.
Q.6	Find a positive real root of $3x = \cos x + 1$ by Newton's method.
Q.7	Write step by step procedure for Gauss elimination method.
Q.8	Using gauss elimination method solve the following set of simultaneous equations. $2x + 4y - 6z = -4$; $x + 5y + 3z = 10$; $x + 3y + 2z = 5$.
Q.9	Solve the following system of equation using Gauss elimination method. $3x + 2y + 3z = 18$; $2x + y + z = 10$; $X + 4y + 9z = 16$.
Q.10	What is meant by partial pivoting in Gauss elimination to solve simultaneous equations?
Q.11	Solve the system of equation using Gauss elimination method. $x + y - 2z = 3$; $4x - 2y + z = 5$; $3x - y + 3z = 8$. Us e partial pivoting
Q.12	Solve the following system of equation using Seidel method up to Six times. $3x + y + z = 5$; $x + 6y + 2z = 19$; $-x - 2y - 5z = 10$.
Q.13	Draw the flowchart for Thomas algorithm method.
Q.14	Solve the following equation by Thomas algorithm $3x_1 - x_2 = 5$; $2x_1 - 3x_2 + 2x_3 = 5$; $X_2 + 2x_3 + 5x_4 = 10$; $X_3 - x_4 = 1$
Q.15	Using Gauss Seidel Method solve the following set of equations up to four iterations. $X + 2y + z = 0$ $3x + y - z = 0$ $X - y + 4z = 3$

NSM: [illegible]

Roll No	Name of the Student	Questions to be attempted
21MS336	POMAN PRACHIT PRAVIN	Q.6, Q.8, Q.20, Q.24
21MS337	RANE VISHAL PRAKASH	Q.1, Q.8, Q.22, Q.27
21MS338	SABALE PRAHLAD GAUTAM	Q.5, Q.13, Q.19, Q.29
21MS339	SHINDE SANDHYA DHARMRAJ	Q.4, Q.12, Q.19, Q.27
20MS026	SHINDE YOGADA SANTOSH	Q.1, Q.11, Q.17, Q.24
20MS027	SHIRODKAR ATHARWA SUHAS	Q.2, Q.15, Q.17, Q.26
21MS340	SONAWANE GANESH NIMBA	Q.4, Q.10, Q.18, Q.29
20MS028	SONAWANI PARTH SANJAY	Q.4, Q.13, Q.16, Q.29
21MS341	SONDKAR SHWETA AMOL	Q.2, Q.15, Q.21, Q.23
21MS342	SUTAR OMKAR BHARAT	Q.1, Q.8, Q.21, Q.29
21MS343	TAKLE ANUJ BALASAHEB	Q.4, Q.13, Q.20, Q.23
21MS344	TILEKAR CHETAN NANDKUMAR	Q.3, Q.12, Q.19, Q.23
20MS029	URKUDE NIRANJAN JITENDRA	Q.4, Q.9, Q.22, Q.30
20MS030	UTTEKAR ARYESH DHIRAJ	Q.2, Q.11, Q.16, Q.27
21MS345	WAGHMARE SHUBHAM SANDIP	Q.1, Q.13, Q.21, Q.29
20MS031	WELDE PARTH JAGDISH	Q.5, Q.9, Q.22, Q.26
20MS032	YEVATEKAR YASH MUKUND	Q.4, Q.12, Q.16, Q.26

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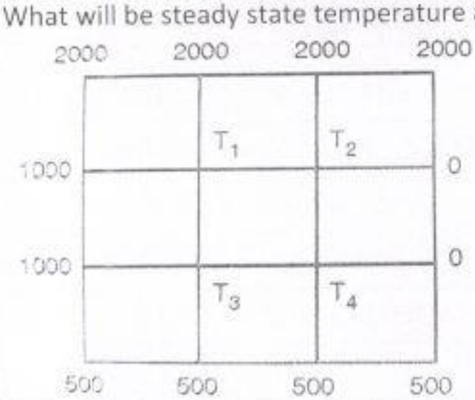
DEPARTMENT OF MECHANICAL ENGINEERING

Unit 2

Q.16	Obtain the solution of $dy/dx = 3x + y^2$ using Taylor's series method. Given $y(0) = 1$. Determine $y(0.1)$
Q.17	Draw flow chart for Euler's method.
Q.18	Use Euler's method with $h = 0.5$ to solve the initial value problem over the interval $x = 0$ to 2. $dy/dx = yx^2 - 1.1y$; Where $y(0) = 1$
Q.19	Draw a flow chart for Runge-Kutta second order method.
Q.20	$dy/dx = x + y$ given $y(0) = 1$, $h = 0.1$ find $y(0.2)$ using Runge-Kutta 2[nd] order method.
Q.21	Use Runge Kutta 4[th] order method to solve $y' - \sin(y) = 1$, from $x = 0$ to 0.5 in step of $h = 0.1$.
Q.22	Solve the second order differential equation $y'' = xy' - y^2$ for $x = 0.2$ correct to 4 decimal places. Initial conditions are $x = 0$, $y = 1$, $y' = 0$ by Runge-kutta 2[nd] order. Increment in $x = 0.1$.
Q.23	Solve the differential equations for $x= 0.3$. Using Runge-kutta method of fourth order with initial value $x = y = 0$; $z = 1$. $dy/dx = (1 + xy)$ and $dz/dx = - xy$
Q.24	Second order differential equation is $x^2 (d^2y/dx^2) + (x - 2) (dy/dx) - 3y = 10x$, subject to consideration $y(0) = 0$; $y(0.3) = 10$; $h = 0.1$ solve by finite difference method.
Q.25	The edges of a steel plate 750 x 750 mm has maintained at temperature as shown in Figure. What will be steady state temperature at the interior point?



Q.26	Draw the flowchart of parabolic equation
Q.27	Solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ for the following condition using explicit finite difference scheme at $t = 0$, $u = \sin\pi x$ $(0 < x < 1)$ at $x = 0$ and $x = 1$, $u = 0$ for all values of t. Taking increment in t as 0.002 and increment in x as 0.2 tabulate values of u for $t = 0$ to 0.006 and $x = 0$ to 1.
Q.28	Solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$, for the following condition using Crank-Nicolson method. At $x = 0$ and $x = 3$; $u = 0$ for all values of t At $t = 0$, $u = x^2$ for $0 < x < 3$ Take increment in x as 1 and increment in t as 0.1. Find all values of u for $t = 0$ to $t = 0.3$.
Q.29	Solve the equation $\nabla^2 u = -10(x^2 + y^2 + 10)$ over the square with sides $x = 0 = y$; $x = 3 = y$ with $u = 0$ on the boundary and mesh length = 1.
Q.30	Write a short note on boundary value problem.

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Department of Mechanical Engineering

Academic Year : 2022-23 (Term I)

Assignment 1 (Unit I & II)

Class : TE Mechanical Sandwich		Numerical & Statistical Methods (302041)
Roll No	**Name of the Student**	**Questions to be attempted**
20MS001	AGRAWAL JAY GANESH	Q.3, Q.8, Q.17, Q.24
19MS031	ATUL BALU LOKHANDE	Q.3, Q.8, Q.21, Q.28
21MS301	BHOI BHAVESH SUNIL	Q.2, Q.8, Q.19, Q.28
20MS002	BHONSLE KARAN HAMBIR	Q.3, Q.10, Q.19, Q.27
20MS003	BHOSALE JAYESH DATTATRAY	Q.2, Q.14, Q.16, Q.29
20MS004	BUUNDELE PRERNAA DINESH	Q.4, Q.12, Q.18, Q.27
21MS302	CHAUDHARI DEVENDRA ANIL	Q.3, Q.8, Q.20, Q.25
21MS303	CHAUDHARI MOHAN DATTATRAY	Q.4, Q.13, Q.21, Q.23
21MS304	CHAUDHARI ROHIT PRAMOD	Q.5, Q.14, Q.16, Q.29
21MS305	CHAUDHARI SHALEM NARESH	Q.1, Q.10, Q.16, Q.28
20MS005	CHOUDHARI KAILASH SOMARAM	Q.6, Q.11, Q.16, Q.28
21MS306	CHOURE RAMHARI ASARAM	Q.6, Q.11, Q.16, Q.27
20MS006	DAKLIYA YASH PRASHANT	Q.1, Q.15, Q.18, Q.26
21MS307	DALE PRASHANT DILIPRAO	Q.1, Q.13, Q.22, Q.30
21MS308	DATE DHANANJAY VILAS	Q.2, Q.12, Q.21, Q.24
21MS309	DESHMUKH ATHANG VIVEK	Q.7, Q.10, Q.17, Q.26
21MS310	GAIKWAD TEJAS SHAILENDRA	Q.1, Q.8, Q.17, Q.28
21MS311	GARODI KUNAL NAMDEO	Q.1, Q.8, Q.21, Q.29
21MS312	GHODERAO SHUBHAM ANIL	Q.5, Q.14, Q.21, Q.24
21MS313	GORAD SAURAV GORAKSHANATH	Q.5, Q.15, Q.21, Q.23
21MS314	GUGALE YASH SANDIP	Q.2, Q.9, Q.22, Q.27
20MS007	GUJARATHI GAURANG PANKAJ	Q.1, Q.15, Q.20, Q.25
21MS315	HATTARGE ABHISHEK ANIL	Q.1, Q.12, Q.22, Q.24
20MS008	HATTEKAR NIKHIL ABHAY	Q.7, Q.15, Q.21, Q.24
21MS316	HINGANE SHUBHAM VIKAS	Q.6, Q.8, Q.21, Q.28

Roll No	Name of the Student	Questions to be attempted
20MS010	IRALE SUMEET SURESH	Q.2, Q.11, Q.16, Q.29
20MS011	JADHAV SHANTANU SANJAY	Q.4, Q.12, Q.16, Q.29
20MS012	JADHAV SHASHWAT SHIVAJI	Q.4, Q.9, Q.16, Q.23
20MS013	JAKAPURE SHIVSHANKAR SURESH	Q.4, Q.15, Q.20, Q.28
20MS014	KADAM KRISHNA BALASAHEB	Q.3, Q.11, Q.21, Q.29
21MS317	KADAM SIDDHANT SACHIN	Q.7, Q.14, Q.22, Q.26
21MS318	KALE MANSI ULHAS	Q.3, Q.15, Q.19, Q.29
21MS319	KARANJKAR ADITI RAMCHANDRA	Q.6, Q.13, Q.21, Q.29
20MS015	KHARKAR PUSHPANJAY HEMKANT	Q.7, Q.14, Q.17, Q.23
21MS320	KHATIB AFRID FIROJ	Q.6, Q.15, Q.20, Q.26
21MS321	KSHIRSAGAR SHARVARI MADHUKAR	Q.7, Q.9, Q.19, Q.24
20MS016	KULKARNI ABHISHEK PRASHANT	Q.6, Q.13, Q.16, Q.25
20MS017	LATE PRATHAMESH GIRISH	Q.6, Q.12, Q.22, Q.26
21MS322	LIMKAR SHAUNAK PRASHAANT	Q.6, Q.11, Q.21, Q.25
21MS323	LONARI ROHIT SHANKAR	Q.5, Q.10, Q.20, Q.25
21MS324	MAGARE OM SHIRISH	Q.1, Q.8, Q.21, Q.28
21MS325	MALEKAR SARVESH DEEPAK	Q.3, Q.14, Q.20, Q.27
20MS018	MANDALE ADITYA UMESH	Q.6, Q.9, Q.22, Q.26
21MS326	MANE MANASI NARENDRA	Q.7, Q.13, Q.16, Q.29
20MS019	MHASKE CHAITANYA MILIND	Q.1, Q.14, Q.20, Q.25
21MS327	MUJAWAR MAHAMMADSAIF JAKIRHUSEN	Q.1, Q.10, Q.18, Q.24
21MS328	PALANGE ATHARVA PRADEEP	Q.2, Q.12, Q.17, Q.23
21MS329	PALIWAL SHEETAL SACHIN	Q.3, Q.15, Q.17, Q.28
20MS020	PALVE VEDANT CHANDRAKANT	Q.1, Q.10, Q.22, Q.24
21MS330	PANCHAL MAROTI DNYANOBA	Q.2, Q.14, Q.18, Q.29
20MS021	PATEL YASH JAYANT	Q.3, Q.15, Q.17, Q.29
21MS331	PATIL ADITYA AJAY	Q.5, Q.12, Q.21, Q.29
21MS332	PATIL KANISHK SHARAD	Q.5, Q.14, Q.20, Q.25
20MS022	PATIL PARTH DINKARRAO	Q.2, Q.14, Q.18, Q.28
21MS333	PATIL PRAGATI UDAY	Q.1, Q.15, Q.19, Q.23
21MS334	PATIL RAJ KIRAN	Q.7, Q.8, Q.18, Q.28
20MS023	PATIL SIDDHESH MAHESH	Q.7, Q.9, Q.19, Q.30
20MS024	PATIL YASH DIPAK	Q.6, Q.10, Q.20, Q.29
21MS335	PAWASKAR MAYURESH KISHOR	Q.5, Q.12, Q.16, Q.30
20MS025	PIMPLE MALHAR AJIT	Q.7, Q.10, Q.20, Q.26

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COLLEGE OF ENGINEERING

DEPARTMENT OF MECHANICAL ENGINEERING

Assignment 2 (Unit III & Unit IV)
Course: Numerica l and Statistical Methods
Class: TE Mechanical Sandwich (A Y: 2022-23)

Unit 3

Q.1 Explain the Trapezoidal rule with the help of flow chart.

Q.2 Evaluate $\int_0^2 \frac{x}{\sqrt{2+x^2}}$ by using Trapezoidal rule with four strip

Q.3 Find the integral $\int_0^{\pi} \sin(x)\,.dx\ using\ Trapezoidal\ rule$

Q.4 Explain Simpson's 1/3rd rule using graphical representation.

Q.5 Evaluate $\int_0^4 e^x.\,dx$ using Simpsons 1/3rd rule using four strips

Q.6 Evaluate $\int_1^2 \frac{e^x}{x}.\,dx$ using Simpsons 1/3rd rule using four strips

Q.7 Explain Simpson's 3/8 rule using flow chart.

Q.8 Evaluate $\int_0^1 \frac{sinx}{2+3sinx}.\,dx$ using Simpsons 3/8 rule using four strips

Q.9 Write a flow chart for Gauss Legendre 2 point formula.

Q.10 Evaluate $\int_0^1 \frac{1}{1+x^2}.\,dx$ use Gauss Legendre formula.

Unit 4

Q.11 Draw flow chart to fit an equation y = ax + b

Q.12 Determine constant a and b using method of least square such that y = ax + b fits following data.

x	2	4	6	8	10
y	4.077	11.084	30.128	81.128	222.62

Q.13 Fit a straight line passing through the points

x	1	2	5	7
y	1	12	117	317

Q.14 The equation of the best-fit curve is of the type $y = a\,b^x$. Find value of constant a and b. Fitting the curve through the points.

x	2	3	4	5	6
y	144	172.8	207.4	248.8	298.5

Q.15 Determine the values of a and b so that the equation $y = a\,x^b$ best fits the following data by method of least squares.

x	25	20	12	9	7	5
y	0.22	0.2	0.15	0.13	0.12	0.1

Q.16 The pressure (P) and volume (V) of a gas are related by the equation $PV^w = C$, where C and W being constants: Fit this equation to the following set of observation.

P	0.5	1	1.5	2	2.5	3
V	1.62	1	0.75	0.62	0.52	0.46

Q.17 Find interpolating polynomial for the data using Lagrane's method.

x	0	1	2	5
f(x)	2	3	12	147

Q.18 Find value of y for x = 0.5 for the following table of x, y values using Newton's forward difference formula.

x	0	1	2	3	4
y	1	5	25	100	250

Q.19 Fit the parabola $y = ax^2 + bx + c$ in least square sense to the data.

x	10	12	15	23	20
y	14	17	23	25	21

Q.20 Explain the term interpolation.

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Department of Mechanical Engineering

Academic Year : 2022-23 (Term I)

Assignment 2 (Unit III & IV)

Class :	TE Mechanical Sandwich	Numerical & Statistical Methods (302041)

Roll No	Name of the Student	Questions to be attempted
20MS001	AGRAWAL JAY GANESH	Q.3, Q.9, Q.11, Q.20
19MS031	ATUL BALU LOKHANDE	Q.3, Q.6, Q.14, Q.16
21MS301	BHOI BHAVESH SUNIL	Q.1, Q.8, Q.13, Q.19
20MS002	BHONSLE KARAN HAMBIR	Q.4, Q.8, Q.13, Q.20
20MS003	BHOSALE JAYESH DATTATRAY	Q.2, Q.10, Q.15, Q.16
20MS004	BUUNDELE PRERNAA DINESH	Q.3, Q.8, Q.11, Q.20
21MS302	CHAUDHARI DEVENDRA ANIL	Q.5, Q.6, Q.15, Q.17
21MS303	CHAUDHARI MOHAN DATTATRAY	Q.3, Q.8, Q.12, Q.19
21MS304	CHAUDHARI ROHIT PRAMOD	Q.3, Q.10, Q.12, Q.20
21MS305	CHAUDHARI SHALEM NARESH	Q.3, Q.6, Q.13, Q.20
20MS005	CHOUDHARI KAILASH SOMARAM	Q.2, Q.7, Q.13, Q.19
21MS306	CHOURE RAMHARI ASARAM	Q.2, Q.9, Q.15, Q.18
20MS006	DAKLIYA YASH PRASHANT	Q.4, Q.10, Q.15, Q.20
21MS307	DALE PRASHANT DILIPRAO	Q.2, Q.10, Q.13, Q.17
21MS308	DATE DHANANJAY VILAS	Q.1, Q.10, Q.11, Q.20
21MS309	DESHMUKH ATHANG VIVEK	Q.5, Q.10, Q.12, Q.16
21MS310	GAIKWAD TEJAS SHAILENDRA	Q.1, Q.10, Q.13, Q.16
21MS311	GARODI KUNAL NAMDEO	Q.4, Q.7, Q.12, Q.17
21MS312	GHODERAO SHUBHAM ANIL	Q.1, Q.9, Q.15, Q.18
21MS313	GORAD SAURAV GORAKSHANATH	Q.4, Q.8, Q.13, Q.16
21MS314	GUGALE YASH SANDIP	Q.5, Q.7, Q.12, Q.18
20MS007	GUJARATHI GAURANG PANKAJ	Q.4, Q.10, Q.13, Q.18
21MS315	HATTARGE ABHISHEK ANIL	Q.3, Q.9, Q.13, Q.17
20MS008	HATTEKAR NIKHIL ABHAY	Q.2, Q.8, Q.11, Q.18
[illegible]	[illegible]	Q.5, Q.10, Q.11, Q.18

Roll No	Name of the Student	Questions to be attempted
20MS009	INGALE ASAWARI DINKAR	Q.4, Q.6, Q.15, Q.19
20MS010	IRALE SUMEET SURESH	Q.4, Q.8, Q.15, Q.19
20MS011	JADHAV SHANTANU SANJAY	Q.2, Q.6, Q.15, Q.19
20MS012	JADHAV SHASHWAT SHIVAJI	Q.3, Q.8, Q.13, Q.18
20MS013	JAKAPURE SHIVSHANKAR SURESH	Q.4, Q.9, Q.13, Q.19
20MS014	KADAM KRISHNA BALASAHEB	Q.2, Q.7, Q.12, Q.20
21MS317	KADAM SIDDHANT SACHIN	Q.1, Q.8, Q.11, Q.16
21MS318	KALE MANSI ULHAS	Q.5, Q.9, Q.12, Q.19
21MS319	KARANJKAR ADITI RAMCHANDRA	Q.5, Q.6, Q.11, Q.19
20MS015	KHARKAR PUSHPANJAY HEMKANT	Q.5, Q.6, Q.15, Q.16
21MS320	KHATIB AFRID FIROJ	Q.3, Q.7, Q.12, Q.17
21MS321	KSHIRSAGAR SHARVARI MADHUKAR	Q.3, Q.10, Q.15, Q.19
20MS016	KULKARNI ABHISHEK PRASHANT	Q.4, Q.10, Q.15, Q.18
20MS017	LATE PRATHAMESH GIRISH	Q.2, Q.6, Q.14, Q.19
21MS322	LIMKAR SHAUNAK PRASHAANT	Q.3, Q.6, Q.12, Q.16
21MS323	LONARI ROHIT SHANKAR	Q.5, Q.10, Q.12, Q.19
21MS324	MAGARE OM SHIRISH	Q.4, Q.7, Q.14, Q.19
21MS325	MALEKAR SARVESH DEEPAK	Q.1, Q.10, Q.12, Q.16
20MS018	MANDALE ADITYA UMESH	Q.3, Q.8, Q.15, Q.19
21MS326	MANE MANASI NARENDRA	Q.5, Q.8, Q.13, Q.19
20MS019	MHASKE CHAITANYA MILIND	Q.5, Q.7, Q.15, Q.20
21MS327	MUJAWAR MAHAMMADSAIF JAKIRHUSEN	Q.3, Q.8, Q.15, Q.16
21MS328	PALANGE ATHARVA PRADEEP	Q.1, Q.10, Q.11, Q.16
21MS329	PALIWAL SHEETAL SACHIN	Q.2, Q.6, Q.12, Q.19
20MS020	PALVE VEDANT CHANDRAKANT	Q.4, Q.8, Q.11, Q.17
21MS330	PANCHAL MAROTI DNYANOBA	Q.3, Q.7, Q.13, Q.20
20MS021	PATEL YASH JAYANT	Q.1, Q.10, Q.13, Q.16
21MS331	PATIL ADITYA AJAY	Q.1, Q.8, Q.13, Q.18
21MS332	PATIL KANISHK SHARAD	Q.5, Q.7, Q.14, Q.19
20MS022	PATIL PARTH DINKARRAO	Q.3, Q.6, Q.11, Q.16
21MS333	PATIL PRAGATI UDAY	Q.5, Q.9, Q.12, Q.20
21MS334	PATIL RAJ KIRAN	Q.4, Q.7, Q.14, Q.18
20MS023	PATIL SIDDHESH MAHESH	Q.2, Q.7, Q.11, Q.18
20MS024	PATIL YASH DIPAK	Q.5, Q.6, Q.15, Q.16

Roll No	Name of the Student	Questions to be attempted
20MS025	PIMPLE MALHAR AJIT	Q.3, Q.10, Q.15, Q.19
21MS336	POMAN PRACHIT PRAVIN	Q.4, Q.10, Q.15, Q.18
21MS337	RANE VISHAL PRAKASH	Q.2, Q.6, Q.14, Q.19
21MS338	SABALE PRAHLAD GAUTAM	Q.3, Q.6, Q.12, Q.16
21MS339	SHINDE SANDHYA DHARMRAJ	Q.5, Q.10, Q.12, Q.19
20MS026	SHINDE YOGADA SANTOSH	Q.4, Q.7, Q.14, Q.19
20MS027	SHIRODKAR ATHARWA SUHAS	Q.1, Q.10, Q.12, Q.16
21MS340	SONAWANE GANESH NIMBA	Q.4, Q.10, Q.13, Q.18
20MS028	SONAWANI PARTH SANJAY	Q.3, Q.9, Q.13, Q.17
21MS341	SONDKAR SHWETA AMOL	Q.2, Q.8, Q.11, Q.18
21MS342	SUTAR OMKAR BHARAT	Q.5, Q.10, Q.11, Q.18
21MS343	TAKLE ANUJ BALASAHEB	Q.4, Q.6, Q.15, Q.19
21MS344	TILEKAR CHETAN NANDKUMAR	Q.3, Q.6, Q.12, Q.16
20MS029	URKUDE NIRANJAN JITENDRA	Q.5, Q.10, Q.12, Q.19
20MS030	UTTEKAR ARYESH DHIRAJ	Q.4, Q.7, Q.14, Q.19
21MS345	WAGHMARE SHUBHAM SANDIP	Q.1, Q.10, Q.12, Q.16
20MS031	WELDE PARTH JAGDISH	Q.4, Q.10, Q.13, Q.18
20MS032	YEVATEKAR YASH MUKUND	Q.3, Q.9, Q.13, Q.17

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Department of Mechanical Engineering

Course: Numerical & Statistical Methods (302041)

List of topics for mini projects

1. Exploratory data analysis on automobile data
2. Data Analysis from Machine Predictive Maintenance
3. Mechanical Fitting Failure Analysis using statistical method
4. Linear Regression Study on 3D printing dataset
5. Mechanical properties plot from stress strain curve data

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DEPARTMENT OF MECHANICAL ENGINEERING

Assignment 2 (Unit III & Unit IV)
Course: Numerica l and Statistical Methods
Class: TE Mechanical Sandwich (A Y: 2022-23)

Unit 3

Q.1 Explain the Trapezoidal rule with the help of flow chart.

Q.2 Evaluate $\int_0^2 \frac{x}{\sqrt{2+x^2}}$ by using Trapezoidal rule with four strip

Q.3 Find the integral $\int_0^\pi \sin(x).dx$ *using Trapezoidal rule*

Q.4 Explain Simpson's 1/3rd rule using graphical representation.

Q.5 Evaluate $\int_0^4 e^x.dx$ using Simpsons 1/3rd rule using four strips

Q.6 Evaluate $\int_1^2 \frac{e^x}{x}.dx$ using Simpsons 1/3rd rule using four strips

Q.7 Explain Simpson's 3/8 rule using flow chart.

Q.8 Evaluate $\int_0^1 \frac{sinx}{2+3sinx}.dx$ using Simpsons 3/8 rule using four strips

Q.9 Write a flow chart for Gauss Legendre 2 point formula.

Q.10 Evaluate $\int_0^1 \frac{1}{1+x^2}.dx$ use Gauss Legendre formula.

Unit 4

Q.11 Draw flow chart to fit an equation y = ax + b

Q.12 Determine constant a and b using method of least square such that y = ax + b fits following data.

x	2	4	6	8	10
y	4.077	11.084	30.128	81.128	222.62

Q.13 Fit a straight line passing through the points

x	1	2	5	7
y	1	12	117	317

Q.14 The equation of the best-fit curve is of the type $y = a\,b^x$. Find value of constant a and b. Fitting the curve through the points.

x	2	3	4	5	6
y	144	172.8	207.4	248.8	298.5

Q.15 Determine the values of a and b so that the equation $y = a\,x^b$ best fits the following data by method of least squares.

x	25	20	12	9	7	5
y	0.22	0.2	0.15	0.13	0.12	0.1

Q.16 The pressure (P) and volume (V) of a gas are related by the equation $PV^w = C$, where C and W being constants: Fit this equation to the following set of observation.

P	0.5	1	1.5	2	2.5	3
V	1.62	1	0.75	0.62	0.52	0.46

Q.17 Find interpolating polynomial for the data using Lagrane's method.

x	0	1	2	5
f(x)	2	3	12	147

Q.18 Find value of y for x = 0.5 for the following table of x, y values using Newton's forward difference formula.

x	0	1	2	3	4
y	1	5	25	100	250

Q.19 Fit the parabola $y = ax^2 + bx + c$ in least square sense to the data.

x	10	12	15	23	20
y	14	17	23	25	21

Q.20 Explain the term interpolation.

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Department of Mechanical Engineering
Academic Year : 2022-23 (Term I)
Assignment 2 (Unit III & IV)

Class :	TE Mechanical Sandwich	Numerical & Statistical Methods (302041)

Roll No	Name of the Student	Questions to be attempted
20MS001	AGRAWAL JAY GANESH	Q.3, Q.9, Q.11, Q.20
19MS031	ATUL BALU LOKHANDE	Q.3, Q.6, Q.14, Q.16
21MS301	BHOI BHAVESH SUNIL	Q.1, Q.8, Q.13, Q.19
20MS002	BHONSLE KARAN HAMBIR	Q.4, Q.8, Q.13, Q.20
20MS003	BHOSALE JAYESH DATTATRAY	Q.2, Q.10, Q.15, Q.16
20MS004	BUUNDELE PRERNAA DINESH	Q.3, Q.8, Q.11, Q.20
21MS302	CHAUDHARI DEVENDRA ANIL	Q.5, Q.6, Q.15, Q.17
21MS303	CHAUDHARI MOHAN DATTATRAY	Q.3, Q.8, Q.12, Q.19
21MS304	CHAUDHARI ROHIT PRAMOD	Q.3, Q.10, Q.12, Q.20
21MS305	CHAUDHARI SHALEM NARESH	Q.3, Q.6, Q.13, Q.20
20MS005	CHOUDHARI KAILASH SOMARAM	Q.2, Q.7, Q.13, Q.19
21MS306	CHOURE RAMHARI ASARAM	Q.2, Q.9, Q.15, Q.18
20MS006	DAKLIYA YASH PRASHANT	Q.4, Q.10, Q.15, Q.20
21MS307	DALE PRASHANT DILIPRAO	Q.2, Q.10, Q.13, Q.17
21MS308	DATE DHANANJAY VILAS	Q.1, Q.10, Q.11, Q.20
21MS309	DESHMUKH ATHANG VIVEK	Q.5, Q.10, Q.12, Q.16
21MS310	GAIKWAD TEJAS SHAILENDRA	Q.1, Q.10, Q.13, Q.16
21MS311	GARODI KUNAL NAMDEO	Q.4, Q.7, Q.12, Q.17
21MS312	GHODERAO SHUBHAM ANIL	Q.1, Q.9, Q.15, Q.18
21MS313	GORAD SAURAV GORAKSHANATH	Q.4, Q.8, Q.13, Q.16
21MS314	GUGALE YASH SANDIP	Q.5, Q.7, Q.12, Q.18
20MS007	GUJARATHI GAURANG PANKAJ	Q.4, Q.10, Q.13, Q.18
21MS315	HATTARGE ABHISHEK ANIL	Q.3, Q.9, Q.13, Q.17
20MS008	HATTEKAR NIKHIL ABHAY	Q.2, Q.8, Q.11, Q.18
21MS316	HINGANE SHUBHAM VIKAS	Q.5, Q.10, Q.11, Q.18

Roll No	Name of the Student	Questions to be attempted
20MS009	INGALE ASAWARI DINKAR	Q.4, Q.6, Q.15, Q.19
20MS010	IRALE SUMEET SURESH	Q.4, Q.8, Q.15, Q.19
20MS011	JADHAV SHANTANU SANJAY	Q.2, Q.6, Q.15, Q.19
20MS012	JADHAV SHASHWAT SHIVAJI	Q.3, Q.8, Q.13, Q.18
20MS013	JAKAPURE SHIVSHANKAR SURESH	Q.4, Q.9, Q.13, Q.19
20MS014	KADAM KRISHNA BALASAHEB	Q.2, Q.7, Q.12, Q.20
21MS317	KADAM SIDDHANT SACHIN	Q.1, Q.8, Q.11, Q.16
21MS318	KALE MANSI ULHAS	Q.5, Q.9, Q.12, Q.19
21MS319	KARANJKAR ADITI RAMCHANDRA	Q.5, Q.6, Q.11, Q.19
20MS015	KHARKAR PUSHPANJAY HEMKANT	Q.5, Q.6, Q.15, Q.16
21MS320	KHATIB AFRID FIROJ	Q.3, Q.7, Q.12, Q.17
21MS321	KSHIRSAGAR SHARVARI MADHUKAR	Q.3, Q.10, Q.15, Q.19
20MS016	KULKARNI ABHISHEK PRASHANT	Q.4, Q.10, Q.15, Q.18
20MS017	LATE PRATHAMESH GIRISH	Q.2, Q.6, Q.14, Q.19
21MS322	LIMKAR SHAUNAK PRASHAANT	Q.3, Q.6, Q.12, Q.16
21MS323	LONARI ROHIT SHANKAR	Q.5, Q.10, Q.12, Q.19
21MS324	MAGARE OM SHIRISH	Q.4, Q.7, Q.14, Q.19
21MS325	MALEKAR SARVESH DEEPAK	Q.1, Q.10, Q.12, Q.16
20MS018	MANDALE ADITYA UMESH	Q.3, Q.8, Q.15, Q.19
21MS326	MANE MANASI NARENDRA	Q.5, Q.8, Q.13, Q.19
20MS019	MHASKE CHAITANYA MILIND	Q.5, Q.7, Q.15, Q.20
21MS327	MUJAWAR MAHAMMADSAIF JAKIRHUSEN	Q.3, Q.8, Q.15, Q.16
21MS328	PALANGE ATHARVA PRADEEP	Q.1, Q.10, Q.11, Q.16
21MS329	PALIWAL SHEETAL SACHIN	Q.2, Q.6, Q.12, Q.19
20MS020	PALVE VEDANT CHANDRAKANT	Q.4, Q.8, Q.11, Q.17
21MS330	PANCHAL MAROTI DNYANOBA	Q.3, Q.7, Q.13, Q.20
20MS021	PATEL YASH JAYANT	Q.1, Q.10, Q.13, Q.16
21MS331	PATIL ADITYA AJAY	Q.1, Q.8, Q.13, Q.18
21MS332	PATIL KANISHK SHARAD	Q.5, Q.7, Q.14, Q.19
20MS022	PATIL PARTH DINKARRAO	Q.3, Q.6, Q.11, Q.16
21MS333	PATIL PRAGATI UDAY	Q.5, Q.9, Q.12, Q.20
21MS334	PATIL RAJ KIRAN	Q.4, Q.7, Q.14, Q.18
20MS023	PATIL SIDDHESH MAHESH	Q.2, Q.7, Q.11, Q.18
20MS024	PATIL YASH DIPAK	Q.5, Q.6, Q.15, Q.16
21MS335	[illegible]	[illegible]

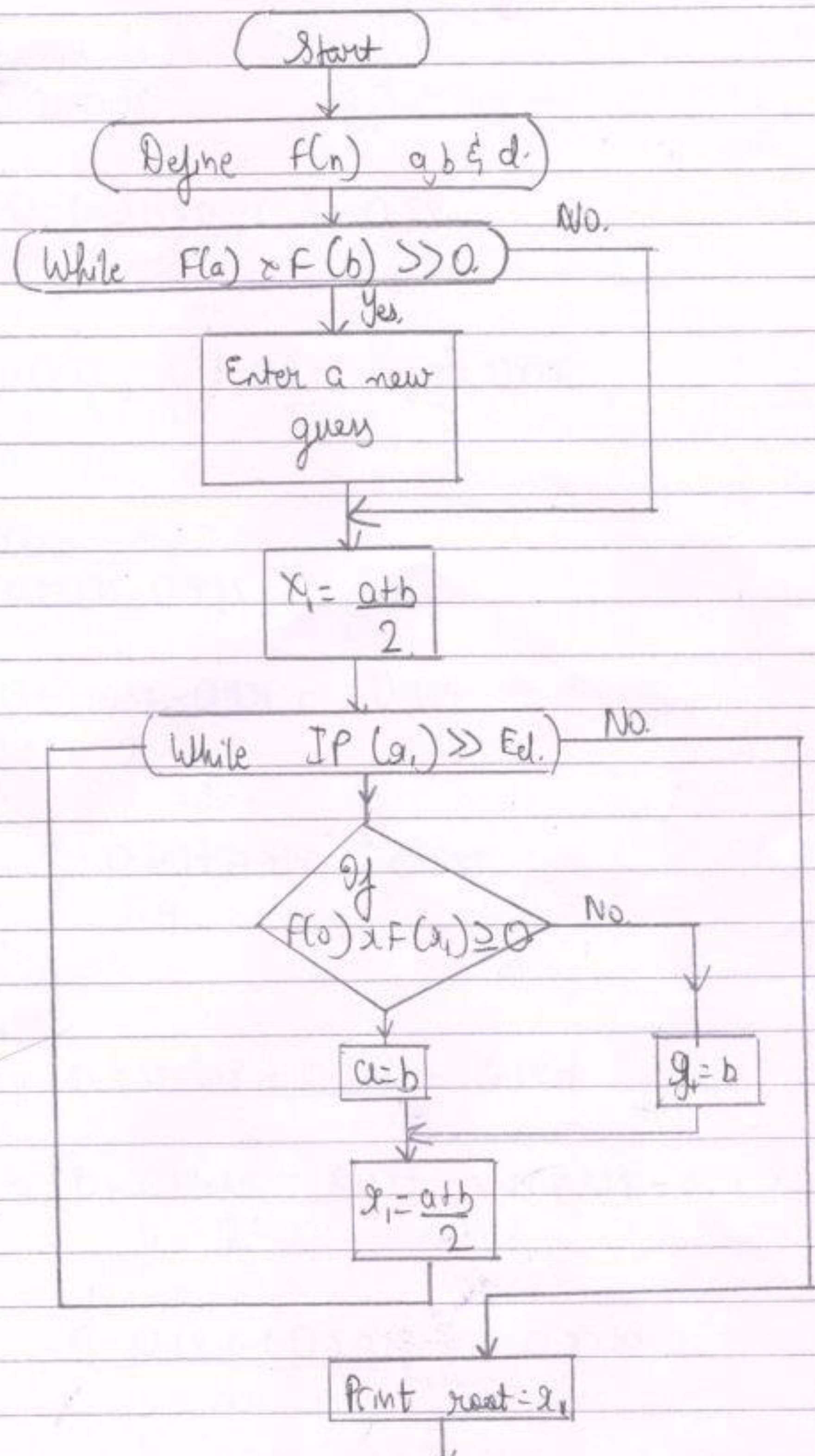
Roll No	Name of the Student	Questions to be attempted
20MS025	PIMPLE MALHAR AJIT	Q.3, Q.10, Q.15, Q.19
21MS336	POMAN PRACHIT PRAVIN	Q.4, Q.10, Q.15, Q.18
21MS337	RANE VISHAL PRAKASH	Q.2, Q.6, Q.14, Q.19
21MS338	SABALE PRAHLAD GAUTAM	Q.3, Q.6, Q.12, Q.16
21MS339	SHINDE SANDHYA DHARMRAJ	Q.5, Q.10, Q.12, Q.19
20MS026	SHINDE YOGADA SANTOSH	Q.4, Q.7, Q.14, Q.19
20MS027	SHIRODKAR ATHARWA SUHAS	Q.1, Q.10, Q.12, Q.16
21MS340	SONAWANE GANESH NIMBA	Q.4, Q.10, Q.13, Q.18
20MS028	SONAWANI PARTH SANJAY	Q.3, Q.9, Q.13, Q.17
21MS341	SONDKAR SHWETA AMOL	Q.2, Q.8, Q.11, Q.18
21MS342	SUTAR OMKAR BHARAT	Q.5, Q.10, Q.11, Q.18
21MS343	TAKLE ANUJ BALASAHEB	Q.4, Q.6, Q.15, Q.19
21MS344	TILEKAR CHETAN NANDKUMAR	Q.3, Q.6, Q.12, Q.16
20MS029	URKUDE NIRANJAN JITENDRA	Q.5, Q.10, Q.12, Q.19
20MS030	UTTEKAR ARYESH DHIRAJ	Q.4, Q.7, Q.14, Q.19
21MS345	WAGHMARE SHUBHAM SANDIP	Q.1, Q.10, Q.12, Q.16
20MS031	WELDE PARTH JAGDISH	Q.4, Q.10, Q.13, Q.18
20MS032	YEVATEKAR YASH MUKUND	Q.3, Q.9, Q.13, Q.17

DSM

Assignment No-1

Q Flow chart for Bisection method [18, 20].

Ans)



$x^{(1)}=0, \quad y^{(1)}=0, \quad z^{(1)}=0.75.$

2nd iteration

$$x^2 = \frac{0-0-0.75}{3} = -0.25.$$

$$y^3 = \frac{0-(-0.25)-0.75}{2} = -0.25.$$

$z^2 = -0.25, \quad y^2 = -0.25, \quad z^2 = 0.875.$

3rd iteration

$$x^3 = \frac{0+0.25-0.875}{3} = -0.208$$

$$y^3 = \frac{0+0.208-0.875}{2} = -0.334.$$

$$z^3 = \frac{3+0.208+0.334}{4} = 0.885.$$

4th iteration

$$x^4 = \frac{0+0.208+0.334}{3} = 0.1806$$

$$y^4 = \frac{0-0.1806-0.885}{2} = -0.5328$$

$$z^4 = \frac{3-0.1806+0.5328}{4} = 0.8380$$

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Date

Q-3) We use Euler's method with $h = 0.5$ to solve initial value problem to interval $x = 0$ to 2 $\frac{dy}{dx} = yx^2 - 1.1y$ where $y(0) = 1$.

Ans-3) $n = \frac{x_g - x_0}{h} = \frac{2-0}{0.5} = 4$

Iteration $x_0 = 0$, $y_0 = 1$, $y_1 = 2$ at $x = 0.5$.

$$f(x_0, y_0) = y_0 x_0^2 - 1.1 y_0$$
$$= 1 \times 0^2 - 1.1 \times 1$$
$$= -1.1$$

$$y_1 = y_0 + h\, f(x_0, y_0)$$
$$= 1 + [0.5(-1.1)]$$
$$= 0.45$$

Iteration- $y_2 = ?$ at $x_2 = 1$.

$$f(x_1, y_1) = y_1 x_1^2 - 1.1 y_1$$
$$= 0.45 \times (0.5^2) - (1.1) \times 0.45$$
$$= -0.3825$$

$$y_2 = y_1 + h f(x_1, y_1)$$
$$= 0.45 + 0.5 \times -0.3825$$
$$= 0.2875$$

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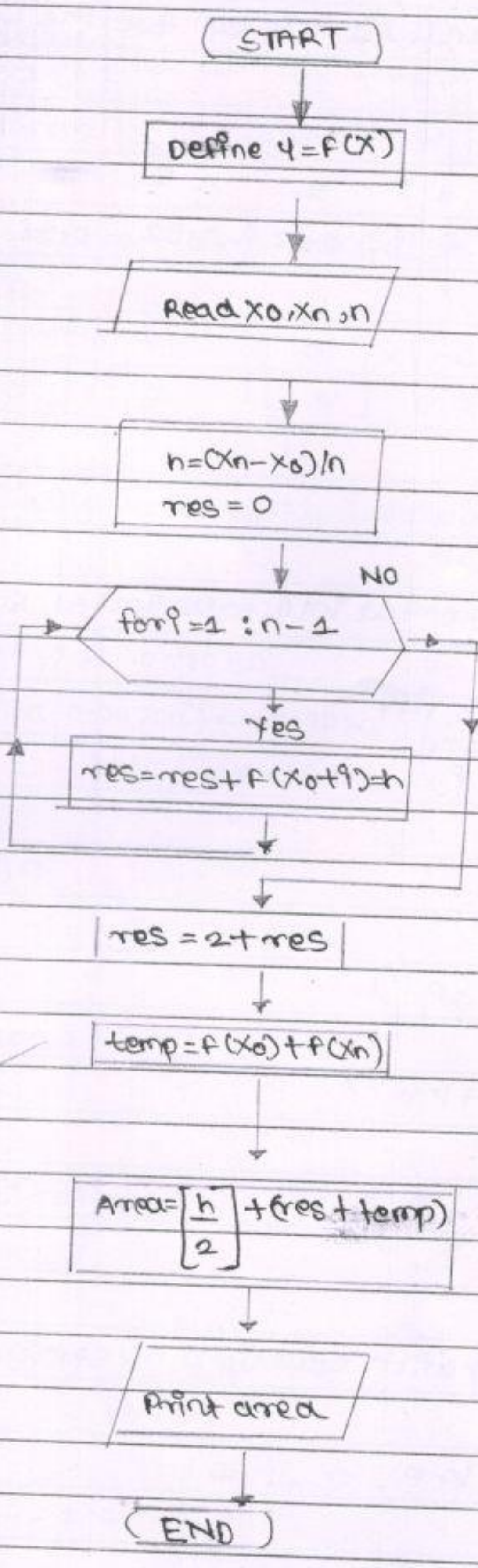
Iteration-3:- y_3 = at $x_3 = 1.5$, $y_2 = 0.287$ y_1 =

$f(x_2, y_2) = y_2 \times 2^2 - 1.1 y_2$
$= 0.25875 \times 1^2 - 1.1 \times 0.2875$
$= y_2 + h\, f[x_2, y_2]$
$= 0.2875 + 0.5 \times [-0.025875]$
$= 0.2458$

Iteration-4 :- at y_4 : $x_3 = 1.5$, $y_3 = 0.245$.
$f(x_3, y_3) = y_3\, x_3^2 = 1.1 y_3$
$= 0.2458125 \times [1.5]^2 - 1.1 \times 0.2458125$
$= 0.282684375$.

$y_4 = y_3 + h\, f(x_3, y_3)$
$= 0.24581 + 0.5 \times [0.278084]$
$= 0.387154$

ASSIGNMENT: 2



Q:> The Pressure (P) & volume (V) of a gas are related by the equa $pV^{\gamma} = k$, γ & k are constants, fit this eqn for the following set observations:-

P(kg/m²)	0.5	1	1.5	2	2.5	3
V(litres)	1.62	1	0.75	0.62	0.52	0.46

A:> GIVEN DATA :-

$pV^{\gamma} = K, \; n = 6$

FIND: Constant γ & K

STEP:- Convert the polynomial into equations of straight lines.

$$pV^{\gamma} = K \quad \text{or} \quad V = \left(\frac{K}{P}\right)^{1/\gamma}$$

Taking ln on both sides,

$$\ln V = \ln(K^{1/\gamma} \cdot p^{-1/\gamma})$$

$$\therefore \quad \ln V = \ln K^{1/\gamma} + \ln p^{-1/\gamma}$$

$$\therefore \quad \ln V = \frac{1}{\gamma} \ln K - \frac{1}{\gamma} \ln p \quad \cdots \text{(i)}$$

Equating equation (i) with equations of straight line,

$$\ln V = -\frac{1}{\gamma} \ln P + \frac{1}{\gamma} \ln k.$$

write equation in matrix from,

$$\begin{bmatrix} 2.4202 & 6 \\ 3.1712 & 2.4202 \end{bmatrix} \begin{bmatrix} a' \\ b' \end{bmatrix} = \begin{bmatrix} -1.7136 \\ -2.2342 \end{bmatrix}$$

Slove the above matrix by Gauss elimination Methods,

$$\begin{bmatrix} 1 & 2.4791 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} a' \\ b' \end{bmatrix} = \begin{bmatrix} -0.7080 \\ -0.00202 \end{bmatrix}$$

Sloving Simultaneous eqn by backward Substitution methods,

$$b' = -0.00202$$

$$a' + 2.4791\, b' = -0.7080$$

$$a' + 2.4791 \times (-0.00202) = -0.7080$$

$$a' = 0.7029$$

from eqn (ii)

$$a' = \frac{1}{Y}$$

$$\therefore \quad -0.7029 = \frac{-1}{Y}$$

$$b' = \frac{1}{Y} \ln K$$

$$-0.00202 = \frac{1}{1.4226} \ln K$$

$$\therefore K = 1.0028$$

$$\downarrow \quad \downarrow \quad \downarrow \quad \downarrow$$
$$Y \quad a' \quad X \quad b'$$

where, $Y = \ln v$, $X = \ln p$

$$a' = -\frac{1}{\gamma}, \quad b' = \frac{1}{\gamma} \ln K.$$

STEP 2 : Make a table for given values of P & V.

P	V	$x = \ln p$	$Y = \ln V$	XY	X^2
0.5	1.62	−0.6931	0.4824	−0.3343	0.4803
1	1	0	0	0	0
1.5	0.75	0.4054	−0.2876	−0.1165	0.1643
2	0.62	0.6931	−0.4780	−0.3313	0.4803
2.5	0.52	0.9162	−0.6539	−0.5991	0.8394
3	0.46	1.0986	−0.7765	−0.8530	1.2069
		$\Sigma X = 2.402$	$\Sigma Y = -1.7136$	$\Sigma XY = -2.324$	$\Sigma X^2 = 3.1712$

STEP 3 :- calculate the value of constant γ & K.

for straight line,

$$a' \Sigma X + nb' = \Sigma Y$$
$$a' \Sigma X^2 + b' \Sigma X = \Sigma XY$$

Substituting corresponding values in equations

$$2.4202 a' + 6b' = -1.7136$$
$$3.1712 a' + 2.4202 b' = 2.3242$$

SE/SY 2022-23 Term-1 Assignment

AISSMS
COLLEGE OF ENGINEERING

ज्ञानम् सकलजनहिताय

Approved by AICTE, New Delhi, Recognized by Govt. of Maharashtra,
Affiliated to Savitribai Phule Pune University and recognized 2(f) and 12(B) by UGC
(Id.No. PU / PN/ Engg. / 093 (1992)
(Accredited by NAAC with grade A+)

Department of Mechanical Engineering

Academic Year: 2022-23 **Semester:** I

Class: SE (Mech)/Mech SW **Div:** B

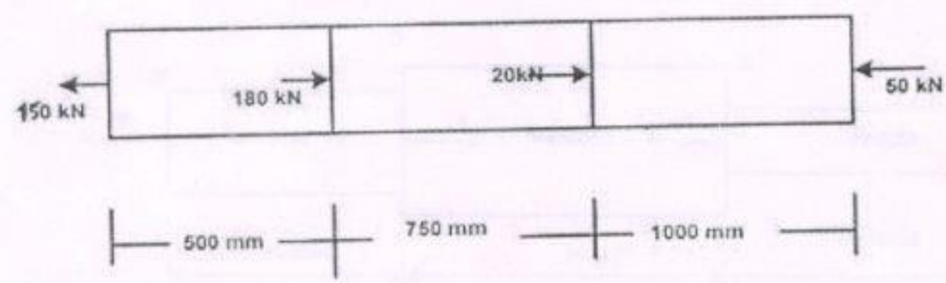
Assignment: I **Subject:** Solid Mechanics **Maximum marks: 15**

[CO1]. DEFINE various types of stresses and strain developed on determinate and indeterminate members.

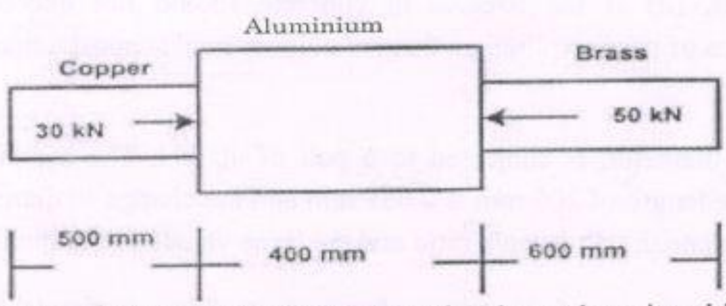
[CO2]. DRAW Shear force and bending moment diagram for various types of transverse loading and support.

[CO3]. COMPUTE the slope & deflection, bending stresses and shear stresses on a beam.

1 A bar made of Brass and having cross-sectional area 1000 mm² is subjected to axial forces as shown in figure. Find the total change in length of the bar. Take $E = 1.05 \times 10^5$ N/mm². [CO1] [5]



2 For the composite section fixed at both ends as shown in, find: (i) Reactions at both ends (ii) Stresses in each part (iii) Construct axial force diagram. Assume: for Copper, A_{Cu}= 4000 mm², E_{Cu}= 120 kN/mm², for Aluminium, A_{Al}= 6000 mm², E_{Al}= 70 kN/mm² and for Brass, A_{Br}= 5500 mm², E_{Br}= 100 kN/mm². [CO1] [5]



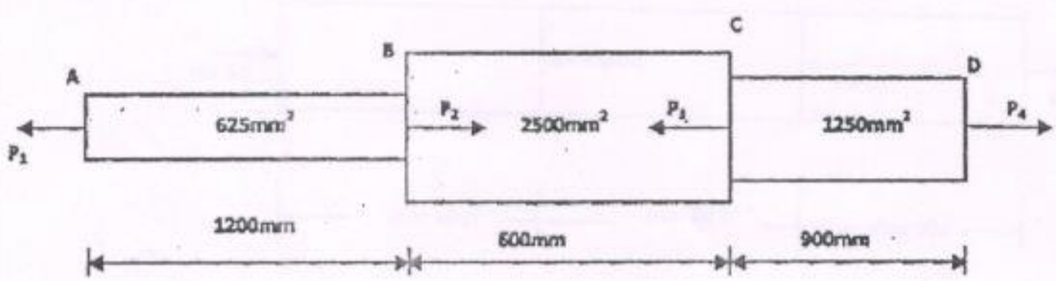
3 A cylindrical piece of steel 80 mm diameter and 120 mm long is subjected to an axial compressive force 70 kN. Calculate the change in volume of the piece if Bulk modulus is 1.7×10^5 N/mm² and Poisson's ratio is 0.3. [CO1] [5]

4 A steel rod of 30 mm diameter is placed centrally inside a hollow Bronze tube of external diameter 40 mm. The steel rod is tightly fitted with bronze tube so that entire section acts as composite section subjected to compressive force of 30 kN. Determine stresses in rod and tube when temperature falls by 30°C. Assume: $E_{St} = 2 \times 10^5 N/mm^2$: $E_{Br} = 8 \times 10^4 N/mm^2$: $\alpha_{St} = 12 \times 10^{-6} /°C$: $\alpha_{Br} = 18 \times 10^{-6} /°C$. [CO1] [5]

5 A compound bar ABC 1.5 m long is made up of two parts 'AB' of aluminium and 'BC' of steel having cross-sectional area of steel half of the aluminum bar. The rod is fixed at 'A' and subjected to an axial pull of 200 kN at end 'C'. If the elongations of both materials is equal, find the lengths of each part assuming $E_{St} = 200$ GPa and E_{Al} as one third of steel. [CO1] [5]

6 A steel bar 2 m long is at 30°C. The temperature of the rod is increased by 150°C. Find: (i) free expansion of the rod (ii) temperature stress produced if expansion is prevented and nature of the stress (iii) stress produced if 2.5 mm expansion is permitted. Assume supports are unyielding? Take E = 210 GPa, and $\alpha = 12 \times 10–6$ /°C. Assume bar diameter = 16 mm. [CO1] [5]

7 A member ABCD is subjected to point loads P1, P2, P3 and P4 as shown in the figure. Calculate the force P2 necessary for equilibrium if P 1 = 45 kN, P3 = 450 kN and P 4 = 130 kN. Determine the total elongation of the member, assuming Modulus of Elasticity to be $E = 2.1 \times 10^5 N/mm^2$. [CO1] [5]

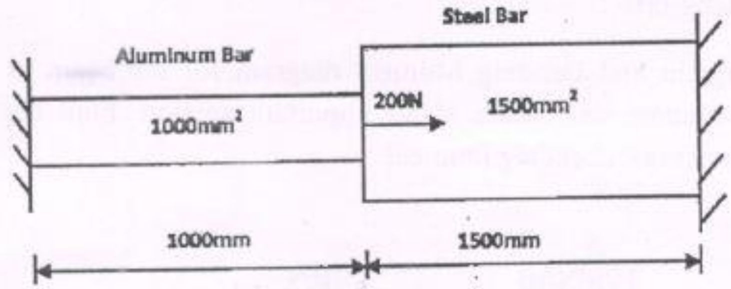


8 A load of 300 kN is applied on a short concrete column 250 mm × 250 mm. The column is reinforced by steel bars of total area 5600 mm². If the Modulus of Elasticity for steel is 15 times to that of concrete, find :(i) The stresses in concrete and steel. (ii) If the stresses in concrete should not exceed 4 N/mm²,find the area of steel required so that the column may support a load of 600 kN. [CO1] [5]

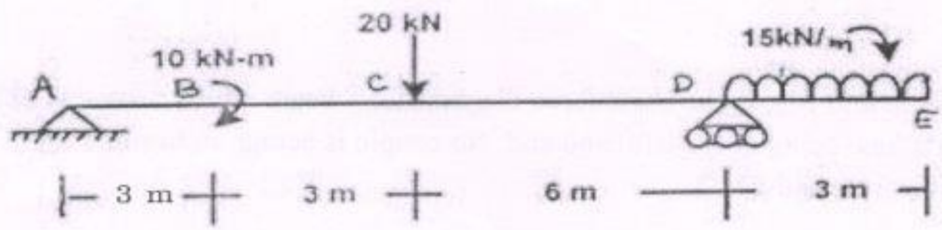
9 A bar of 25 mm diameter, is subjected to a pull of 40 kN. The measured extension on gauge length of 200 mm is 0.085 mm and the change in diameter is 0.003 mm. Calculate the Poisson's ratio and the three values of the moduli. [CO1] [5]

10 A composite bar made up of Aluminum bar and steel bar is firmly held between two unyielding supports as shown in Fig. 2.1. An axial load of 200 kN is applied at B at 20°C. Find the stresses in each material, when the [CO1] [5]

temperature is 70°C. Take E for Aluminum and Steel as 0.7×10^5 N/mm² and 2×10^5 N/mm² respectively and coefficient of expansions for Aluminum and steel as 24×10^{-6} per °C and 12×10^{-6} per °C respectively.

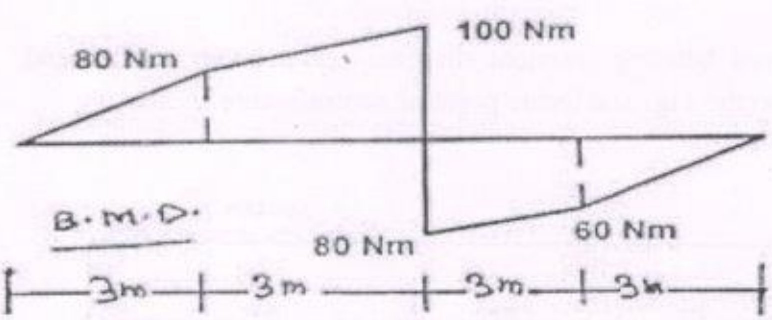


11 Construct shear force and bending moment diagrams for a beam loaded as shown in and locate point of contra flexure: [CO2] [5]

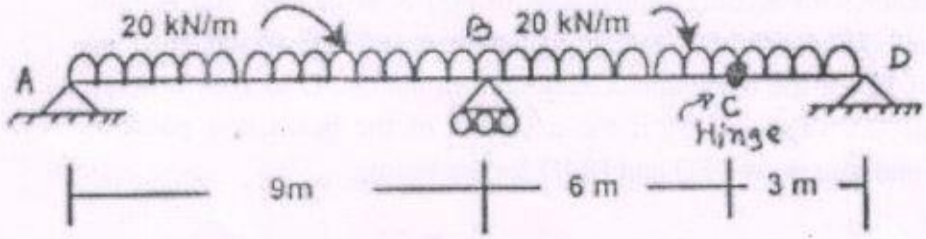


12 The beam with overhangs on both sides is having total length of 10 m. It carries a UDL of 180 N/m all over the span in addition to a point load of 200 N at the left end. The beam is supported at two points 7 m apart so chosen that each support carries half the total load. Draw S.F.D. and B.M.D. [CO2] [5]

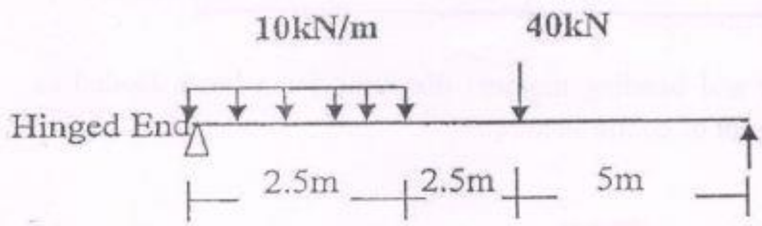
13 The bending moment diagram of a beam of span 12 m is as shown in figure. Construct shear force diagram and load diagram. [CO2] [5]



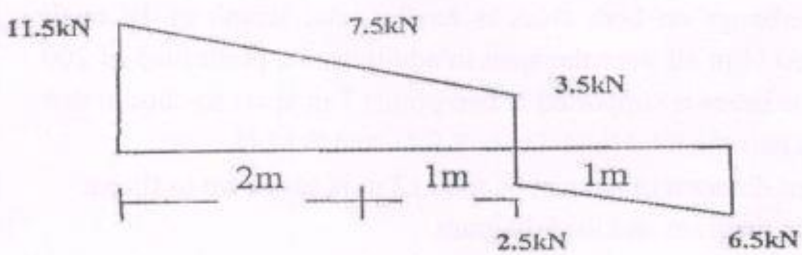
14 Draw S.F.D. and B.M.D. for the beam ABCD loaded as shown in figure. [CO2] [5]



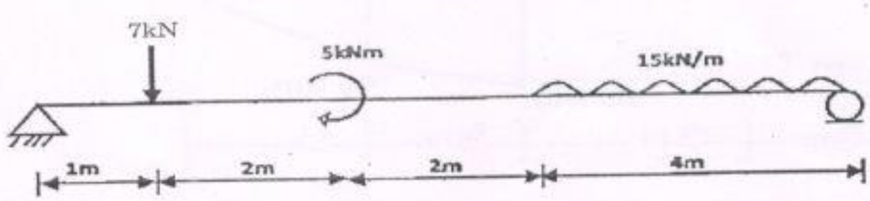
15	An overhanging beam ABC with end 'A' hinged and simply supported at 'B' is loaded with udl of intensity 30 kN/m acting on 2 m length from 'A' and a point load of 10 kN acting at free end 'C'. Draw B.M.D. and S.F.D. Assume length(AB) =4 m and length(BC) = 1 m.	[CO2]	[5]
16	Draw Shear force diagram and Bending Moment diagram for the beam as shown in. Indicate the numerical values at all important section. Find the position and value of maximum bending moment.	[CO2]	[5]



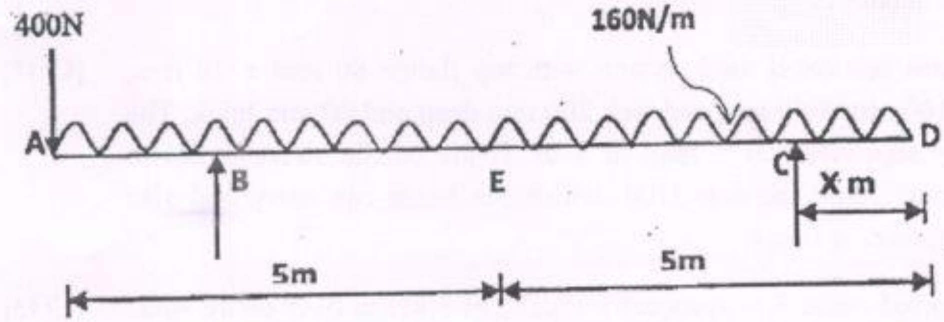
17	The diagram shown in Fig. is the shear force diagram for a beam which rests on two supports, one being at the left hand end. No couple is acting on beam. Draw loading diagram and BMD.	[CO2]	[5]



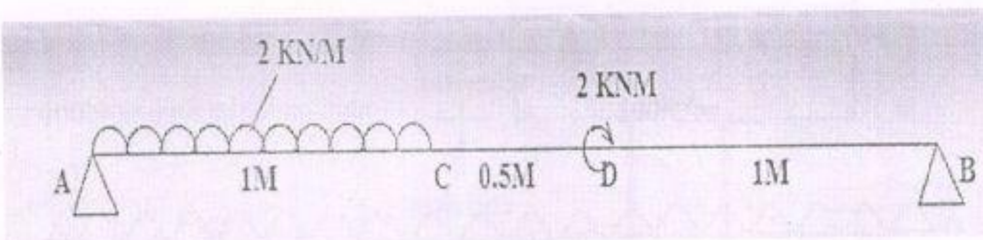
18	Draw shear force and bending moment diagram for a beam loaded and supported as shown in the Fig. and locate point of contraflexure.	[CO2]	[5]



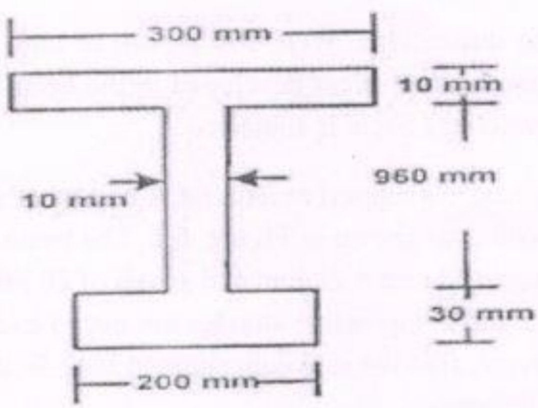
19	Q9. A horizontal beam AD, 10 m long carries a uniformly distributed load of 160 N/m together with a concentrated load of 400 N at the left end A. The beam is supported at a point B which is 1 m from A and at C which is on the right hand half ED of the beam and X meters from the end D as shown in the Fig. Determine the value of X', if the midpoint of the beam is a point of contraflexure and also draw SFD and BMD for the beam.	[CO2]	[5]



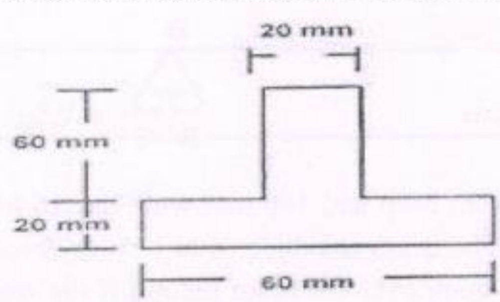
20 A simply supported bean subjected to a uniformly distributed load and a clock wise couple is shown in figure. Draw the shear force and bending moment diagram. [CO2] [5]



21 A beam of span 4 m carries UDL of 15 kN/m. The cross-section of the beam is as shown in Figure. Find maximum stress induced. Draw bending stress diagram. [CO3] [5]



22 The cross-section of the beam is as shown in Figure. If this cross-section is subjected to shear force of 15 kN, draw shear stress distribution diagram and find ratio of maximum shear stress to average shear stress. [CO3] [5]

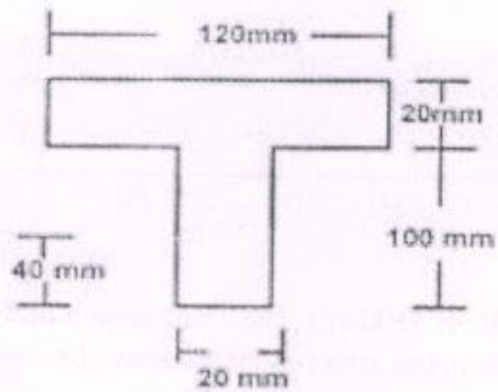


23 Construct the shear stress distribution diagrams showing salient points: (i) Rectangular section (ii) Symmetrical I-section (iii) Triangular section (iv) [CO3] [5]

Hollow circular section.

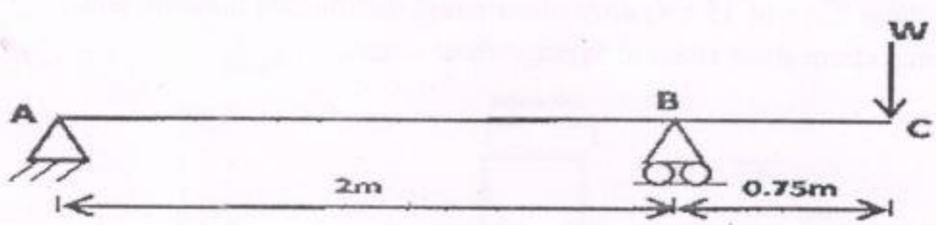
24 A cast iron beam section is an I section with top flange 80 mm × 20 mm, bottom flange 160 mm × 40 mm and web 200 mm deep and 20 mm thick. The beam is simply supported on a span of 5 m. If the tensile stress is not to exceed 20 N/mm^2, find the safe UDL which the beam can carry and also maximum compressive stress. [CO3] [5]

25 A simply supported beam 8 m span carries UDL of 3 kN/m over entire span. Find the maximum bending stress induced if the cross-section is as shown in Figure. [CO3] [5]

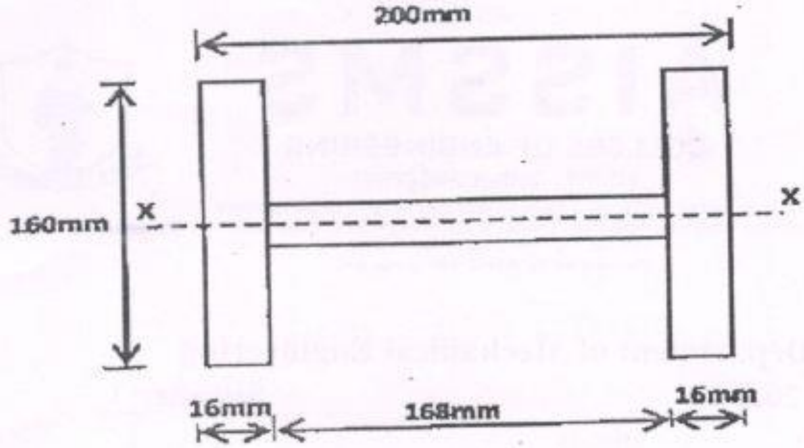


26 An I section has the following dimensions. Web: 300 mm × 10 mm, Flange 150 mm × 20 mm. The maximum shear stress developed in the beam is 14.8 MPa. Find the shear force to which the beam is subjected. [CO3] [5]

27 A cast iron beam 2.75 m long has one support at left end A and other support at B which is at 0.75 m from end C as shown in Figure. 5.1. The beam is of T section consisting of a top flange 150 mm × 20 mm and a web of 20 mm wide and 80 mm deep. If the tensile and compressive stresses are not to exceed 40 N/mm^2 and 70 N/mm^2 respectively, find the safe concentrated load W that can be applied at the right end of the beam. [CO3] [5]



28 A steel beam of I section, 200 mm deep and 160 mm wide has 16 mm thick flanges and 10 mm thick web. The beam is subjected to a shear force of 200 kN. Determine the stress distribution over the beam section if the web of the beam is kept horizontal as shown in Figure. [CO3] [5]



29 Q9. A steel beam of I section, 500 mm deep and 190 mm wide has 25mm thick flanges and 15mm thick web. The beam is subjected to a shear force of 400 kN. Calculate the maximum intensity of shear stress in the section assuming the moment of inertia to be 6.45×10^8 mm^4. Also calculate the total shear force carried by the web and sketch the shear stress distribution across the section. [CO3] [5]

30 A simply supported beam of span 4 m uses a T section with flange 100 × 10 mm deep and web 150 × 10 mm wide. The section is symmetric about vertical axis. The beam carries two point loads 5 kN each placed 1 m from ends point. Find out maximum shear stress in the beam. [CO3] [5]

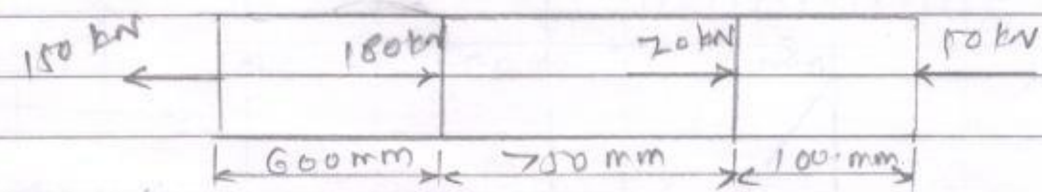
AY- 2022-23, Term I, Solid Mechanics Assignment.

Name:- Kedar Hari pore,
Roll no:- 17S-D2207

15

Assignment no 1.

1. A bar made of brass having L/S 1500 mm³ is subjected to axial forces shown in fig. Find total change in length. take $E = 1.05 \times 10^5 \, N/mm^2$.



$$\delta l = \left(\frac{PL}{AE}\right)_1 + \left(\frac{PL}{AE}\right)_2 + \left(\frac{PL}{AE}\right)_3$$

$$\delta l = \frac{1}{1500 \times 1.05 \times 10^5} \times (Pl_1 + Pl_2 + Pl_3)$$

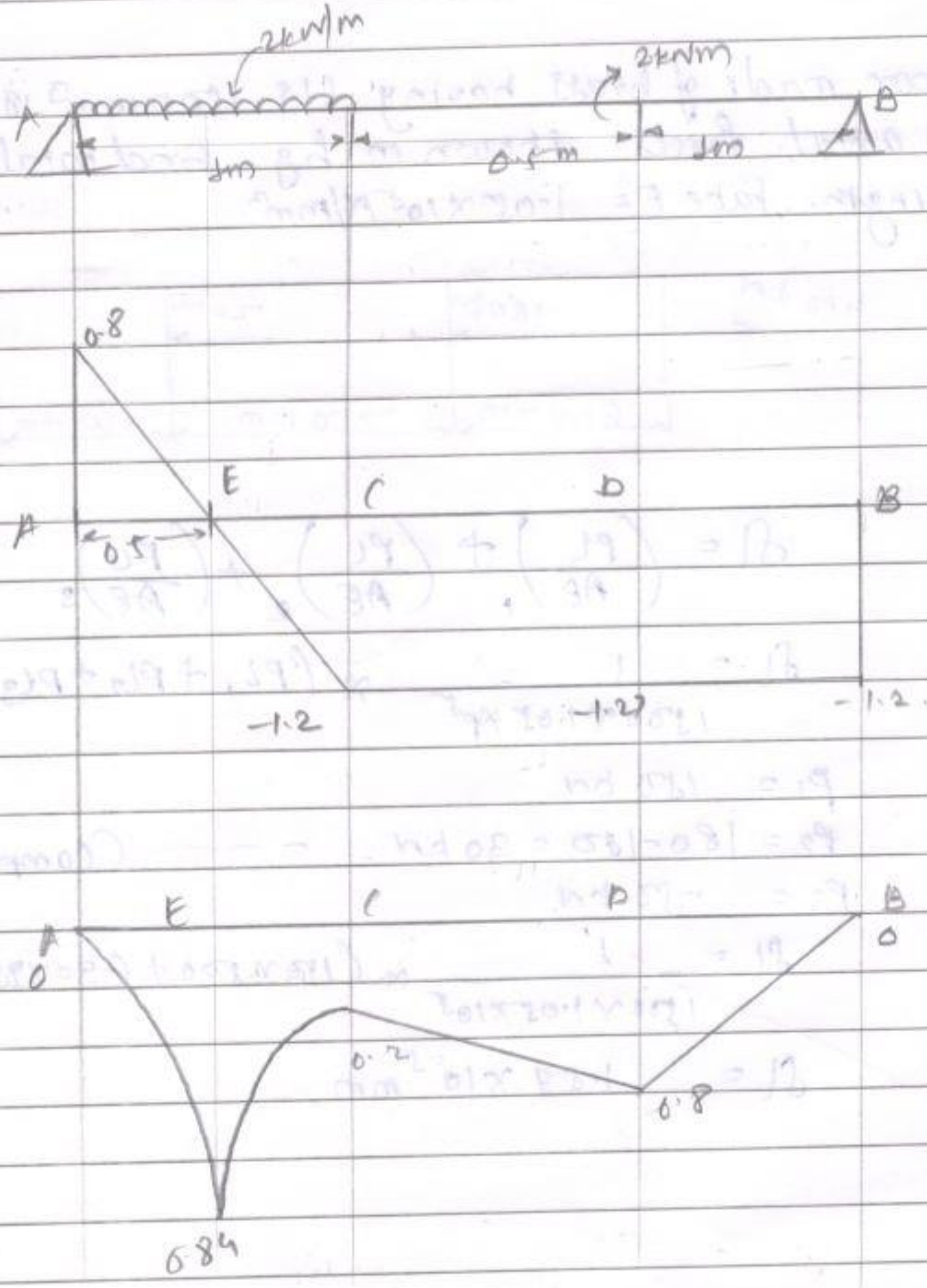
$P_1 = 150$ kN

$P_2 = 180 - 150 = 30$ kN. ——— (compression)

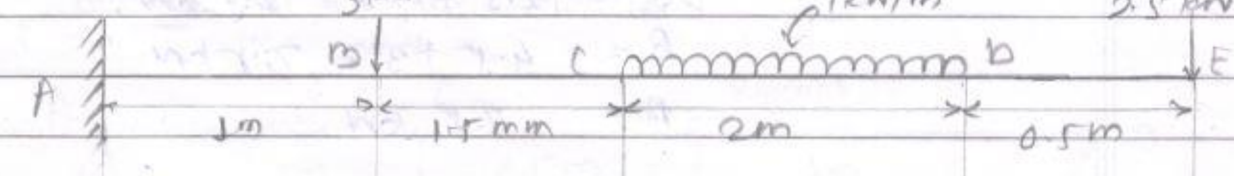
$P_3 = -50$ kN

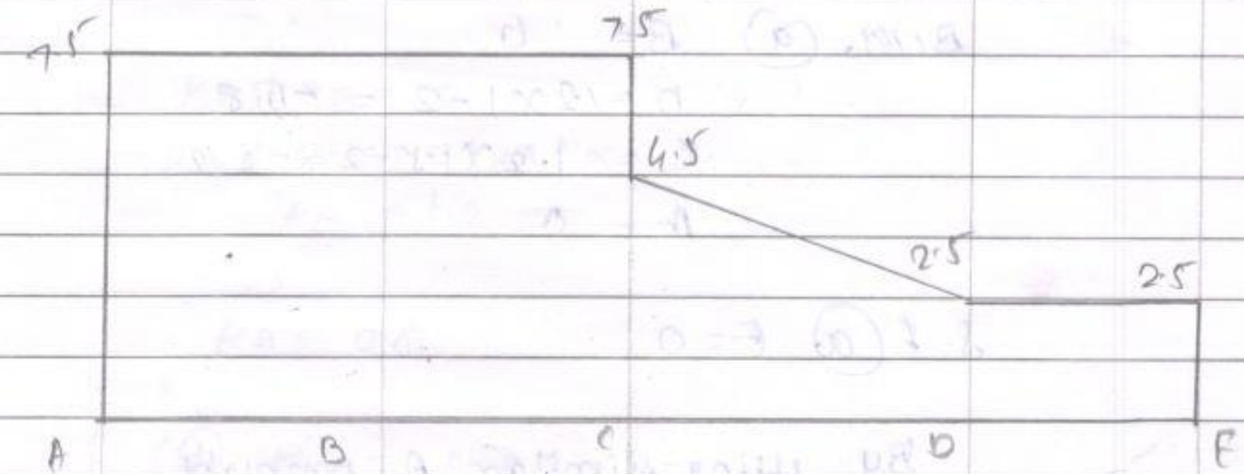
$$\delta l = \frac{1}{1500 \times 1.05 \times 10^5} \times (150 \times 600 + (-30 \times 750)) + (-50 \times 1000))$$

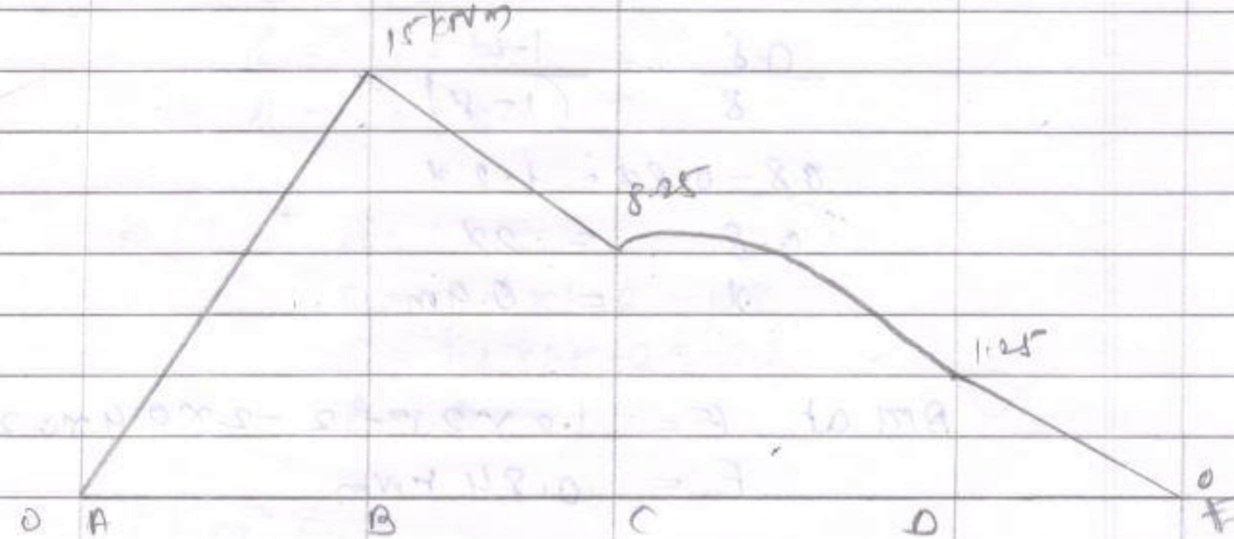
$$\delta l = 1.59 \times 10^{-5} \, mm,$$


2kN/m
2kNm
A
B
1m
0.5m
1m
0.8
E
C
D
B
A
0.5
-1.2
-1.2
-1.2
E
C
D
B
A
0
0
0.2
0.8
0.84

2. Construct shear force diagram & B.M.D for a beam loaded as shown in total point of contra-flexure.







→ S.F. @ $E = 2.5$ kN

$D = 2.5 = 5$ kN.

$C = 2.5 + 1\times 2 = 4.5$ kN.

$B = 4.5 + 3 = 7.5$ kN

$A = 7.5$ kN.

B.M. @ $B = 0$

$D = 12 \times 1 - 2 = -0.8$

$C = 1.2 \times 1.5 - 2 = -0.2$.

$A = 0$.

S.F @ $E = 0$

By using similar A property

$$\frac{0.8}{x} = \frac{1.2}{(1-x)}$$

$0.8 - 0.8x = 1.2x$

$0.8 = 2x$

$x = 0.4$m

BM at $E = 1.2 \times 2.5 - 2 - 2 \times 0.4 \times 0.2$

$E = 0.84$ kNm

B.M. at @ $E = 0$ kNm.

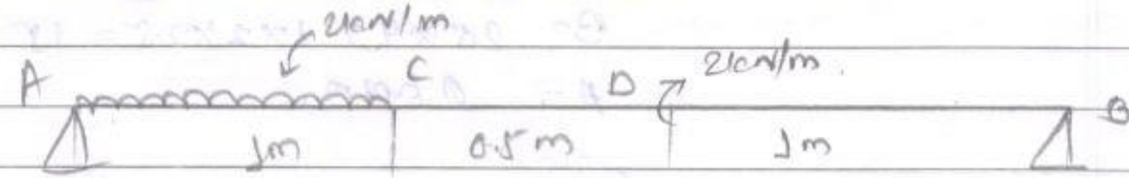
$D = 2.5 \times 0.5 = 1.25$ kNm

$C = 2.5 \times 2.5 + 1 \times 2 \times 2/2 = 8.25$ kNm

$B = 2.5 \times 4 + 1 \times 2 \times 2.5 = 15$ kNm

$A = 0$ kNm.

3. A simply supported beam subjected to a uniformly distributed load and a clockwise couple is shown in Fig. draw neat SFD & BMD.



RA + RB = 2.

- RB × 2.5 - 2 + 2 × 1 × 0.5

RB = 1.2.

RA = 0.8.

S.F. @ B = -1.2 kN

D = -1.2 kN

C = -1.2 kN

A = 0.8 kN.

B.M at B = 0.

D = 1.2 × 1 - 2 = -0.8

C = 1.2 × 1.5 - 2 = -0.2

A = 0.

S.F. @ E = 0

By using similar Δ property

$\frac{0.8}{x} = \frac{1.2}{(1-x)}$

$0.8 - 0.8x = 1.2x$

$0.8 = 2x$

$x = 0.4$ m.

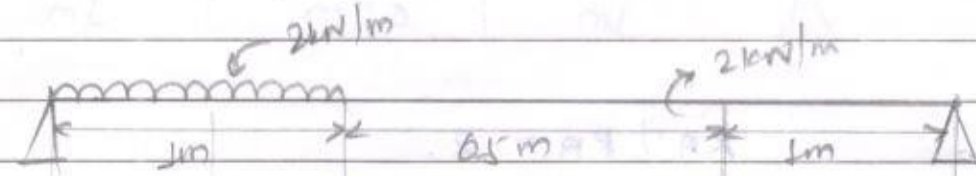
B.M at E = 0. 1kNm

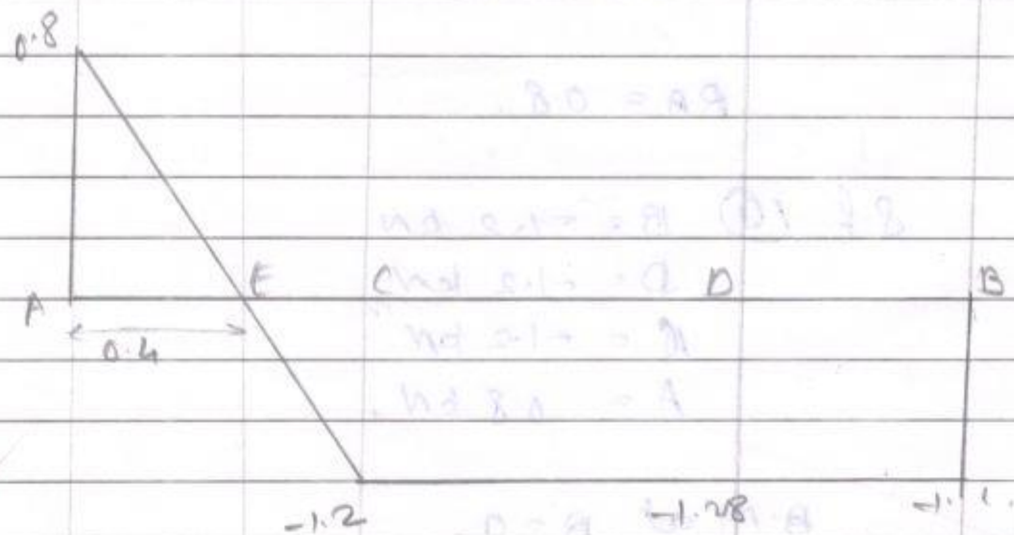
D = 2.5 x 0.5 = 1.25 kNm

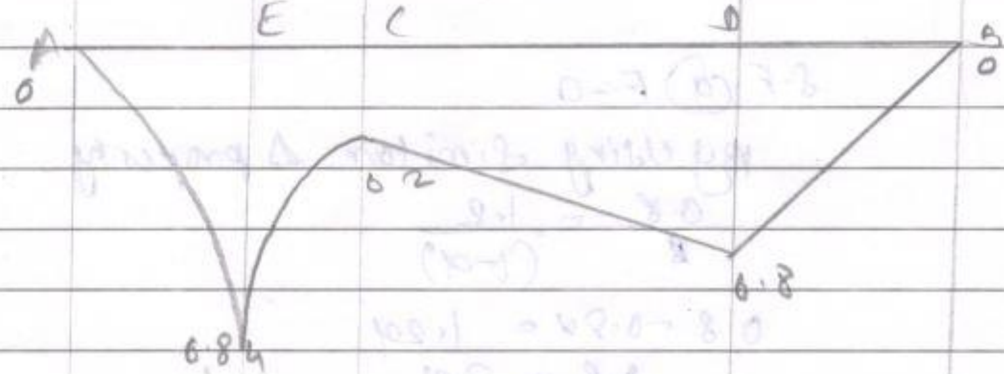
C = 2.5 x 2.5 + 1 x 2 x 2/2 = 8.25 kNm

B = 2.5 x 4 + 1 x 2 x 2.5 = 15 kNm.

A = 0 kNm.







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DEPARTMENT OF PRODUCTION ENGINEERING

Assignment I

Result Analysis

Class: S. E. Prod SW

Subject: Manufacturing Process-II

Total No of Students As per Roll Call List:

AY: 2022-23

Term II

Sr. No.	Description	Total No. of Students	Percentage (%)
1	Students Appear for Examination	07	63.63%
2	Students Absent for Examination	04	36.37%
3	Students Passed	07	63.63%
4	Students Failed	04	36.37%

Sign of Faculty:

Name of Faculty: S. K. Bidgar

Date:

Mr S K Bidgar
Exam Coordinator

Dr N G Shekapure
HOD

Head of Department
Production Engineering
AISSMS COE, PUNE 1

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DEPARTMENT OF PRODUCTION ENGINEERING

Assignment I Marksheet

Class: S.E. Prod SMQ
Subject : Manufacturing process II

SR. No	ROLL NO.	NAME OF THE STUDENTS	Marks	Remark
1	21PS001	WABLE SARTHAK PRAWIN	A	
2	22PS301	ATIWADKAR PARTH PANDIT	24	
3	22PS302	BHAGAT HARSHADA HARI	18	
4	22PS303	CHOBHE SHRIRAM NAMDEV	A	
5	22PS304	DESHMUKH SHREEJA GANESH	A	
6	22PS305	GADAKH ABHISHEK ASHOKRAO	25	
7	22PS306	HANDE VAISHNAVI GANESH	25	
8	22PS307	KADAM ADITYA UDAY	24	
9	22PS308	KHADKE UMESH BALASAHEB	A	
10	22PS309	NAVSUPE TEJAS POPAT	20	
11	22PS310	WAGH OMKAR SANTOSH	20	
12				
13				
14				
15				
16				
17				
18				
19				
20				

Signature of Examiner

Head of Department

Head of Department
Production Engineering
AISSMS COE, PUNE 1

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DEPARTMENT OF PRODUCTION ENGINEERING

Asg. I ~~Unit Test II~~ Attendance Sheet

Class: S.E. Prod SH2

Subject : Manufacturing Process II

Date:

Time.:

SR. No	ROLL NO.	NAME OF THE STUDENTS	Signature
1	21PS001	WABLE SARTHAK PRAWIN	[signature]
2	22PS301	ATIWADKAR PARTH PANDIT	[signature]
3	22PS302	BHAGAT HARSHADA HARI	Harshada
4	22PS303	CHOBHE SHRIRAM NAMDEV	[signature]
5	22PS304	DESHMUKH SHREEJA GANESH	
6	22PS305	GADAKH ABHISHEK ASHOKRAO	[signature]
7	22PS306	HANDE VAISHNAVI GANESH	Vaishnavi
8	22PS307	KADAM ADITYA UDAY	[signature]
9	22PS308	KHADKE UMESH BALASAHEB	[signature]
10	22PS309	NAVSUPE TEJAS POPAT	Navsupe T.R.
11	22PS310	WAGH OMKAR SANTOSH	[signature]
12			
13			
14			
15			
16			
17			
18			
19			
20			

Signature of Examiner

Head of Department

Head of Department
Production Engineering
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Department of Production Engineering

Assignment I (AY: 2022-23 Term II)

Class: SE Production
Date of Display:

Course: Manufacturing Process-II
Submission Date:

Mention Cognitive Level: Remember, Understand, Apply, Analyze, Evaluate, Create

Qns No	Question	Connected CO	Cognitive Level
Q1	Can you provide an overview of the theory of metal cutting and its significance in machining processes?	*CO1*	Remember
Q2	How does thread rolling work, and what are its key features in producing threaded components?	*CO2*	Understand
Q3	Explain the concept of FMS (Flexible Manufacturing System) and its significance in modern manufacturing?	*CO3*	Understand
Q4	What are the main advantages of using CNC machines and machining centers in manufacturing processes?	*CO3*	Apply

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KENNEDY ROAD, PUNE - 411 001.

Supervisor's Signature

Name: Parth Pandit Atiwadkar Roll No.: 22PS301

Subject: MP-II Division: –

Examination: Assignment I Day & Date:

Question No.	1	2	3	4	5	6	7	8	9	10	Total Marks
Marks	06	06	06	06							24

Examiner Signature

Q.1 Can you provide an overview of the theory of metal cutting and its signification in machine processes?

→

① In metal cutting theory, all operation performed with the wedge-shaped tool when a layer of metal is removed in the form of continuous or discontinuou chip can be conventionally divided into two general cases.

② Theory of Metal cutting has following factors

a) Overview of machining technology
b) Theory of chip formation
c) Material removal rate
d) Feed / Feed rate
e) Depth of cut
f) Cutting speed
g) Type of chip in machining

Q.2 How does thread rolling work, and what are it's key features in production of threaded components?

→

Thread rolling :-

1. Thread rolling is a mechanical process where thread are cold formed when the part is squeezed betw two thread dies on a thread rolling machine.
2. Thread rolling provides for a stroger thread and no loss of material.
3. This process is different from other processes like metal cutting, grinding and chasing because it does not remove any metal to create the desize profile.
4. Instead these hardened steel thread roll moves and mold ductile metal quickly and very precisely into desired thread from.

Q.3 Explain the concept of FMS (Flexible Manufacturing System) and its significance in modern manufacturing

→ ① A flexible manufacturing system is a production method that is designed to easily adpat to change in the type and quantity of product being manufactured.

② Machines and computerized system can be configured to manufacture a variety of parts and handle changing level of production.

③ The main benefit of a FMS is that it make production more efficient.

④ Delay are reduced, as production doesn't have to be shut down to set up to different product.

⑤ Drawbacks include higher up-front costs and the greater time required to design the system specification.

Q.4 What are the main advantage of using CNC machine and machining centre in manufacturing process?

→ The main advantages of CNC :-

① CNC machining services require no extensive skill

② Product can be replicated thousands of time.

③ Less labour is required to operate CNC machinery.

④ CNC Software make your production option versatile.

⑤ CNC machine fits the skills of modern workers

⑥ CNC uses oil base coolant that result in better quality.

0.6