DIGITAL ASSIGNMENT I

STRENGHT OF MATERIALS – MEE 2002

LAST DATE OF SUBMISSION – 06/10/2018

Run the given program in Matlab with the loading and span length given for you in the following table.

EXPECTED OUTCOME

DA 1 PDF SUBMISSION SHOULD HAVE

- ✓ PROBLEM DEFINITION IN SKETCH (Avoid manual drawing)
- ✓ MATLAB PROGRAM
- ✓ FULL LIST OF COMMAND PROMPT USED TO RUN THE PROGRAMM
- ✓ PLOT OF SHEAR FORCE DIAGRAM AND BENDING MOMENT DIAGRAM
- ✓ MAXIMUM SHEAR FORCE AND BENDING MOMENT
- ✓ YOUR ARE FREE TO GIVE ADDITIONAL ENCHANCEMENT TO GIVEN PROGRAMM WITH THE LOGIC BEHIND IT

NOTE

- IN THE LIST, FOR LOAD COLUMN TYPE 1 REPRESENT POINT LOAD, TYPE 2 REPRESENT UNIFORM DISTRIBUTED LOAD
- IN THE GIVEN DATA, CORRESPONDING TO YOUR REGISTRATION NUMBER CONSIDER INPUT WHICHEVER IS APPLICABLE TO LAOD TYPE
- MATLAB PROGRAMM IS GIVEN AT THE END

Sl Num	Programme	Register No	LOAD TYPE	POINT LOAD (N)	DISTANCE OF LOAD FROM LEFT SUPPORT (m)	UDL LOAD RATE (N/m)	LENGTH OF THE BEAM (m)
1	BME	13BME0528	2	12	8	18	21
2	BME	14BME0133	2	12	7	21	24
3	BME	14BME0525	1	16	5	24	22
4	BME	14BME0876	2	15	5	20	24
5	BME	15BME0394	2	17	6	23	23
6	BME	16BME0351	1	13	5	20	21
7	BME	16BME0506	1	17	4	18	24
8	BME	16BME0692	1	17	8	19	19
9	BME	16BME0973	1	21	4	21	18
10	BME	17BME0003	1	14	5	20	21
11	BME	17BME0005	1	17	5	18	18
12	BME	17BME0009	1	11	5	19	18
13	BME	17BME0012	2	18	4	23	16
14	BME	17BME0019	1	16	8	19	18
15	BME	17BME0034	2	16	4	19	16
16	BME	17BME0040	2	20	8	18	20
17	BME	17BME0048	2	10	8	19	17
18	BME	17BME0049	1	14	5	22	18
19	BME	17BME0069	2	14	7	20	22
20	BME	17BME0085	2	17	6	19	22
21	BME	17BME0087	2	21	4	20	19
22	BME	17BME0117	1	22	7	22	21
23	BME	17BME0129	1	10	6	23	18
24	BME	17BME0149	2	19	5	24	16
25	BME	17BME0174	2	19	7	21	19
26	BME	17BME0214	2	16	7	21	23
27	BME	17BME0244	1	16	8	23	23
28	BME	17BME0271	1	19	4	23	22
29	BME	17BME0301	1	16	7	19	24
30	BME	17BME0339	1	14	6	18	23
31	BME	17BME0340	1	16	7	24	16
32	BME	17BME0403	2	14	5	21	17
33	BME	17BME0454	1	20	7	18	17
34	BME	17BME0505	1	14	4	19	18
35	BME	17BME0509	2	11	6	24	22
36	BME	17BME0548	1	17	8	21	21
37	BME	17BME0553	1	11	4	22	16
38	BME	17BME0564	1	22	6	22	23
39	BME	17BME0673	1	10	6	23	22
40	BME	17BME0680	1	13	8	21	22
41	BME	17BME0710	1	20	4	22	24

42	BME	17BME0765	1	23	4	21	18
43	BME	17BME0779	2	17	4	19	23
44	BME	17BME0838	2	21	4	19	21
45	BME	17BME0847	1	12	5	18	21
46	BME	17BME0862	1	11	8	21	18
47	BME	17BME0867	2	24	4	18	24
48	BME	17BME0871	1	16	6	22	20
49	BME	17BME0873	1	13	6	21	19
50	BME	17BME0886	2	10	4	18	17
51	BME	17BME0896	2	14	6	21	19
52	BME	17BME0952	2	14	8	24	18
53	BME	17BME0961	1	19	6	24	19
54	BME	17BME0991	1	13	4	20	20
55	BME	17BME2011	1	11	8	20	19
56	BME	17BME2012	1	18	4	22	19
57	BME	17BME2027	1	20	7	18	18
58	BME	17BME2028	1	17	4	20	23

PROGRAMM

```
% This Matlab code can be used for simply supported beam with single point
% load or uniformly distributed to find the
% * Support reaction
% * Maximum Bending Moment
% * Shear force diagram
% * Bending Moment daigram

clc; clear; close all
disp('Simply Supported Beam');

% Data input section
disp(' ');
L    = input('Length of beam in meter =  ');
disp(' ');disp('Type 1 for point load, Type 2 for udl')
Type = input('Load case = ');

if Type == 1
disp(' ');
W = input('Load applied in kN = ');
disp(' ');
a = input('Location of Load from left end of the beam in meter = ');
c  = L-a;

R1 = W*(L-a)/L;              % Left Support Reaction.
R2 = W*a/L;                  % Right Support Reaction.

else
disp(' ');
W  = input('Uniformly distributed load in kN/m = ');
disp(' ');
b  = input('Length of udl in meter = ');
disp(' ');
cg = input('C.G of udl from left end of the beam in meter = ');
a  = (cg-b/2);
c  = L-a-b;

R1 = W*b*(b+2*c)/(2*L); % Left Support Reaction.
R2 = W*b*(b+2*a)/(2*L);                 % Right Support Reaction.
end

% Discretization of x axis.
n = 1000;                    % Number of discretization of x axis.
delta_x = L/n;               % Increment for discretization of x axis.
x = (0:delta_x:L)';          % Generate column array for x-axis.

V = zeros(size(x, 1), 1);    % Shear force function of x.
M = zeros(size(x, 1), 1);    % Bending moment function of x.


% Data processing section
if Type == 1
for ii = 1:n+1
% First portion of the beam, 0 < x < b
V(ii) = R1;
M(ii) = R1*x(ii);
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```
% Second portion of the beam, b < x < L
if x(ii) >= a
      V(ii) = R1-W;
      M(ii) = R1*x(ii)-W*(x(ii)-a);
end
end
x1   = a;
Mmax = W*a*(L-a)/L;
else
for ii = 1:n+1
% First portion of the beam, 0 < x < a
if x(ii) < a
V(ii) = R1;
M(ii) = R1*x(ii);
elseif a <= x(ii) && x(ii)< a+b
% Second portion of the beam, a < x < a+b
      V(ii) = R1-W*(x(ii)-a);
      M(ii) = R1*x(ii)-W*((x(ii)-a)^2)/2;
elseif x(ii) >= (a+b)
% Second portion of the beam, a+b < x < L
      V(ii) = -R2;
      M(ii) = R2*(L-x(ii));
end
end
x1 = a+b*(b+2*c)/(2*L);
Mmax = W*b*(b+2*c)*(4*a*L+2*b*c+b^2)/(8*L^2);
end

disp(' ');disp (['Left support Reaction'  '  = ' num2str(R1) ' ' 'kN'])
disp(' ');disp (['Left support Reaction'  '  = ' num2str(R2) ' ' 'kN'])
disp(' ');disp (['Maximum bending moment'  ' = ' num2str(Mmax) ' ' 'kNm'])

figure
subplot(2,1,1);
plot(x, V, 'r','linewidth',1.5); % Grafica de las fuerzas cortantes.
grid
line([x(1) x(end)],[0 0],'Color','k');
line([0 0],[0 V(1)],'Color','r','linewidth',1.5);
line([x(end) x(end)],[0 V(end)],'Color','r','linewidth',1.5);
title('Shear Force Diagram','fontsize',16)
text(a/2,V(1),num2str(V(1)),'HorizontalAlignment','center','FontWeight','bold'
,'fontsize',16)
text((L-
c/2),V(end),num2str(V(end)),'HorizontalAlignment','center','FontWeight','bold'
,'fontsize',16)
axis off

subplot(2,1,2);
plot(x, M, 'r','linewidth',1.5); % Grafica de momentos flectores;
grid
line([x(1) x(end)],[0 0],'Color','k');
line([x1 x1],[0 Mmax],'LineStyle','--','Color','b');
title('Bending Moment Diagram','fontsize',16)
text(x1+1/L,Mmax/2,num2str(roundn(Mmax,-
2)),'HorizontalAlignment','center','FontWeight','bold','fontsize',16)
text(x1,0,[num2str(roundn(x1,-2)) '
m'],'HorizontalAlignment','center','FontWeight','bold','fontsize',16)
axis off
```