CE383 STRUCTURAL ANALYSIS
SPRING SEMESTER 2012
ANSWERS TO PROBLEM SET 1

1)

$S_{A,R}$= 213,76 kN; $S_{C,L}$= -112.64 kN; $S_{C,R}$= 22.5 kN; $S_{D,L}$=22.5 kN;
$M_{A,R}$=-634.37 kNm; $M_{B,L}$=0 kNm; $M_{B,R}$= 0 kNm; $+M_{max}$= 37,59 kNm;
$M_{C,R}$= $M_{C,L}$= -149 kNm; $M_{D,L}$=-41 kNm

2)

$S_{A,R} = 90$ kN; $S_{C,L} = -180$ kN;
$S_{C,R} = 157.5$ kN; $S_{E,L} = -112.5$ kN;
$S_{E,R} = 157.5$ kN; $S_{F,L} = -112.5$ kN;
$M_C = -675$ kN · m; $M_E = -337.5$ kN − m;
$+M_{\max} = 351.6$ kN − m, at 6.25 m to the left of F

3)

N_{BC}= -15.67 kN; $S_{A,R}$= 115.5 kN; $S_{A+4m,R}$ = $S_{B,L}$ =-19.5 kN; $S_{B,R}$= 11.47 kN; $S_{C,L}$= 101.47 kN;
$M_{A,R}$=0 kNm; $M_{A+4m,R}$ =462 kNm; $M_{B,R}$= 384 kNm; $M_{BC,mid}$ = 345.63 kNm

4)

Member AC: $S_{\max} = 108$ kN; $M_{\max} = 486$ kN − m;
$Q = -7.65$ kN
Member BD: $S = M = 0$; $Q = -217.35$ kN
Member CE: $S_{\max} = -142.35$ kN; $M_{\max} =$
487.95 kN − m; $Q = 0$

5)

Member AB: $S = 43$ kN; $M_{\max} = 279.5$ kN-m; $Q =$
-49.5 kN
Member BC: $S_{\max} = -140.25$ kN; $M_{\max} = 335$ kN-m;
$Q_{\max} = -79.16$ kN
Member CD: $S_{\max} = 67$ kN; $M_{\max} = 335$ kN-m;
$Q = -125.5$ kN

6)

Member AC: $S = 5$ kN; $M_{\max} = 25$ kN-m; $Q = -55$ kN
Member CE: $S_{\max} = -165$ kN; $M_{\max} = 575$ kN-m;
$Q = -115$ kN
Member EG: $S = 115$ kN; $M_{\max} = 575$ kN-m;
$Q = -165$ kN

7)

N_{AB}= 40 kN; $N_{BC\ up\ to\ mid}$= 84.85 kN; $N_{BC,\ mid\ to\ C}$= 28.28 kN; N_{AB}= 40 kN;
$S_{A,R}$= 160 kN; $S_{B,R,up\ to\ mid\ BC}$ =28.28 kN; $S_{from\ mid\ BC\ to\ C,L}$ =- 28.28 kN; S_{CD}= 0 kN;
$M_{A,R}$=480 kNm; $M_{max,BC}$ = 40 kNm

8)

N_{AB}= 0 kN; N_{BD}= 0 kN; N_{BC} = -133,33 kN;
$S_{A,R}$= -3.33 kN; $S_{B,L}$ =-63.33 kN; $S_{B,R}$ = 70 kN; $_{E,L}$ =30 kN; $S_{D,L}$= -30 kN;
$M_{B,R}$= $M_{B,L}$=100 kNm; $M_{max,BD}$ = 22.5 kNm