Ministry of Higher Education
Giza Higher Institute of Engineering & Technology
Civil Engineering Department
Course Name: **Theory of Structures (2)A**
Course Code: **CIV 211** Date: **21 / 11 / 2021**

Academic Year: **2021/2022**
Semester: **First**
Level: **2^{nd} Civil**
Time: **1½ Hours**
Examiner: ***Dr. M. Abdel-Kader***

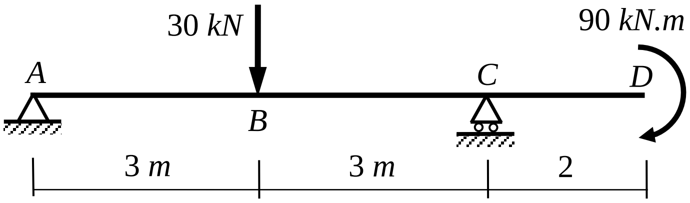
Mid-Term Exam

Total Marks: **15** No. of Questions: **20** (Attempt all questions)

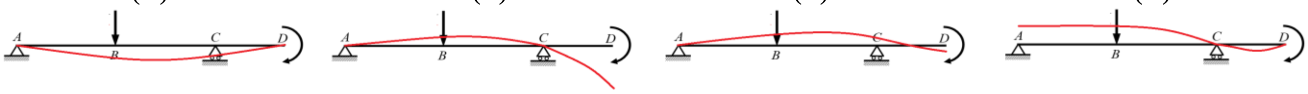
Choose the nearest answer.

For the shown beam, it is required to determine the deflections at ***B*** and ***D*** and the slopes at ***A*** and ***D*** by using the **double integration method**.

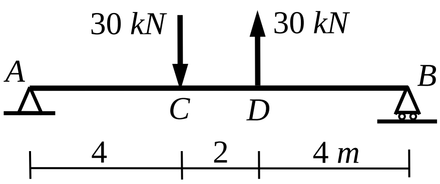
$EI = 1\times10^4\ kN.m^2$



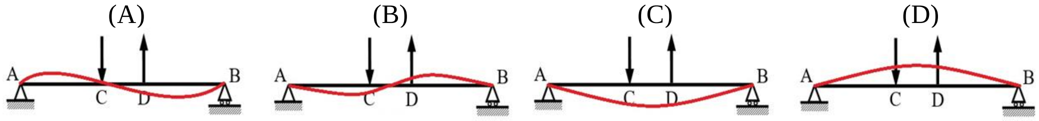
1. The vertical reaction at the roller support ***C*** is:
   (A) 30 *kN* ↑ (B) 15 *kN* ↓ (C) 15 *kN* ↑ (D) zero
2. The vertical reaction at the hinged support ***A*** is:
   (A) zero (B) 40 *kN* ↓ (C) 15 *kN* ↑ (D) 15 *kN* ↓
3. The bending moment equation (M) in the last part ***CD*** is:
   (A) $30\ (x-3) - 30\ (x-6)$ (B) $-30\ (x-3) + 30\ (x-6)$ (C) $-3\ (x-6) + 30\ (x-8)$ (D) $30\ (x+3) + 30\ (x+6)$
4. $EIy' = \ldots\ldots$
   (A) $-30\ (x-3)^2 + 30\ (x-6)^2 + C_1$ (B) $-15\ (x-3)^2 + 15\ (x-6)^2 + C_1$ (C) $-1.5\ (x-6)^2 + 15\ (x-8)^2$ (D) $15\ (x+3)^2 + 15\ (x+6)^2 + C_1$
5. $EIy = \ldots\ldots$
   (A) $-5\ (x-3)^3 + 5\ (x-6)^3$ (B) $-5\ (x)^3 + 5\ (x)^3 + C_1x + C_2$ (C) $-5\ (x-3)^3 + 5\ (x-6)^3 + C_1x + C_2$ (D) $5\ (x)^3 + 5\ (x+6)^3 + C_1 + C_2$
6. Boundary Conditions are:
   (A) At $x = 3$, $y = 0$ & at $x = 6$, $y = 0$ (B) At $x = 0$, $y = 0$ & at $x = 8$, $y' = 0$ (C) At $x = 0$, $y = 0$ & at $x = 6$, $y = 0$
7. C_1 and C_2 are:
   (A) $C_1=0$ and $C_2=22.5$ (B) $C_1=-22.5$ and $C_2=10$ (C) $C_1=2.5$ and $C_2=10$ (D) $C_1=22.5$ and $C_2=0$
8. The deflection at ***B***, y_B is:
   (A) 11.2 *mm* ↑ (B) 6.75 *mm* ↑ (C) zero (D) 11.2 *mm* ↓
9. The deflection at ***D***, y_D is:
   (A) 11.2 *mm* ↑ (B) 10.1 *mm* ↑ (C) zero (D) 40.5 *mm* ↓
10. The value of slope at ***A***, $\theta_A = y'_A$ is:
    (A) 0.00225 rad (B) 0.702 rad (C) 0.012 rad (D) 0.055 rad
11. The value of slope at ***D***, $\theta_D = y'_D$ is:
    (A) 0.02925 rad (B) 0.702 rad (C) 0.055 rad (D) 0.041 rad
12. The nearest elastic curve of the shown beam is:
    (A) (B) (C) (D)



For the shown beam, it is required to determine the slope at ***A*** and the deflection at ***C*** by using the **moment-area method**.
$EI = 2.5\times10^3\ kN.m^2$



13. The vertical reaction at the hinged support ***A*** is:
    (A) 60 *kN* ↑ (B) 60 *kN* ↓ (C) 6 *kN* ↑ (D) 6 *kN* ↓
14. The vertical reaction at the roller support ***B*** is:
    (A) 60 *kN* ↑ (B) 60 *kN* ↓ (C) 6 *kN* ↑ (D) 6 *kN* ↓
15. The bending moment at ***C*** is:
    (A) 32 *kN.m* (B) -16 *kN.m* (C) 24 *kN.m* (D) 60 *kN.m*
16. The bending moment at ***D*** is:
    (A) -24 *kN.m* (B) -60 *kN.m* (C) 40 *kN.m* (D) -16 *kN.m*
17. The deviation of ***B*** relative to the tangent of the elastic curve at ***A***, $t_{B/A}$ is:
    (A) 0.032 *m* (B) 0.016 *m* (C) 0.048 *m* (D) 0.096 *m*
18. The slope of the tangent of the elastic curve at ***A***, θ_A is:
    (A) 0.0032 rad ↻ (B) 0.0096 rad ↻ (C) 0.0016 rad ↻ (D) 0.0048 rad ↺
19. The deflection at ***C***, δ_C is:
    (A) 12.8 *mm* ↓ (B) 5.5 *mm* ↑ (C) zero (D) 4.6 *mm* ↓
20. The nearest elastic curve of the shown beam is:
    (A) (B) (C) (D)



With my best wishes
Dr. M. Abdel-Kader