

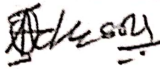


FACULTY OF ENGINEERING

DEPARTMENT OF CIVIL ENGINEERING  
SECOND SEMESTER EXAMINATION  
(AUGUST 2018)  
2017/2018 ACADEMIC SESSION

**Course Title: Engineering Mathematics 2**

**Course Code: GNE 212**

  
HOD'S SIGNATURE

**Instructions:**

- 1) Attempt Questions One and any three
- 2) Time Allowed: 3 hours
- 3) SEVERE PENALTIES APPLY FOR MISCONDUCT, CHEATING, POSSESSION OF UNAUTHORIZED MATERIALS DURING EXAMINATION

**FACULTY OF ENGINEERING**  
**DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING**  
**B.Sc. (Engineering) Degree Examination**  
**Second Semester 2017/2018 Session**  
Course Title: Engineering Mathematics II Course Code: GNE 212

**TIME ALLOWED: 3 HOURS**

**INSTRUCTION: ANSWER QUESTIONS 1 AND ANY OTHER THREE** (State clearly your assumptions. Remember to show your steps and work clearly)

**QUESTION 1 (30 Marks)**

Determine general solution to the following ordinary differential equations

- a.  $\frac{dy}{dx} = \frac{x}{y}$  (3 marks)
- b.  $\frac{dy}{dx} + 3y = -5$  (4 marks)
- c.  $\frac{dy}{dx} - 3y = 5x$  (5 marks)
- d.  $\frac{dy}{dx} - 3xy = 5x$  (5 marks)
- e.  $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = 0$  (5 marks)
- f.  $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = x+4$  (8 marks)

**QUESTION 2 (10 marks):**

- a. Find the general solution to this first order differential equation  $\frac{dy}{dx} + 0 = \frac{x}{y^2 + 1}$  (4 marks)
- b. Determine particular solution to  $\frac{dy}{dx} + 0 = \frac{x+1}{y}$ , when  $y(1) = 8$  (6 marks)

**QUESTION 3 (10 marks):**

- a. Find the general solution to this first order differential equation  $\frac{dy}{dx} + 3y = 6$  (4 marks)
- b. Determine particular solution to  $\frac{dy}{dx} + 11y = 15$ , when  $y(0) = 6$  (6 marks)

**QUESTION 4 (10 marks):**

- a. Find the general solution to  $\frac{dy}{dx} + 6y = 10x$  (4 marks)
- b. Determine particular solution to  $\frac{dy}{dx} + 4y = 8x$ , when  $y(2) = 8$  (6 marks)

**QUESTION 5 (10 marks):**

- a. Find the general solution to this second order differential equation  
 $\frac{d^2y}{dx^2} - \frac{dy}{dx} - 2y = 0$  (4 marks)
- b. Determine particular solution to this second order differential equation  
 $\frac{d^2y}{dx^2} - \frac{dy}{dx} - 2y = x^2 + 4$ , when  $y(0) = 2$  and  $\frac{dy}{dx}(0) = 1$  (6 marks)

**QUESTION 6 (10 marks):**

- c. Find the general solution to this second order differential equation  
 $2\frac{d^2y}{dx^2} - 3\frac{dy}{dx} - 2y = 0$  (4 marks)
- d. Determine particular solution to this second order differential equation  
 $\frac{d^2y}{dx^2} + 5\frac{dy}{dx} + 6y = 0$ , when  $y(0) = 2$  and  $\frac{dy}{dx}(0) = 1$  (6 marks)