



## Final Exam

2017/2018

Subject: Engineering Analysis

Stage: 2<sup>nd</sup>

Lecturer: Abdualлах Adil

Time: 3 hours

Date: 24-5-2018

**Note: Answer five questions only (Each question is worth 20 marks)**

**Q1/** Find Fourier series for the periodic function which is defined in Fig. (1):

$$F(X) = X \quad -2 < X < 2$$

$$F(X + 4) = F(X)$$

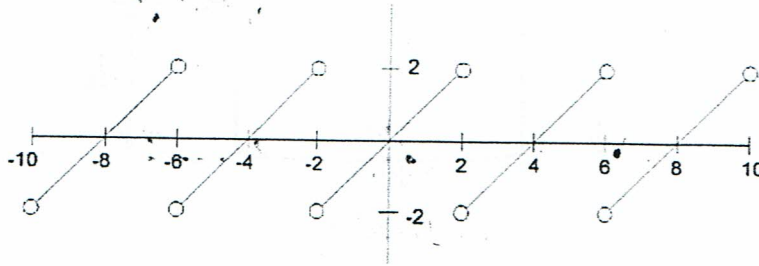


Fig. (1)

**Q2/ A-** Find the Fourier transform for the waveform shown in Fig. (2)

$$F(t) = \sin(\Omega t) \quad \text{For } \left(-\frac{\pi}{\Omega} \leq t \leq \frac{\pi}{\Omega}\right)$$

**B-** What will happen to the Fourier transform equation if the waveform is shifted to the right by  $\frac{2\pi}{\Omega}$

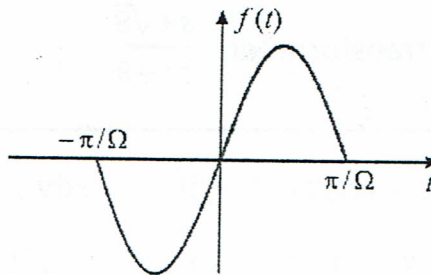


Fig. (2)

**Q3/** Answer **two** of the following:

**A-** Find the Particular solution for the following differential equation

(10 marks)

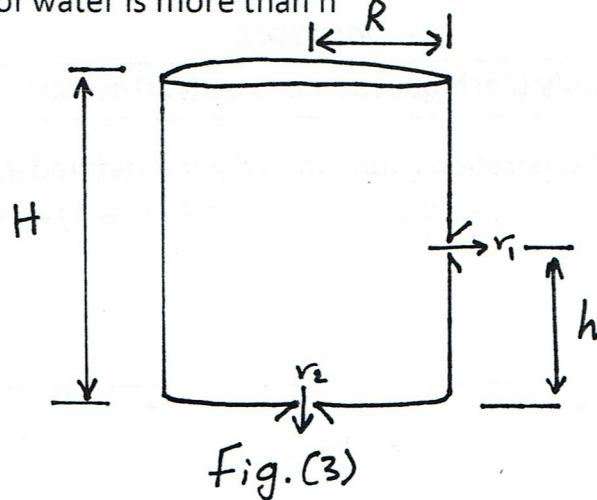
$$Y'' - 6Y' + 8Y = 3 \cos x$$

**B-** Solve the following differential equation

(10 marks)

$$\frac{dY}{dX} = e^{3X+Y-2}$$

- C- Derive the differential equation that describes level of water in the tank shown in Fig. (3) when the level of water is more than h (10 marks)



Q4/ Answer the following:

- A- Graph  $r = 5 - 5\sin\theta$  (10 marks)
- B- Convert  $2x - 5x^3 = 1 + xy$  into polar coordinates (10 marks)

Q5/ A- Find the Laplace transform for  $(2 - 4t)\cos t + 2\sinh 4t$  (10 marks)

B- Find the inverse Laplace transform for  $\frac{s+\sqrt{8}}{s^2+8}$  (10 marks)

Q6/ Determine the value of the integral  $I = \iint_R \frac{1}{y} dx dy$ , where R is the region enclosed by  $y = (1 - x)$ ,  $y = 2(1 - x)$ ,  $y = (1 + x)$ ,  $y = 2(1 + x)$ , Assuming  $U = \frac{y}{1-x}$  and  $V = \frac{y}{1+x}$

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