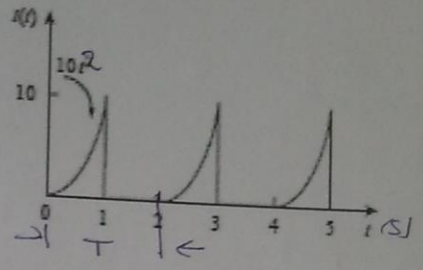
Question 5: (5 marks)

For the following wave form find
1. R.M.S value of $i(t)$
2. Average value of $i(t)$



Average

$$I_{av} = \frac{1}{T}\int_0^2 i(t)\,dt$$

[1]

$$= \frac{1}{2}\int_0^2 i(t)\,dt$$

$$= \frac{1}{2}\left[\int_0^1 10t^2\,dt + \int_1^2 0\,dt\right]$$

$$= \frac{1}{2}\left[10\frac{t^3}{3}\Big|_0^1 + 0\right]$$

$$= \frac{10}{6}[1-0] = \frac{10}{6} = 1.667 \text{ A}$$

[2]

$$I_{r.ms}^2 = \frac{1}{T}\int_0^T i^2(t)\,dt$$

$$= \frac{1}{2}\int_0^2 i^2(t)\,dt$$

$$= \frac{1}{2}\left[\int_0^1 (10t^2)^2\,dt + \int_1^2 0^2\,dt\right]$$

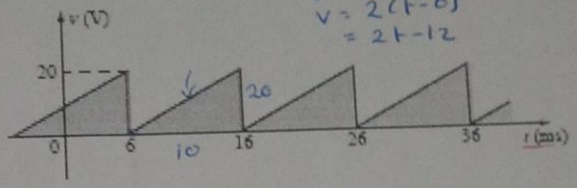
$$= \frac{1}{2}\left[100\frac{t^5}{5}\Big|_0^1 + 0\right] = \frac{100}{10}[1-0]$$

$$I_{r.ms}^2 = 10$$

$$I_{r.ms} = \sqrt{10} = 3.16$$

End Of Questions
GOOD LUCK

Question 5: (5 marks)
For the following wave form find
1. R.M.S value of v(t)
2. Average value of v(t)



$m = \frac{20}{10} = 2$

(6,0)

$\frac{V-0}{t-6} = 2$

$V = 2(t-6)$

$= 2t-12$

Average value

$T = 10$

$$\bar{V}_{av} = \frac{1}{T}\int_0^T v(t)\,dt$$

$$= \frac{1}{10}\int_6^{16} (2t-12)\,dt$$

$$= \frac{1}{10}\left[\frac{2t^2}{2} - 12t\right]_6^{16}$$

$$= \frac{1}{10}\left[[16^2 - 12\times 16] - [6^2 - 12\times 6]\right]$$

$$= \frac{1}{10}[[256-192] - [36-72]] \quad (2)$$

$$= \frac{1}{10}[64+36] = \frac{100}{10} = 10$$

$$\bar{V}^2_{r.ms} = \frac{1}{T}\int_6^{16} v^2(t)\,dt$$

$$= \frac{1}{10}\int_6^{16} (2t-12)^2\,dt$$

$$= \frac{1}{10}\int_6^{16} (4t^2 - 48t + 144)\,dt \quad (3)$$

$$= \frac{1}{10}\left[\frac{4t^3}{3} - \frac{48t^2}{2} + 144t\right]_6^{16}$$

$$= \frac{1}{10}\left\{\frac{4}{3}[16^3 - 6^3] - 24[16^2 - 6^2] + 144[16-6]\right\}$$

$$= \frac{1}{10}\left\{\frac{4}{3}[4096-216] - 24[256-36] + 144[10]\right\}$$

$$= \frac{1}{10}\{5173.33 - 5280 + 1440\}$$

End Of Questions
GOOD LUCK

$\bar{V}^2_{r.ms} = 133.33$

$\bar{V}_{r.ms} = 11.55$

Course's Name : Electric circuits 2 | Palestine Technical University - Kadoorie | Instructor's Name :Eng. Muntaser Al-Dabe

Course's Number :12110203 | Student's Name: .....

Exam's Period :90 minutes | Student's Number: .....

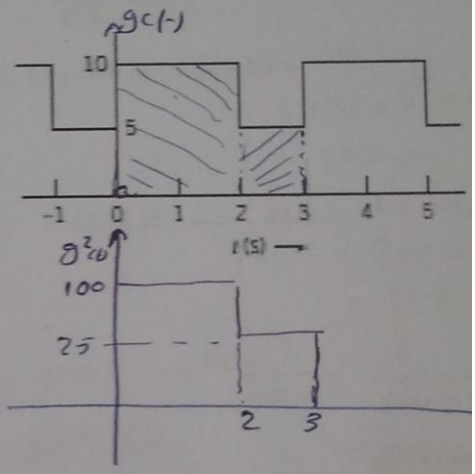
Questions' Number : 5 | First Exam | Section's Number: .....

Total Mark :25 | Fall 2014 | Exam's Date :

Pages' Number :5

Question 1 : (6 marks)

Find R.M.S and Average values of the following waveform



$$\text{average Value} = \frac{1}{T}\int_0^T g(t)\,dt$$

$$= \frac{1}{3}\left[\int_0^2 10\,dt + \int_2^3 5\,dt\right]$$

$$= \frac{1}{3}\left[10(2-0) + 5(3-2)\right]$$

$$= \frac{20+5}{3} = \frac{25}{3}$$

$$= 8.33$$

Cycle ③

$$R.m.s^2 = \frac{1}{T}\int_0^T g^2(t)\,dt$$

$$= \frac{1}{3}\left[\int_0^2 100\,dt + \int_2^3 25\,dt\right]$$

$$= \frac{1}{3}\left[100\times(2-0) + 25(3-2)\right]$$

$$= \frac{200+25}{3}$$

Cycle ③

$$R.m.s^2 = 75$$

$$R.m.s = \sqrt{75} = 8.66$$