


Credit Hours Programs Program of Communications Duration: 2 hours Date : January 18, 2020	 Faculty of Eng. – Shoubra	Final Exam Course: Mathematics 5 Code: EMP 301 Group: 3287
The exam consists of one page    No. of questions : 4    Answer <b>All</b> questions    Total Mark: 40		
<b>Question 1 (8 marks)</b>		
(a) If $x$ is random variable given by the data: 2, 2, 5, 5, 5, 6, 6, 7, 7, 7, 8, 8. Write the table of frequency and the Pdf $f(x)$ and find $\bar{x}, \sigma$ .	3	
(b) Find the curve $y = a + b \ln x$ that fits the data: (1, 3), (2, 5), (4, 9), (5, 11), (6, 15). Also, find $\mu_x, \mu_y, \sigma_x, \sigma_y, cov(x, y)$ and $r$ .	5	
<b>Question 2 (10 marks)</b>		
(a) A box contains 3 red, 5 white and 7 blue balls. At random, four balls are selected simultaneously. If $x$ is the number of red balls, write the table of $x$ and its Pdf $f(x)$ and find the probability that the selection contains 1 red, 2 white, 1 blue balls.	5	
(b) If $x$ is random variable with Pdf $f(x) = \frac{1}{6}(x^3 + 1), 0 \leq x \leq 2$ . Find $P(0 \leq x \leq 2), P(x > 1)$ and $\mu_x$ .	5	
<b>Question 3 (10 marks)</b>		
(a) If $x$ is random variable with pdf $f(x) = \frac{1}{6}(x + 2), 0 \leq x \leq 2$ . Find the moment generating function $M_x(t)$ and from it, find $m_1, m_2$ , and $\sigma$ .	5	
(b) If $x, y$ are random variables with joint Pdf: $f(x, y) = \frac{1}{40}(xy^2), x = 1, 3, 4, y = 1, 2$ . Write the table of the Pdf. Find $\mu_x, \mu_y, cov(x, y)$ .	5	
<b>Question 4 (12 marks)</b>		
(a) In production process, the probability of producing a defective item is 0.002. Find the probability that a lot of 300 items contains 2 defectives.	4	
(b) From the normal distribution, $\mu = 0.6, \sigma = 2, \varphi(0.2) = 0.58, \varphi(1.2) = 0.88, \varphi(1.3) = 0.90$ . Find $P(1 \leq x \leq 3), P(x > 3.2)$ .	4	
(c) From Gamma distribution: $f(x) = \frac{1}{\Gamma(n)} x^{n-1} e^{-x}, x, n > 0$ Find $P(x \leq 2)$ and $P(x > 3)$ when $n = 2$ .	4	
(d) From Beta distribution, prove that $\mu = \frac{m}{m+n}$ .	4	

*Good Luck*

*Dr. Mohamed Eid*