No. of Printed Pages : 5

ET-101(B)

B.Tech. Civil (Construction Management) / B.Tech. Civil (Water Resources Engineering) B.Tech. (Aerospace Engineering) BTCLEVI/BTMEVI/BTELVI/BTECVI/BTCSVI

Term-End Examination 01620

December, 2012

ET-101(B) : MATHEMATICS-II

Time : 3 hours *Maximum Marks : 70*

Note : *All questions are **compulsory**. Use of calculator is permitted. Use statistical table wherever necessary.*

1. Answer ***any six*** of the following : **6x5=30**

(a) Three machines I, II and III manufacture respectively, 40, 50 and 10 percent of the total production. The percentage of defective items produced by I, II and III is 2, 4 and 1 percent, respectively. For an item chosen at random, what is the probability that it is defective ?

(b) Let A and B be two events with $P(A) = \frac{1}{2}$, $P(B) = \frac{1}{3}$, and $P(A \cap B) = \frac{1}{4}$.

Find (i) $P(A/B)$ and (ii) $P(A \cup B)$.

(c) An anti-aircraft gun can take a maximum of four shots on an enemy's plane moving from it. The probabilities of hitting the plane at first, second, third and fourth shots are 0.4, 0.3, 0.2 and 0.1, respectively. Find the probability that the gun hits the plane.

(d) In a factory manufacturing bolts, machines A, B and C manufacture 25%, 35% and 40% of the total output respectively. Of their outputs, 5%, 4%, and 2% are defective bolts. A bolt is chosen at random and found to be defective. What is the probability that the bolt is produced by machine A ?

(e) An urn contain 10 balls of which three are black and seven are white. At each trial, a ball is selected at random, its colour is noted and it is replaced by two additional balls of the same colour. What is the probability that a white ball is selected in the second trial ?

(f) One bag contains 4 white balls and 3 black balls, and a second bag contains 3 white balls and 5 black balls. One ball is drawn from the first bag and placed unseen in the second bag. What is the probability that a ball now drawn from the second bag is black ?

(g) If a discrete random variable X follows uniform distribution and assumes only the values

8, 9, 11, 15, 18 and 20,

Find the probabilities

(i) $P(X=9)$ (ii) $P(X=12)$

(iii) $P(X < 15)$ (iv) $P(X \leq 15)$

(v) $P(X > 15)$

(h) India plays two matches each with West Indies and Australia. In any match the probability of India getting points 0, 1 and 2 are 0.45, 0.05 and 0.50 respectively. Assuming that the outcomes are independent, find the probability of India getting at least 7 points.

2. Answer ***any two*** of the following : **2x10=20**

(a) An underground mine has 5 pumps installed for pumping out storm water. The probability of any one of the pumps failing during the storm is 1/8. What is the probability that

(i) at least 2 pumps will be working ?

(ii) all the pumps will be working during a particular storm ?

(b) The probability density function of a variable x is :

x	0	1	2	3	4	5	6
p (x)	k	3 k	5 k	7 k	9 k	11 k	13 k

(i) Find p ($x < 4$), p ($x \geq 5$), p ($3 < x \leq 6$)

(ii) What will be the minimum value of k so that p ($x \leq 2$) ≥ 0.3 ?

(c) A multiple choice test contains 6 questions. Each question has 3 answers of which only 1 is correct. The student has no idea as to which of the alternatives is the correct answer : The student rolls a fair dice. If face 1 or 2 show up, he selects answer (A). If face 3 or 4 show up, he selects answer (B), and if face 5 or 6 show up, he selects answer (C). Find the probability that he will get.

(i) exactly 4 correct answers

(ii) no correct answer

(iii) at most 2 correct answers

3. Answer ***any two*** of the following : **2x10=20**

(a) A manufacturer intends that his electric bulbs have a life of 1000 hours. He tests a sample of 20 bulbs , drawn at random from a batch and discovers that the mean life of the sample bulb is 990 hours with a standard deviation of 22 hours. Does this signify that the batch is not up to the standard ? Test at 1% level of significance.

(b) The mean height of a sample of 50 students active in sports is 68.2 inches with a standard deviation of 2.5 inches, while for another sample of 50 students with no active interest in sports, the mean height is 67.5 inches with a standard deviation of 2.8 inches. Test at 5% level of significance whether the interest in sports makes a student taller.

(c) Ten individuals are chosen at random from the population and their heights are found in inches were 63, 63, 64, 65, 66, 69, 69, 70, 70 and 71. Discuss the suggestion that the mean height in the universe is 65 inches, given that for 9 degrees of freedom the value of students 't' at 0.05 level of significance is 2.262.