36	78
72	62
65	65
47	72
25	82

(a) Calculate the correlation coefficient and comment.

(b) Obtain the regression equation of Y on X and find the expected blood pressure of a person who is 49 year old. **20**

4. (a) Use the data below, showing a summary of highway CNG mileage for serveral observations, to decide if the average highway gas mileage is the same for midsize cars, SUV's, and pickup trucks. Test the appropriate hypotheses at the $\alpha = 0.01$ level. **10**

	n	Mean	Std. Dev.
Midsize	31	25.8	2.56
SUV's	31	22.68	3.67
Pickups	14	21.29	2.76

BB-203

M. Tech. EXAMINATION, May 2017

(Second Semester)

(B. Scheme) (Main & Re-appear)

(BME)

BME-506

BIO-MATHEMATICS

Time : 3 *Hours*]   [*Maximum Marks :* 100

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt any *Five* questions. All questions carry equal marks.

1. (a) What is a box plot ? What additional information does this type of display give that is not available from either a bar graph or stem-and-left plot ? For the given information, draw a box and whisker plot : **10**

Minimum	82
Median	95
Lower quartile	94
Upper Quartile	102
Maximum	110

(b) Suppose that 84% of hypertensive and 23% of normotensives are classified as hypertensive by an automated blood-pressure machine. If it is estimated that the prevalence of hypertensive is 20%, what is the predictive value of a positive test ? What is the predictive value of a negative test ? **10**

2. (a) A packaging plant fills bags with cement. The weight X kg of a bag of cement can be modelled by a normal distribution with mean 50 kg and standard deviation 2 kg. **10**

   (i) Find $P(X > 53)$.

   (ii) Find weight that is exceeded by 99% of the bags.

(b) Discuss and define ROC. For the given table find the estimates of the values and their standard errors. **10**

Diagnosis	Test Result	
	+ive	**–ive**
+ive	30	3
–ive	20	42

3. The following table shows the ages (X) and blood presure (Y) of 8 persons : **20**

Age	Blood Pressure
52	73
63	68
45	75

If each scientific calculator sold results in a ₹ 20 loss, but each graphing calculator produces a ₹ 50 profit, how many of each type should be made daily to maximize net profits ? (*Hint* : LPP). **20**

7. Discuss different types of control charts used for the attributes and variables. **20**

8. The following data is for the malarial patients admitted a week. Test for the uniformity of the distribution over the weak.

Days	No. of Admission
Monday	14
Tuesday	18
Wednesday	12
Thursday	11
Friday	15
Saturday	14

Given data : Chi square significance value at 5, 6, 7 d.o.f. are 11.07, 12.59, 14.07, respectively at 5% level of significance. **20**

(b) Find the constant c such that the function.

$$f(x) = \begin{cases} cx^2 & 0 < x < 3 \\ 0 & \text{otherwise} \end{cases}$$

is a density function, and (b) compute $P(1 < x < 2)$. **10**

5. (a) Discuss the reliability of series and parallel connection. **10**

(b) With the help of continuity equation and the Navier-Stokes equations, derive cardiovascular system equation satifying the properties of blood flow. **10**

6. A calculator company produces a scientific calculator and a graphing calculator. Long-term projections indicate an expected demand of at least 100 scientific and 80 graphing calculators each day. Because of limitations on production capacity, no more than 200 scientific and 170 graphing calculators can be made daily. To satify a shipping contract, a total of at least 200 calculators much be shipped each day.