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Fifure Vision By K B Hemanth Raj

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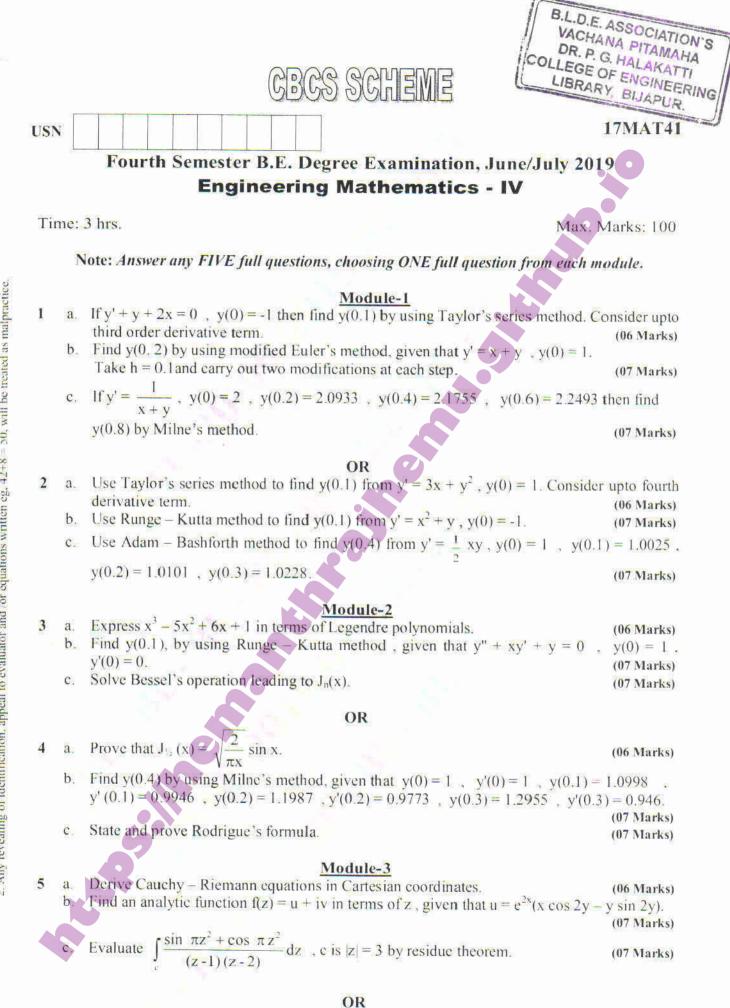
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Important Note: 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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### D.E. ASSOCIATION S VACHANA PITAMAHA DR. P. G. HALAKATTI COLLEGE OF EADINEERING LIBRARY, BIJAPUR.

- a. Prove that  $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right) |\mathbf{f}(z)|^2 = 4|\mathbf{f}'(z)|^2$ .
  - b. Discuss the transformation  $W = Z^2$ .
  - c. Find a bilinear transformation that maps the points  $\infty$ , i, o in Z plane into -1, -i, 1 in W - plane respectively. (07 Marks)

#### Module-4

- a. In a sampling a large number of parts manufactured by a machine, the mean number of 7 defectives in a sample of 20 is 2, out of 1000 such samples , how many would be expected to contain atleast 3 defective parts? (06 Marks)
  - b. If X is a normal variate with mean 30 and standard deviation 5, find the probabilities that i)  $26 \le X \le 40$ ii) X > 45iii) |X - 30| > 5.
  - Given that  $\phi(0.8) = 0.288$ ,  $\phi(2.0) = 0.4772$ ,  $\phi(3) = 0.4987$ ,  $\phi(1) = 0.3413$ . (07 Marks) c. The joint density function of two continuous random variables X and Y is given by

< 5

+3y).

$$f(x, y) = \begin{cases} K & xy, \quad 0 \le x \le 4, \quad 1 < y \\ 0, \quad \text{otherwise} \end{cases}$$
  
Find i) K ii) E(x) iii) E(2x)

(07 Marks)

**17MAT41** 

06 Marks)

(07 Marks)

### OR

a. Derive mean and standard deviation of the Poisson distribution. 8 (06 Marks) b. The joint probability distribution for two random variables X and Y as follows :

X Y	-2	-1	4	5	
1	0.1	0.2	0	0.3	
2	0.2	0.1	0.3	0	
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Find i) Expectations of X, Y, XY ii) SD of X and Y iii) Covariance of X. Y iv) Correlation of X and Y. (07 Marks)

c. In a certain town the duration of shower has mean 5 minutes. What is the probability that shower will last for i) 10 minutes or more ii) Less than 10 minutes iii) Between 10 and 12 minutes. (07 Marks)

#### Module-5

a. A group of boys and girls were given in Intelligence test. The mean score, SD score and 9 numbers in each group are as follows (06 Marks)

	Boys	Girls	
Mean	74	70	
SD	8	10	
Х	12	10	

Is the difference between the means of the two groups significant at 5% level of significance? Given that  $t_{0.05} = 2.086$  for 20 d.f.

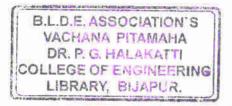
The following table gives the number of accidents that take place in an industry during various days of the week. Test if accidents are uniformly distributed over the week.

Day	Mon	Tue	Wed	Thu	Fri	Sat
No. of accidents	14	18	12	11	15	14

Given that  $X^2 = 11.09$  at 5% level for 5 d.f.

(07 Marks)

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17MAT41

c. Find the unique fixed probability vector for the regular stochastic matrix.

 $\mathbf{A} = \begin{bmatrix} 0 & 1 & 0 \\ 1/6 & 1/2 & 1/3 \\ 0 & 2/3 & 1/3 \end{bmatrix}$ 

(07 Marks)

(06 Marks)

OR

- 10 a. Define the following terms :
  - i) Type I error and type II error.
  - ii) Transient state.
  - iii) Absorbing state.
  - b. A certain stimulus administered to each of the 12 patients resulted in the following increases of blood pressure : 5, 2, 8, -1, 3, 0, -2, 1, 5, 0, 4, 6. Can it be concluded that the stimulus will be general be accompanied by an increase in blood pressure. Given that  $t_{0.05} = 2.2$  for 11 d.f. (07 Marks)
    - 0 2/3 1/3
  - c. If  $P = \begin{bmatrix} 1/2 & 0 & 1/2 \\ 1/2 & 1/2 & 0 \end{bmatrix}$ . Find the corresponding stationary probability vector. (07 Marks)

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