

4E1206

Roll No. _____

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B. Tech. IV-Sem. (Back) Exam., Oct.-Nov. - 2020

HSMC Agriculture Engineering

4AG2 - 01 Advanced Engineering Mathematics – II

AG, CE, MI

Time: 2 Hours

Maximum Marks: 65
Min. Passing Marks: 23

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and one questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

*Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)*

1. NIL

2. NIL

PART – A

(Answer should be given up to 25 words only)

[5×2=10]

All questions are compulsory

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Q.1 State the Bayes' Theorem.

Q.2 Define the Marginal and Conditional distribution.

Q.3 Define the Skewness and Kurtosis.

Q.4 State the angle between two lines of regression. Also Interpret the case $r = 0$, $r = \pm 1$.

Q.5 Write the test of significance of single mean.

Part – B

(Analytical/Problem solving questions)

[4×10=40]

Attempt any four questions

Q.1 Obtain the rank correlation for the following data –

x : 81 78 79 73 69 68 62 58

y : 10 12 18 18 18 20 20 24

Q.2 State and prove the Chebyshev's Inequality.

Q.3 There are three boxes containing respectively 1 white, 2 red and 3 black balls; 2 white, 3 red and 1 black balls; 3 white, 1 Red, and 2 black balls. A box is chosen at random and from it two balls are drawn at random, which are 1 red and 1 white. Find the probability that these come from -

- (a) The first box
- (b) The second box
- (c) The third box

Q.4 Define the curve fitting by the Method of least squares. Also fit a straight line to the following data.

(x, y) : (0, 1) (1, 1.8) (2, 3.3) (3, 4.5) (4, 6.3)

Q.5 Fit a Binomial distribution to the following set of observations –

Variety (x): 0 1 2 3 4 5

Frequency (f): 10 20 25 20 17 8

Q.6 A sample of 400 male students is found to have a mean height of 168.67 cm. Can it be reasonable regarded as a sample from large population with mean height 168.47 cm. and SD 3.25 cm.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions)

[1×15=15]

Attempt any one questions

Q.1 Two random variable X and Y have the following Joint Probability density function.

$$f(x,y) = \begin{cases} 2 - x - y; & 0 \leq x \leq 1, 0 \leq y \leq 1 \\ 0 & \text{otherwise} \end{cases}$$

Find-

- (a) Marginal Probability density function of X and Y
- (b) Conditional density function
- (c) Var (X) and Var (Y)
- (d) Covariance between X and Y

Q.2 (a) Prove Poisson distribution as a limiting case of Binomial distribution.

(b) In a Normal distribution 31% of the item are under 45 and 8% are over 64. Find the parameters of the distribution.

Q.3 (a) if X is a Random Variate, then Prove that

(i) $E(X^2) \geq [E(X)]^2$

(ii) $|E(X)| \leq E|X|$

(b) Sample of size 10 and 12 taken from two normal population gave $S_1 = 12$ and $S_2 = 18$. Test the Hypothesis $\sigma_1 = \sigma_2$.
