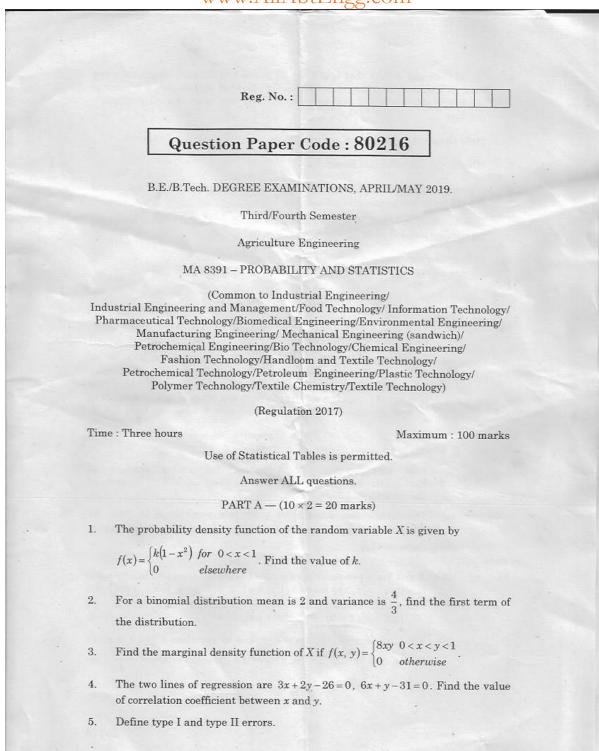
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- 6. An oil company claims that less than 20 percent of all car owners have not tried its gasoline. Test this claim at the 0.01 level of significance if a random check reveals that 22 of 200 car owners have not tried the oil company's gasoline.
- 7. State the identity for sum of squares for one way of analysis of variance.
- 8. What is the Latin Square Design?
- A garment was sampled on 10 consecutive hours of production. The number of defects found per garment is given below:

Defects : 5, 1, 7, 0, 2, 3, 4, 0, 3, 2. Compute upper and lower control limits for monitoring number of defects.

10. Define tolerance limits.

PART B - (5 × 16 = 80 marks)

- (a) (i) Find the moment generating function of a Poisson distribution.
 Hence find mean and variance.
 (8)
 - (ii) Four boxes A, B, C, D contain fuses .The boxes contain 5000, 3000, 2000 and 1000 fuses respectively. The percentages of fuses in boxes which are defective are 3%, 2%, 1% and 0.5% respectively. One fuse is selected at random arbitrarily from one of the boxes. It is found to be defective fuse. Find the probability that it has come from box D.

Or

- (b) (i) Find mean, variance and moment generating function of Exponential distribution. Also prove the lack of memory property of the Exponential distribution. (10)
 - (ii) The distribution function of a random variable X is given by $F(x)=1-(1+x)e^{-x}$; $x\geq 0$. Find the density function, mean, variance of X.
- 12. (a) (i) X and Y are two random variables having the joint probability mass function f(x, y) = k(3x + 5y), x = 1, 2, 3: y = 0, 1, 2. Find the marginal distributions and conditional distribution of X, $P(X = x_i | Y = 2)$, $P(X \le 2 | Y \le 1)$. (8)
 - (ii) The joint density function of two random variables X and Y is given by $f(x, y) = \frac{1}{4}e^{-(x+y)/2}$, x > 0, y > 0. Find the distribution of $\frac{X-Y}{4}$. (8)

Or

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(b) The joint probability density function of two random variables X and Y is given by $f(x, y) = k(xy + y^2)$, $0 \le x \le 1$, $0 \le y \le 2$.

Find
$$P(Y > 1)$$
, $P(X > \frac{1}{2}, Y < 1)$ and $P(X + Y \le 1)$. (16)

13. (a) Two random samples are drawn from normal populations are given below:

Sample 1:	17	27	18	25	27	29	13	17
Sample 2:	16	16	20	27	26	25	21	

Can we conclude that the two samples are drawn from the same population? Test at 5% level of significance. (16)

Or

(b) (i) Fit a Poisson's distribution to the following data and test the goodness of fit. Test at 5% level of significance. (8)

x:	0	1	2	3	4	5
f:	142	156	69	27	5	1

- (ii) A drug manufacturer claims that the proportion of patients exhibiting side effects to their new arthritis drug is at least 8% lower than for the standard brand X. In a controlled experiment, 31 out of 100 patients receiving the new drug exhibited the side effects, as did 74 out of 150 patients receiving brand X. Test the manufacturer's claim at 5% level of significance.
- 14. (a) An experiment was performed to judge the effect of four different fuels and three different types of launchers on the range of a certain rocket. Test, on the basis of following ranges in miles, whether there is a significant effect due to differences in fuels and, whether there is a significant effect due to differences in launchers. Use the 0.01 level of significance.

	Fuel 1	Fuel 2	Fuel 3	Fuel 4
Launcher X	45	47	48	42
Launcher Y	43	46	50	37
Launcher Z	51	52	55	49

Or

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	test	ang la	borat	ory is	given	all th	ne ava	ilable	e bolt	ts th	at co	nnec	ted th	ding, a ne steel
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	12 s on s	sample state o	es eac f cont	h of 5 rol.	lamp	s. Co	nstruc	t X-	-cha	rt an	d R	-cha	rt, co	mment (16)
Sai	mple No:	1	2	3	4	5	6	7	8		9	10	11	12
\overline{X} :		120	127	152	157	160	134	137	12			144	120	127
D		30	44	60	34	38	35	45	62		00		Lancas and the same of the sam	
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