

GUJARAT TECHNOLOGICAL UNIVERSITY**MBA(PT) - SEMESTER-II EXAMINATION – WINTER 2020****Subject Code:4529901****Date:04/02/2021****Subject Name:Business Statistics****Time:10:30 AM TO 12.30 PM****Total Marks: 47****Instructions:**

1. Attempt any two questions from Q1 to Q4.
2. Q5 & Q6 are compulsory.
3. Make suitable assumptions wherever necessary.
4. Figures to the right indicate full marks.

| Q. No. | Question Text and Description | Marks |
|--------|---|-------|
| Q.1 | (a) Difference between descriptive and inferential statistics. (b) Explain mutually exclusive events. (c) Explain hypothesis testing procedure steps in brief. | 06 |
| Q.1 | (a) Distinguish between qualitative and quantitative charts. (b) Probability of getting Sunday in a leap year (c) Explain characteristics of binomial and find its σ^2 if $n=180$, $p=0.60$. | 06 |
| Q.2 | (a) The amount of time devoted to studying statistics each week by students who achieve a grade of A in the course is a normally distributed random variable with a mean of 7.5 hours and a standard deviation of 2.1 hours. <ol style="list-style-type: none"> i. What proportion of A student study for more than 10 hours per week? ii. Find the probability that an A student spends between 7 and 9 hours studying. iii. What proportion of A students spend fewer than 3 hours studying? iv. What is the amount of time below which only 5% of all A students spend studying? | 06 |
| | (b) Spam is the price we pay for being able to easily communicate by e-mail. Does spam affect everyone equally? In a preliminary study, university professors, administrators, and students were randomly sampled. Each person was asked to count the number of spam messages received that day. The results follow. Can we infer at the 2.5% significance level that the differing university communities differ in the amount of spam they receive in their e-mails? | 06 |

| Professors | Administrators | Students |
|------------|----------------|----------|
| 7 | 5 | 12 |
| 4 | 9 | 4 |
| 0 | 12 | 5 |
| 3 | 16 | 18 |
| 18 | 10 | 15 |

| | | |
|-----|--|----|
| Q.3 | (a) One of the earliest applications of the Poisson distribution was in analyzing incoming calls to a telephone switchboard. Analysts generally believe that | 06 |
|-----|--|----|

random phone calls are Poisson distributed. Suppose phone calls to a switchboard arrive at an average rate of 2.4 calls per minute.

- i. If an operator wants to take a one-minute break, what is the probability that there will be no calls during a one-minute interval?
- ii. If an operator can handle at most five calls per minute, what is the probability that the operator will be unable to handle the calls in any one-minute period?
- iii. What is the probability that exactly three calls will arrive in a two-minute interval?
- iv. What is the probability that one or fewer calls will arrive in a 15-second interval?

Q.3 (b) A computer manufacturer estimates that its line of minicomputers has, on average, 8.4 days of downtime per year. To test this claim, a researcher contacts seven companies that own one of these computers and is allowed to access company computer records. It is determined that, for the sample, the average number of downtime days is 5.6, with a sample standard deviation of 1.3 days. Assuming that number of down-time days is normally distributed, test to determine whether these minicomputers actually average 8.4 days of downtime in the entire population. Let $\alpha = 0.01$.

06

Q.4 (a)

06

| Checker | Manual | Scanner |
|---------|--------|---------|
| 1 | 426 | 473 |
| 2 | 387 | 446 |
| 3 | 410 | 421 |
| 4 | 506 | 510 |
| 5 | 411 | 465 |
| 6 | 398 | 409 |
| 7 | 427 | 414 |
| 8 | 449 | 459 |
| 9 | 407 | 502 |
| 10 | 438 | 439 |
| 11 | 418 | 456 |
| 12 | 482 | 499 |
| 13 | 512 | 517 |
| 14 | 402 | 437 |

Most supermarkets across India have invested heavily in optical scanner systems to expedite customer checkout, increase checkout productivity, and improve product accountability. These systems are not 100% effective, and items often have to be scanned several times. Sometimes items are entered into the manual cash register because the scanner cannot read the item number. In general, do optical scanners register significantly more items than manual entry systems do? The following data are from an experiment in which a supermarket selected 14 of its best checkers and measured their productivity both when using a scanner and when working manually. The data show the number of items checked per hour by each method. Use α

= .05 to test the difference. Assume the underlying distributions are not symmetrical.

- Q.4 (b)** Three airlines serve a small town in Ohio. Airline A has 50% of all the scheduled flights, airline B has 30%, and airline C has the remaining 20%. Their on-time rates are 80%, 65%, and 40%, respectively. A plane has just left on time. What is the probability that it was airline A? **06**

- Q.5** The following is the Forbes magazine's list of India's twenty Billionaires for 2006 titled

| Rank | Name | Net Worth (\$billion) | Age |
|------|------------------|-----------------------|-----|
| 1 | Lakshami Mittal | 20.00 | 55 |
| 2 | Azim Premji | 11.00 | 60 |
| 3 | Mukesh Ambani | 7.00 | 48 |
| 4 | Anil Ambani | 5.50 | 46 |
| 5 | Kushal Pal Singh | 5.00 | 74 |
| 6 | Sunil Mittal | 4.90 | 48 |
| 7 | Kumar Birla | 4.40 | 38 |
| 8 | Tulsi Tanti | 3.70 | 47 |
| 9 | Pallonji mistry | 3.30 | 76 |
| 10 | Anurag Dikshit | 3.10 | - |
| 11 | Shiv Nadar | 3.00 | 60 |
| 12 | Shashi Ruia | 2.70 | 62 |
| 13 | Adi Godrej | 2.30 | 63 |
| 14 | Anil Agarwal | 2.10 | 52 |
| 15 | Dilip Shanghvi | 2.00 | 50 |
| 16 | Naresh Goyal | 1.90 | 56 |
| 17 | Indu Jain | 1.70 | - |
| 18 | Venugopal Dhoot | 1.60 | 52 |
| 19 | Malvinder Singh | 1.55 | - |
| 20 | Rahul Bajaj | 1.50 | 67 |

- (a) Comment on the measures of central tendency for both the parameters. **5.5**
 (b) Comment on the relationships between two parameters based on all measurements. **5.5**

OR

- (a) Comment on the measures of variability for both the parameters. **5.5**
 (b) Comment on the relationships between two parameters based on all measurements. **5.5**

- Q.6** According to the Capital Asset Pricing Model (CAPM), the risk associated with a capital asset is proportional to the slope β_1 (or simply β : Regression coefficient Y on X) obtained by regressing the assets past returns with the corresponding return of the average portfolio called the market portfolio. (The return of the market portfolio represents the return earned by the average investor. It is a weighted average of the returns from all the assets in the market. The larger the sloop of β on of an asset, the larger is the risk associated with that asset. A β of 1.00 represents average risk. The return from IT firm's stock and the corresponding returns for the market portfolio for the past 8 years are given below:

| | | | | | | | | |
|--------------------|----|----|----|----|----|----|----|----|
| Market Return (x) | 53 | 47 | 41 | 50 | 58 | 62 | 45 | 60 |
| Stock's Return (y) | 5 | 5 | 7 | 4 | 10 | 12 | 3 | 11 |

- (a) Determine the equation of the simple regression line to predict y from x . **06**
(b) Using the x values, solve for the predicted values of y and the residuals. **06**

OR

- (a) Solve for SSE and Calculate the standard error of the estimate. **06**
(b) Determine the coefficient of determination **06**

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