No. of Pages - 09
No of Questions - 08

SCHOOL OF ACCOUNTING AND BUSINESS
BSc. (APPLIED ACCOUNTING) GENERAL / SPECIAL DEGREE PROGRAMME

YEAR I SEMESTER II (Group A)
END SEMESTER EXAMINATION – DECMBER 2014

QMT 10230 Business Statistics

Date	:	22nd December 2014
Time	:	9.00 a.m. – 12.00 p.m.
Duration	:	Three (03) Hours

Instructions to Candidates:

- Answer only **FIVE** (05) questions.
- The total marks for the paper is 100.
- All questions carry equal marks.
- Use of scientific calculator is allowed.
- Standard Normal Table and Formula Sheets are provided.
- Graph Papers are provided on request.
- Answers should be written neatly and legibly.

Question No. 01

Discuss the different roles played by the qualitative and quantitative approaches of managerial decision making. Why it is important for a manager or decision maker to have a good understanding in both of these approaches of decision making?

(Total 20 Marks)

Question No. 02

i. A study on the quality of all the items produced by three shifts in a factory during a certain day gave the following summary.

	Shift I	Shift II	Shift III	*Total*
Grade A	84	75	55	214
Grade B	57	22	11	90
Grade C	12	17	01	30
Total	153	114	67	334

If an item is selected at random what is the probability that

a. It is grade A.
b. It was produced by shift II or is grade B.
c. It was produced by shift I and Grade C.
d. It is Grade C given that it was produced by shift III.
e. It is from shift III, given that it is grade B.

ii. The chance that a harvest is poorer than average is 0.60, but if it is known that a certain disease *D* is present, this probability increases to 0.85. The disease *D* is present in 35% of the harvests. Find the probability that, when the harvest is observed to be poorer than average, the disease *D* is present.

iii. A business consultant evaluates a proposed venture as follows. A company stands to make a profit of \$10 000 with a probability 0.15, to make a profit of \$5000 with a probability 0.45, to break even with a probability of 0.25 and to lose \$5000 with a probability of 0.15. Find the expected profit.

(Total 20 Marks)

Question No. 03

i. Mean and Standard deviation are called "Descriptive Measures" in Statistics. "Descriptive Measures play a major role in helping Managers in their decision making". Comment on this statement.

ii. The prices of slacks in five different stores are Rs. 1290, Rs.1550, Rs.2950, Rs 2450, and Rs. 1790. Find the mean and the standard deviation of the price of slacks.

iii. During ten days in a festival the highest sale of a shop was on Sunday and Rs. 50000 more than the average sale for the other days. If the Average sales of the festival season was calculated to be 130000, find the mean sales leaving the highest sales.

(Total 20 Marks)

Question No. 04

i. A new bulb manufacturer states that the bulbs he produces have a mean lifetime of 1500 hours with a standard deviation of 150 hours.
    a. If a bulb is selected at random find the probability that it has a lifetime less than 1650 hours.
    b. What percentage of the bulbs will last more than 1950 hours?
    c. If the manufacturer wishes to replace 15% of the bulbs free of charge, what guarantee period would the manufacturer planning to offer?

ii. During the trial production run of new Aluminum bar Production Company the weight of bars is observed to be normally distributed. It is also observed that 10% of the bars' weight is more than 1.8 kg, and 15% of bars' weight is less than 1.35 kg. Find the mean and the standard deviation of the weight of the Aluminum bar produced by this company during the trial production run.

(Total 20 Marks)

Question No. 05

An US insurance company is reviewing its current policy rates. When originally setting the rates they believed that the average claim amount was $1,800. They are concerned that the true mean is actually higher than this, because they could potentially lose a lot of money. They

randomly selected 40 claims, and calculated the sample mean as $1,950. Assuming that the standard deviation of claims is $500, you are requested to check whether the insurance company's belief is acceptable or not at 5% level of significance by carefully answering the following steps.

i. Write down the null hypothesis
ii. Write down the alternative hypothesis
iii. What are the test statistic and the critical region for this hypothesis testing
iv. Evaluate the test statistic using the sample provided
v. Give your conclusion at the required level of significance

(Total 20 Marks)

Question No. 06

A random sample of eight drivers insured with a company and having similar auto insurance policies in the US were considered and the following table lists their driving experiences (in years) and monthly auto insurance premiums (in $).

Driving Experience (in years)	Monthly Auto Insurance Premium ($)
05	64
02	87
12	50
09	71
15	44
06	56
25	42
16	60

i. Does the insurance premium depend on the driving experience or does the driving experience depend on the insurance premium? Do you expect a positive or a negative relationship between these two variables?
ii. Calculate the correlation coefficient and coefficient of determination and explain what they mean.
iii. By choosing appropriate response and predictor variables based on your answer in part (i). Develop the least square regression line.

iv. Interpret the meaning of the values of $\boldsymbol{\beta_0}$ and $\boldsymbol{\beta_1}$ calculated in part (iii).

v. Predict the monthly auto insurance premium for a driver with 10 years of driving experience.

(Total 20 Marks)

Question No. 07

The following table gives the quarterly production figures of a company which produces soft toys.

Year	Quarter	Production
2012	Q1	205
	Q2	270
	Q3	198
	Q4	189
2013	Q1	209
	Q2	259
	Q3	239
	Q4	209
2014	Q1	239
	Q2	299
	Q3	269
	Q4	-

i. Briefly explain the four components defined in time series and the basic models available in time series

ii. Suggest the best approach to find the trend of production.

iii. Using the approach you mentioned in part (ii) find the trends

iv. With an appropriate argument choose the best model and find the seasonal components

v. Adjust the seasonal components you found in part (iv).

vi. Interpret the seasonal components you found in part (v).

vii. If the forecasted trends for the four quarters of the year 2015 are 250, 345, 290 and 265 respectively, forecast the production for four quarters of the year 2015, using an appropriate forecasting model.

viii. Find the deseasonalized figures of the given quarterly production figures using the seasonal components you have calculated in part (iv)

(Total 20 Marks)

Question No. 08

i. Write short notes on three of the following.
   a. Type I error
   b. Type II error
   c. Significance level
   d. Rejection region

ii. The average weekly wage of all workers in a large factory is Rs. 14,480. In a random sample of 100 male workers in the factory, it was found that the mean income was Rs. 14,510. Assuming that the standard deviation Rs. 112, can we conclude (with $\alpha = 0.05$) that the mean weekly wage of male workers is greater than the overall mean weekly wage?

iii. A grocer wishes to index the prices of four different types of Toilet Soap, with base year 2013 and current year 2014. The available information is as follows:

	2013		**2014**	
Type	**Price (£)**	**Quantity(crates)**	**Price (£)**	**Quantity (crates)**
A	0.89	65	1.03	69
B	1.43	23	1.69	28
C	1.29	37	1.49	42
D	0.49	153	0.89	157

Calculate the;

a. Laspeyres index
b. Paasche index
c. Fisher index

(Total 20 Marks)

FORMULA SHEET

$$\bar{X} = \frac{\sum X}{n}$$

$$\bar{X} = \frac{\sum fX}{\sum f}$$

$$SD = \sqrt{\frac{\sum (X - \bar{X})^2}{n - 1}}$$

$$SD = \sqrt{\frac{\sum f(X - \bar{X})^2}{\sum f - 1}}$$

$$MAD = \frac{1}{n}\sum |X - \bar{X}|$$

$$MAD = \frac{\sum f\ |X - \bar{X}|}{\sum f}$$

$$C.V. = \frac{SD}{Mean} \times 100$$

$$WAM = \frac{\sum wX}{\sum w}$$

$$r = \frac{n\sum xy - \sum x \sum y}{\sqrt{\left[n\sum x^2 - (\sum x)^2\right] \times \left[n\sum y^2 - (\sum y)^2\right]}}$$

$$Coefficient\ of\ Determination = 100\, r^2$$

$$r = \frac{S_{xy}}{\sqrt{S_{xx} S_{yy}}}$$

$$\beta_1 = \frac{n\sum xy - \sum x \sum y}{\left[n\sum x^2 - (\sum x)^2\right]}$$

$$\beta_0 = \frac{\sum y}{n} - b\frac{\sum x}{n}$$

$$\beta_1 = \frac{S_{xy}}{S_{xx}}$$

$$R = 1 - \frac{6\sum d^2}{n(n^2 - 1)}$$

$$\Pr[A \cup B] = \Pr[A] + \Pr[B] - \Pr[A \cap B] \qquad \Pr[A'] = 1 - \Pr[A]$$

$$\Pr[A \cap B] = \Pr[A] \times \Pr[B] \qquad \Pr[A|B] = \frac{\Pr[A \cap B]}{\Pr[B]}$$

$$\Pr[X = x] = {}^{n}C_{x} p^{x} (1-p)^{n-x} \qquad \Pr[X = x] = \frac{e^{-\lambda}\lambda^{x}}{x!}$$

$$E[X] = \sum x \Pr[X = x]$$

$$Z = \frac{\bar{x} - \mu_0}{\sigma / \sqrt{n}} \qquad T = \frac{\bar{x} - \mu_0}{s / \sqrt{n}}$$

$$Z = \frac{(\bar{x}_1 - \bar{x}_2) - d_0}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}} \qquad T = \frac{(\bar{x}_1 - \bar{x}_2) - d_0}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

$$I_L = \frac{\sum P_1 Q_0}{\sum P_0 Q_0} \qquad I_P = \frac{\sum P_1 Q_1}{\sum P_0 Q_1}$$

$$I_F = \sqrt{I_L \times I_P}$$

$$Z = \frac{\bar{X} - \mu_0}{\left(\frac{\sigma}{\sqrt{n}}\right)}$$

$$T = \frac{\bar{X} - \mu_0}{\left(\frac{s}{\sqrt{n}}\right)}$$

$$Z = \frac{(\bar{X}_1 - \bar{X}_2) - \mu_d}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$$

$$T = \frac{(\bar{X}_1 - \bar{X}_2) - \mu_d}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

$$T = \frac{(\bar{X}_1 - \bar{X}_2) - \mu_d}{S_p\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

$$S_P^2 = \frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}$$

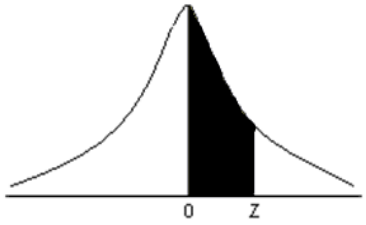
$$Z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0 q_0}{n}}}$$

$$\bar{X} \pm Z_{\frac{\alpha}{2}}\left\{\frac{\sigma}{\sqrt{n}}\right\}$$

$$\bar{X} \pm t_{\frac{\alpha}{2}, n-1}\left\{\frac{s}{\sqrt{n}}\right\}$$

$$\hat{p} \pm Z_{\frac{\alpha}{2}}\sqrt{\frac{\hat{p}\hat{q}}{n}}$$

The Standard Normal Distribution Table



	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.49865	0.49869	0.49874	0.49878	0.49882	0.49886	0.49889	0.49893	0.49896	0.49900
3.1	0.49903	0.49906	0.49910	0.49913	0.49916	0.49918	0.49921	0.49924	0.49926	0.49929
3.2	0.49931	0.49934	0.49936	0.49938	0.49940	0.49942	0.49944	0.49946	0.49948	0.49950
3.3	0.49952	0.49953	0.49955	0.49957	0.49958	0.49960	0.49961	0.49962	0.49964	0.49965
3.4	0.49966	0.49968	0.49969	0.49970	0.49971	0.49972	0.49973	0.49974	0.49975	0.49976
3.5	0.49977	0.49978	0.49978	0.49979	0.49980	0.49981	0.49981	0.49982	0.49983	0.49983