CHARTERED ACCOUNTANTS OF SRI LANKA

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

## YEAR I SEMESTER I (INTAKE VI - GROUP B) END SEMESTER EXAMINATION - SEPTEMBER 2016

## QMT 10130 Business Mathematics

| Date | $:$ | 15th September 2016 |
| :--- | :--- | :--- |
| Time | $:$ | 5.30 p.m. -8.30 p.m. |
| Duration | $:$ | Three $(03)$ hours |

## Instructions to Candidates:

- Answer ALL questions.
- This paper consists of Three (03) parts; Part I, II and III
- Allocated marks for each question is indicated.
- Total marks for the paper is 100 .
- Use of non-programmable electronic calculator is allowed.
- Answers should be written clearly with the required steps.


## PART I

## Question No. 01

## Answer ALL questions

1. Average cost function for a firm is given by

$$
A C=2 X^{2}-18 X+8
$$

Find the level of output at which the marginal cost is minimum.
i. 1
ii. 2
iii. 3
iv. 4
2. The demand function for a firm is given by

$$
3 P+5 X=200
$$

Find the level of output which maximize the total revenue.
i. 20
ii. 25
iii. 30
iv. 40
3. A man invests Rs. 50,000 at simple interest rate of $12 \%$ per annum. How long will it take him to receive Rs. 22,500 as the total interest?
i. 3 years and 4 months
ii. 3 years and 9 months
iii. 4 years and 2 months
iv. 4 years and 6 months
4. A man deposits Rs. 25,000 in a bank account for three years where the bank pays $10 \%$ interest per annum compound semi-annually. What will be the total interest earned during the period?
i. Rs. 3,940.63
ii. Rs. $8,275.00$
iii. Rs. 8,502.39
iv. Rs. 19,289.03
5. What will be the effective interest rate when the nominal rate of $14 \%$ per annum compound quarterly?
i. $16.89 \%$
ii. $14.49 \%$
iii. $14.75 \%$
iv. $31.08 \%$
6. What will be the future value at the end of the fifth year, if you invest Rs. 75,000 today at the rate of $8 \%$ per annum compound semi-annually?
i. Rs. $50,667.31$
ii. Rs. $51,043.74$
iii. Rs. $110,199.61$
iv. Rs. 111,018.32
7. What will be the present value of Rs. 100,000 which is expected to be received after 10 years from now if the interest rate is $15 \%$ per annum compound in every four months?
i. Rs. $23,137.74$
ii. Rs. $24,718.47$
iii. Rs. 404,555.77
iv. Rs. 432,194.32
8. A machine with an original cost of Rs. 50,000 has an estimated salvage value of Rs. 2,000 after 6 years. Assuming an interest rate of $5 \%$ per annum, find the annual deposit to be made at the end of each year to a sinking fund to replace the machine at the end of the sixth year.
i. Rs. 7056.84
ii. Rs. 7350.87
iii. Rs. 7644.91
iv. Rs. 8515.03
9. Previous year a company produced key tags at a fixed cost of Rs. 2,000 per day and variable cost of Rs. 60 per item. This year the fixed cost is expected to increase by $15 \%$ and the variable cost by $20 \%$. If they can sell a key tag at Rs. 95 each, the break-even point in terms of units and value is;
i. 50 and Rs. 5900
ii. 75 and Rs. 7100
iii. 100 and Rs. 5900
iv. 100 and Rs. 9500
10. During last week a manufacturing firm was able to reach a sales goal of Rs. 35,000 with a total expense of Rs. 65,600 , leading to a loss of Rs. 30,600 . Over the past few weeks, it was noted that the firm's fixed expense remained at Rs. 43,200 per week. What was the break-even level of sales for the last week?
i. Rs. 62,222
ii. Rs. 67,500
iii. Rs. 85,000
iv. Rs. 102,500

## PART II

## Answer ALL questions

## Question No. 02

Average cost function for a firm is given by

$$
A C=\frac{1}{3}\left(4 X^{2}-29 X-190\right)
$$

and the demand function is given by

$$
3 P+2 X=50
$$

where X is the level of output and P is the price.
i. Obtain the total revenue function, TR.
(04 marks)
ii. If the government imposed a tax of Rs. 10 per unit of output and the management of the firm decides to add it to their cost, obtain the new average cost function, $\mathrm{AC}_{1}$.
iii. Hence or otherwise obtain the total cost function, TC.
iv. Obtain the profit function, $\pi$
v. Obtain the profit maximizing level of output.

## Question No. 03

A machine costing Rs. 75,000 has an estimated scrap value of Rs. 6,750 after 8 years. Assuming the reducing balance method of depreciation, obtain;
i. The rate of depreciation
(04 marks)
ii. The book value of the machine after 4 years
(02 marks)
iii. Depreciation in the fifth year
(04 marks)
(Total 10 Marks)

## Question No. 04

An investment worth of Rs. 100,000 today yields Rs. 55,000 at the end of the first year and another Rs. 60,500 at the end of the second year.
i. Obtain the present value of total returns under the annual interest rate of $12 \%$ compound annually and decide whether the investment is profitable.
ii. Calculate the internal rate of return of this investment
(08 marks)
(Total 14 Marks)

## Question No. 05

A person wants to accumulate Rs. 150,000 to purchase a computer in three years' time. If he decides to collect this amount through a series of equal deposits made at the end of each year, for which an annual interest rate of $6 \%$, compound semi-annually is paid;
i. Determine the size of each deposit.
ii. If he is able to deposit Rs. 50,000 at the end of each year for the first two years, what will be the amount to be deposited at the end of the third year?

## Part III

Answer ALL questions

## Question No. 06

A manufacturing firm is going to purchase a machine which has a life time of 6 years. The initial cost of the machine will be Rs. 85,000 where the estimated scrap value at the end of the sixth year will be Rs. 15,000 . Thus they have set up a sinking fund to purchase a new machine at the end of the $6^{\text {th }}$ year by saving a fixed sum of money at the end of year. It was assumed that, at the end of the $6^{\text {th }}$ year the cost of the machine will increase by Rs. 25,000 than the cost of the initial purchase. The annual interest rate paid for the savings will be $9 \%$ compounded annually.
i. Calculate how much to be deposited in the sinking fund at the end of each year. (05 marks)
ii. Complete the following depreciation schedule for the first three years.

| Period <br> $($ Year $)$ | Interest | Annual <br> Deposit | Annual <br> Depreciation | Total <br> Depreciation | Book Value <br> at the end |
| :--- | :--- | :--- | :--- | :--- | :--- |
| 0 | - | - | - | - |  |
| 1 | - |  |  |  |  |
| 2 |  |  |  |  |  |
| 3 |  |  |  |  |  |
| $(15$ marks) |  |  |  |  |  |

