THE OPEN UNIVERSITY OF SRI LANKA
Department of Civil Engineering
Construction Management Programme – Level 7
CEX7110 – Construction Project Appraisal
FINAL EXAMINATION – 2017/2018
Time Allowed: Three Hours

Date: 08-02-2017 (Friday)	Time: 0930 - 1230 hrs.

The paper consists of 06 questions. Answer any Four (04) questions.

Q1.

(a) Briefly explain what is understood by the following two processes; compounding of cash flows and discounting of cash flows. Use examples to illustrate your answer.

(Marks 06)

(b) Explain the two terms 'Sinking Fund Deposit Factor' and 'Capital Recovery Factor'. State the benefits of these to a building contractor in its financial operations.

(Marks 06)

(c) Explain how the effects of inflation are incorporated in project appraisal conducted with the use of cash flow techniques.

(Marks 06)

(d) Explain the usefulness of concept of capital budgeting to a contractor who intends to acquire property, plant and equipment.

(Marks 07)

Q2.

(a) Imagine you plan to retire at the age 50 after a short career. You would like to accumulate enough money by the age 50 to withdraw Rs.600,000 per year for 30 years. You plan to pay into your account 25 equal installments beginning when you are 25 and ending when you are 50. Your account bears interest of 15 per cent per year.

(i) How much do you need to accumulate in your account by the time you retire?
(ii) How much do you need to pay into your account in each of the 25 equal installments?

(Marks 10)

(b) A company is considering the purchase of a machine for, Rs.7,200,000. The machine has an eight-year useful life and no salvage value. The estimated cash flows are:

End of Year	Inflows	Major Repair Outflow
1	1,900,000	
2	1,800,000	
3	1,600,000	
4	2,000,000	1,000,000
5	1,800,000	
6	1,600,000	
7	1,800,000	
8	2,000,000	

Determine the payback period of the purchase the machine.

(Marks 05)

(c)   Exaplin five advantages of 'payback period' as a capital budgeting method. Also briefly outline three disadvantages of "payback period'.

(Marks 10)

Q3.

(a) A firm is considering three projects each with initial investment of Rs.1,000,000 and a life of 5 years. The profits generated by the projects are estimated to be as follows;

Year	Project 1	Project 2	Project 3
1	200,000	350,000	150,000
2	200,000	200,000	150,000
3	200,000	150,000	150,000
4	200,000	150,000	200,000
5	200,000	150,000	350,000
Total	1,000,000	1,000,000	1,000,000

For all 3 projects calculate the average annual return (AAR) on;
   i)Initial Capital
   ii) Average capital

(Marks 07)

(b)Jaydee Ltd. is considering investing in a new equipment. The following data is available;

	Present Equipment (5 years old)	Proposed Equipment
Capital cost	Rs.1,000,000	Rs. 1,500,000
Written down value	Rs. 500,000	1,500,000
Estimated life	10 years	10 years
Running hours per annum	2000	2000
Output per hour (units)	10	15
Selling price per unit	Rs.50	Rs.46
Unit costs Power Consumable stores Materials Wages	3.0 5.0 22.0 5.0	3.0 5.0 20.0 5.0

The present equipment would realize Rs.400,000 if sold now, but scrap value should be nil after five years. The proposed equipment is expected to be worth Rs. 750,000 after 5 years and would have no scrap value after 10 years.
The company's cost of capital is 10% p.a. Ignoring tax, calculate the return on capital
i)by the average annual return (AAR) method for both on original investment and on average investment
ii)by the D.C.F internal rate of return method.

Explain whether Jaydee Ltd. should replace its equipment.

(Marks 18)

Q4.

A Metal Products Company is considering an investment in a new product line. The company produces a variety of products from various metals. The new product under consideration is bolts made out of brass.
To produce the product, the company would need to acquire additional production and marketing equipment with an investment of Rs.1,000,000. The equipment would have an expected life of six years, at which time it would have no market value. The company would also need to invest Rs. 200,000 in additional working capital (primarily to support an increase in accounts receivable).
Over the six year life of the equipment, the company projects the following production and sales volume:

	Sales Volume
Year 1	200,000
Year 2	300,000
Year 3	400,000
Year 4	300,000
Year 5	200,000
Year 6	200,000

The company projects the sales price for the new products to be Rs.2.75 for all years and estimates all variable costs would sum to Rs.1.30 per unit. Furthermore, fixed cash expenses are projected at Rs.125,000 per year. For tax purposes, the original cost of the equipment would be depreciated at the following rates;

Year 1	15%
Year 2	22%
Year 3	21%
Year 4	21%
Year 5	21%
Year 6	0%
Total	100%

The company's marginal tax rate is expected to remain at the current rate of 40% over the life of the equipment. The company uses a hurdle rate of 8 % (its cost of capital) to evaluate projects of this type.

(a)   Compute the after-tax NPV of the proposed project. Based on the NPV, is the project acceptable.

(Marks 15)

(b)   Compute the payback period for the proposed project.

(Marks 05)

(c)   Determine the IRR of the project.

(Marks 05)

Q5

(a)   The inflation rate is 15% and a project is expected to generate 18% per annum return on nominal basis. Calculate the real return.

(Marks 05)

(b)   Describe average annual return (AAR) approach. Compare AAR and the NPV approach with reference to the time value of money.

(Marks 05)

(c)   The management of Sharp Pin Company is contemplating the purchase of a new machine (at a cost of $100,000) capable of producing 192,000 units per year. The old machine that is capable of producing 130,000 units per annum is to be sold for $20,000 in the event of purchasing a new machine. The contribution margin per unit from operating the new machine is $0.125, while it is $0.10 per unit from operating the old machine.
The useful life of the old machine was 10 years when it was purchased 2 years ago. The useful life of the new machine is eight years. The new machine has a salvage value of $20,000, while the old machine's salvage value is zero. The old machine will require an overhaul at the end of two years from today at a cost of $10,000. The new machine will require an overhaul at the end of the fourth year at a cost of $8,000. The firm's cut off rate for investment decisions is 10 percent. Income taxes are to be ignored. Using the comparative income approach and net present value analysis, determine whether the old machine should be replaced.

(Marks 15)

Q6

A computing system used by a leading property developer is outdated. The developer has voted to purchase a new computing system to be funded through retained profits. The Chairman has asked the company's finance director to make a recommendation as to which of two computing systems should be purchased. The two systems are equivalent in their ability to meet the company's needs and in their ease of use. The mainframe system consists of one large mainframe computer with remote terminals and printers located through out the sites located in the city. The personal computer system consists of a much smaller mainframe computer, a few remote terminals, and a dozen personal computers, which will be networked to the small frame. Each system would last five years. The finance director has decided to use 12 percent discount rate for the analysis. Following table presents the data pertinent to the decision. The table given below provide a description of the two systems.

Description	Mainframe System (Rs.)	Personal Computer System (Rs.)
Salvage value of old computer (time 0)	250,000	250,000
Acquisition cost of new system (time 0)	4,000,000	3,000,000
Acquisition cost of software (time0)	400,000	750,000
Cost of updating system (time 3)	400,000	600,000
Salvage value of new system (time 5)	500,000	300,000
Operating costs (times 1,2,3,4,5)		
Personnel	3,000,000	2,200,000
Maintenance	250,000	100,000
Other	100,000	50,000
Data link service cost (times 1,2,3,4,5)	200,000	200,000
Revenue from time-share customers (times 1,2,3,4,5)	200,000	200,000

Note: Time 0 denotes 'immediately' Time 1 denotes the end of year 1 etc.

Determine the net present values of both the alternatives and thereby recommend the most cost effective computer system for the organisation.

(Marks 25)