ENGINEERING ECONOMICS

INTEREST AND INTEREST FORMULAE UNIT I

List and explain the conditions for present worth comparisons.

Explain how the problem solving process leading ultimately to decision making is carried out with a neat block diagram.

If you deposit Rs. 20000 today, what equal amounts can you withdraw at the end of each quarter for the next four years when the nominal interest rate is 10%? Draw CFD

A company 3 years ago borrowed Rs. 40000 to pay for a machine tool agreeing to repay the loan in 100 monthly payments at an annual nominal interest rate of 12% compounded monthly. The company now wants to pay off the loan. How much would this payment be assuming no penalty cost for early payout? Draw CFD.

A person is planning for his retired life. He has 15 more years of service. He would like to deposit Rs. 15000 at the end of first year and there after he wishes to increase his deposit by Rs.2500 more every year for the next 14 years. What will be the maturity amount of this deposit if the interest rate is 10%. Draw CFD

Explain: Simple interest, Compound interest, Nominal interest and Effective Interest rate.

Rs 200000 are deposited in a bank for a period of 4 years at an interest rate of 12%. Calculate the compound amount and the effective interest rate if the interest is compounded a) biannually b) quarterly c) monthly d) weekly, e) daily.

If you deposit Rs. 2,00,000 today, what equal amounts can you withdraw at the end of each year for the next four years when the interest rate is 12% ? Draw CFD. Instead if you would like to withdraw at the end of each month for next four years, what will be the monthly with-drawl amount when nominal interest rate is 12% compounded monthly? [L3]. [PO1, PO5] [CO1]

Explain with relevant examples problem solving and engineering decision making.

Mr. James is planning for his retired life. He has 20 more years of service. He would like to deposit Rs. 12000 at the end of first year and there after he wishes to increase his deposit by Rs.3000 more every year for the next 19 years. *Evaluate* the maturity amount of this deposit if the interest rate is 10%. Draw CFD. [L2] [PO1] [CO3]

Define Interest and *explain* interest from lenders and borrowers view point. *Draw* a CFD. [L2] [PO1] [CO1]

Explain the law of demand and law of supply. *Give* examples and *list* the factors affecting them [L2] [PO1] [CO1]

Calculate the accumulated amount in 3 years for a deposit of Rs 2000 with an interest rate of 9% when compounded a) annually b) biannually c) quarterly c) monthly. [L3] [PO1, PO5] [CO1]

A company invests Rs 60000 for a machine today. The expected returns from the machine are Rs 10000 for the first year of operation and thereafter the returns decrease by Rs 500 per year for each further year of operation. The machine will be in use for 9 years. *Draw* a CFD and using present worth method *state* whether the investment in justified or not? Assume an interest rate of 10% compounded annually [L3]. [PO1, PO5] [CO1, CO2]

A manufacturing firm in a foreign country has agreed to pay Rs 25000 in royalties at the end of each year for next 5 years for the use of a patented design. If the payments are left in the foreign country, interest on the retained funds will be paid at an annual rate of 15%. *Calculate* A) What total amount will be available in 5 years under these conditions? B) How large would the uniform annual payments have to be if the patent owners insisted that a minimum of Rs 180000 be accumulated in the account by the end of 5 years? [L3] [PO1, PO5] [CO1]

A house is available for monthly rent of Rs 12000. Calculate the present worth of this plan if the payments are made a) at the end of month b) at beginning of the month. Comment on result. Draw CFD

A company 3 years ago borrowed Rs. 40000 to pay for a machine tool agreeing to repay the loan in 100 monthly payments at an annual nominal interest rate of 12% compounded monthly. The company now wants to pay off the loan. How much would this payment be assuming no penalty cost for early payout? Draw CFD.

Define Interest and explain interest from lenders and borrowers view point. Draw a CFD

Explain how the problem solving process leading ultimately to decision making is carried out with a neat block diagram.

Mr. James is planning for his retired life. He has 20 more years of service. He would like to deposit Rs. 12000 at the end of first year and there after he wishes to increase his deposit by Rs.2000 more every year for the next 19 years. Evaluate the maturity amount of this deposit if the interest rate is 10%. Draw CFD.

The rights to a PATENT have been sold under an agreement in which annual year end payments of Rs.100000 are to be made for next 10 years. What is the future sum of this annuity at an interest rate of 8%? What is the present worth of this annuity at an interest rate of 8%?

Rs 50000 are invested at a nominal interest rate of 15%. Calculate the future amount if the compounding is a)Yearly b)Semi-annually c) Quarterly d) Monthly e) Infinitely. Comment on your results.

Briefly explain law of demand, supply and returns.

Write a note on engineering decision making.

Calculate the net fund accumulated at the end of 5 years if an r 2000 is deposited every month. Take an interest rate of 12%. Also calculate its present worth.

For an interest rate of 10% compounded annually, find:
   a) How much can be loaned now if Rs.2000 will be repaid at the end of three years?
   b) How much will be required 6 years hence to repay a Rs. 50000 loan made now?
What is the present value of the following series of prospective receipts?
   c) Rs. 1500 a year for 15 years at 15% compounded annually.

What annual equal payment series is necessary to repay the following increasing series of payments: A series of 7 end of year payments that begins at Rs.2000 and increases at the rate of Rs.100 a year with 10% interest compounded annually?

Calculate the effective interest rate of a nominal interest rate of 18% P.A. when compounded a) half yearly   b) monthly   c) weekly.

The rights to a patent have been sold under an agreement in which annual year end payments of Rs.100000 are to be made for next 10 years. What is the future sum of this annuity? What is the present worth of this annuity at an interest rate of 7%?

A person borrows Rs. 10000 on loan at a simple interest rate of 10% per annum for 8 years. What will be the compound interest rate if he has to pay the same amount after 5 years?

You have a chance to buy a MOTORCYCLE with a list price of Rs. 90000. You have to pay a down payment of Rs. 30000 and the dealer will finance the remainder at a nominal interest of 12 % compounded monthly for next 3 years. *Determine* the amount of your monthly installment and total interest you pay over 3 years.

An utility is purchased for an amount of 18000 and it is expected to serve for 4 years. If the interest rates are 8% for simple interest and 6% for compound interest, calculate the interest earned in both cases and offer your comments.

Explain Law of demand, supply, break even point and law of returns. Sketch wherever necessary

A person is planning for his retired life. He has 15 more years of service. He would like to deposit Rs. 15000 at the end of first year and thereafter wishes to increase the deposit by Rs 2000 each year for further 14 years. What will be the maturity amount of this deposit if the interest rate is 10%. Draw CFD. Alternatively, if equal end of year payments of Rs 20000 are made for 15 years, evaluate the maturity amount at an interest rate is 10%.

Briefly explain law of demand, law of supply and law of returns. What are the factors that affect demand and supply? Explain.

A company invests Rs 60000 for a machine today. The expected returns from the machine are Rs 10000 for the first year of operation and thereafter the returns decrease by Rs 500 per year for each further year

of operation. The machine will be in use for 9 years. Draw a CFD and using present worth method state whether the investment in justified or not? Assume an interest rate of 10% compounded annually

PRESENT WORTH COMPARISONS (PWC AND EAWC)

A publication house offers a 3 year subscription for a down payment of Rs 10000 or a 5 year subscription for a down payment of 15000. Magazines worth 5200 are dispatched every year. Compare the two alternatives at an interest rate of 14% p.a. using present worth method.

A company is considering investing Rs.10, 000 in a heat exchanger. The heat exchanger will last 5 years, at which time it will be sold for Rs. 2,000. The maintenance cost at the end of the first year is estimated to be Rs. 1,000. Maintenance costs for the exchanger are estimated to increase by Rs. 500 per year over its life. As an alternative, the company may lease the equipment for $X per year, including maintenance. (a) Draw a cash flow diagram of both alternatives. (b) For what value of X should the company lease the heat exchanger? The company expects to earn 8% on its investments. Assume end-of-year lease payments.

.Explain Present worth by Rule 72.

Machine X has first cost of Rs 100000, no salvage value at the end of 6 years of useful life and annual operating costs of Rs 40000. Machine Y costs 150000 and has an expected resale value of Rs 45000 at the end of 9 years of life. Operating costs of machine Y are 50000 per year. Evaluate the two alternatives on the basis of PWC method at 10% annual interest rate.

The maintenance cost of a machine is rs 2000 for the first year of operation and increases by rs 500 from 2nd year onwards. The initial cost of the equipment is rs 100000. If its salvage value at the end of 8 years is rs 20000 calculate the present worth of the equipment.

A company is evaluating 2 transporting equipments for possible use. (Only one equipment will be purchased.) Data associated with transport equipment are as follows

	Equipment A	Equipment B
First cost	235000	212000
Operating and maintenance cost	18000/ year	16000year
Expected income	175000/year	112000/year
Estimated salvage value	25000	16000

Assuming a technological life of 5 years and a desired interest rate of 15%, which equipment seems to be preferable? Assume all other factors are equal.

Mega electronics is considering the purchase of a new programmable circuit tester in order to improve its product quality. The equipment has a first cost of Rs.85000 and the salvage value is predicted to be Rs. 6000 after a service life of 5 years. Maintenance and operating costs are expected to be Rs. 8000 for the first year of operation and increase by Rs. 1500 per year for each additional year of use. Using an interest rate of 10% determine what annual savings must be obtained through the use of this equipment to make it economically justifiable.

Explain the conditions for present worth comparisons. [L2] [PO1] [CO2]

Machine X has a first cost of Rs. 9000, no salvage value at the end of 6 years of useful life and annual operating costs of Rs.5000. **Machine Y** costs Rs.16000 and has an expected resale value of Rs. 4200 at the end of its 9 years of useful life. Operating costs of Machine B are Rs. 4500 per year. *Evaluate* the two alternatives on the basis of present worth comparison at 10% annual interest rate. [L3]. [PO1, PO5] [CO1, CO2]

ALPHA electronics is planning to procure a new programmable circuit tester for improvement in product quality. The tester costs Rs.170000 and the salvage value is predicted to be Rs. 15000 after a service life of 6 years. Maintenance and operating costs are expected to be Rs. 16000 for the first year of operation and increase by Rs. 2000 per year for each additional year of use. Using an interest rate of 12% *calculate* what annual savings must be obtained through the use of this equipment to make it economically justifiable. [L3]. [PO1, PO5] [CO1, CO2]

The following alternatives are available to accomplish an objective of 12 years duration. Compare the PW of these alternatives using an interest rate of 7%.

	Plan A	Plan B	Plan C
First cost (Rs.)	20000	80000	100000
Annual cost (Rs)	32000	7000	5000
Life cycle. (years)	6	3	4

Two types of trucks are available for transportation use. They are needed for 10 years of service. Both trucks deliver the same amount of work. Assume interest rate of 7%. Which truck is to be preferred on PW basis? Use CFD for your analysis.

	Plan A	Plan B
First cost (Rs.)	10,00,000	15,00,000
Annual maintenance cost (Rs)	20000	15000
Estimated Life. (years)	5	10
Estimated salvage value (Rs)	2,00,000	5,00,000

AUTOCON company is evaluating 3 robots for possible use in its assembly operations (one robot will be purchased). Data with these robots is in table. Assuming a technological life of 3 years and a desired interest rate of 12% determine which robot seems to be preferable? Assume all other factors remain same and use NPW evaluation.

	Robot A	Robot B	Robot C
First cost (Rs.)	5,50,000	5,80,000	5,30,000
Operation and maintenance cost (Rs per year)	30000	45000	40000
Expected income (Rs.)	4,00,000	4,40,000	3,80,000
Estimated salvage value (Rs)	40,000	60,000	40,000

	Robot A	Robot B	Robot C
First cost (Rs.)	5,50,000	5,80,000	5,30,000
Operation and maintenance cost (Rs per year)	30000	45000	40000
Expected income (Rs.)	4,00,000	4,40,000	3,80,000
Estimated salvage value (Rs)	40,000	60,000	40,000

2 types of power converters ALPHA and BETA are under consideration for a specific application. An economic comparison is to be made with an interest rate of 10% and the following estimates have been obtained. Determine the annual equivalent cost of the alternative systems.

	Equipment A	Equipment B
Purchase price	100000	250000
Estimated service life	5 years	9 years
Salvage value	0	50000
Annual operating cost	25000	12000

DEPRECIATION ESTIMATING AND COSTING (UNIT III)

What is depreciation? Explain the various causes of depreciation
Define depreciation and list its causes.

Explain in brief various components of costs that are to be considered to arrive at the selling price during manufacturing of a product.

With a block diagram explain how the selling price of a component is evaluated giving all the components of costs.

A CNS machine costs Rs. 30,000,000 and is estimated to serve for 8 years after which its salvage value is estimated to be Rs. 250000. Find a) Depreciation fund at the end of 5th year by straight line method and declining balance method. b) Book value of the machine after 4th year by declining balance method.

A small firm is producing 50 pens per day. The direct material cost is found to be Rs. 160, direct labour cost is Rs. 200, and factory overheads are Rs. 250. If the selling on cost is 40% of factory cost, what must be the selling price of each pen to realize a profit of 14.6% of selling price?

A small firm is producing 500 units per day. The direct material cost is found to be Rs. 40000, direct labor cost is Rs.35000, and factory overheads are Rs. 10000. If the selling on cost are 40% of factory cost, what must be the selling price of each pen to realize a profit of 15% of selling price?

List and *explain* the various causes for depreciation. [L2] [PO1] [CO3]

A car was purchased for Rs.400000 and the salvage value was estimated as Rs.100000 at the end of 6 years of useful life. (i) *Calculate* the book value of the car at the end of 4 years by declining balance method and straight line method. (ii) *Evaluate* the accumulated depreciation at the end of 3rd year by declining balance method. [L3]. [PO1, PO5] [CO3]

A parcel of land adjacent to highway is likely to increase in its value. It can be purchased for Rs 240000 and is expected to be worth 450000 in 5 years. During that period it can be rented for pasture for Rs. 4500 per year. Annual taxes are Rs. 2500 and will remain constant. What rate of return will be earned on the investment?

An old car was purchased for 320000. Its life is estimated as 10 years and the scrap value as Rs. 80000.
(i)   Using reducing balance method calculate depreciation rate
(ii)   Estimate depreciation fund at the end of 2 years.

Explain different methods of calculating depreciation. Write the formulae for calculation of depreciation charge as well as Book value for each method. [L2] [PO1] [CO3]

A MACHINE costs Rs. 30000 and is estimated to serve for 6 years after which its salvage value is estimated to be Rs. 4000. Find a) Depreciation fund at the end of 4th year by straight line method and declining balance method. b) Book value of the machine after 5th year by declining balance method. [L3]. [PO1, PO5] [CO3]

The data for a product is available as follows:
    Initial cost = Rs. 150000, salvage value = Rs.10000 and life = 10 years.
    Find the depreciation and Book value after 5th and 8th year using
    a) Straight line method
    b) Declining balance method
    c) Sum of years digit method

For an asset with 50000 initial cost and zero salvage value and an useful life of 5 years, show the depreciation schedule using declining balance method. Assume depreciation rate of 30%. Also show when the switching will take place from declining balance to straight line method.

From the following data related to manufacturing of a product for the month of Jan 2019, Estimate the profit per unit.

Raw materials used = Rs 40000, Direct wages = Rs. 24000, Machine hours worked = 9500 hrs, Machine hour rate @ Rs 4 /hr , Office overhead = 20% of Works cost, Selling overhead = Rs 1/unit, Units produced = 20000, Units sold = 18000

A company produces 500 units of a product per day. Direct materials involved are Rs 40000, direct labour Rs. 35000 and factory overheads Rs. 10000. If the profit expected is 15% of selling price and selling overheads 30% of factory cost, calculate the selling price per unit.

1. MICO factory produces 6000 spark per day involving a direct material cost of Rs. 5,00,000 direct labour cost of Rs. 4,00,000 and factory overheads of Rs.150000. Assume selling overheads are 30% of factory costs and profit of 20% of selling price. Calculate the selling price of each spark plug. [L2]. [PO1] [CO3].

BALANCE SHEET AND P/L ACCOUNT

Prepare a profit and Loss account for PQR Industries with following data for the year ended 31 march 2011:

Cost of goods sold	12,00,000	Interest	1,30,000
Sales	18,50,000	Other income	1,20,000
Selling Expenses	1,00,000	Excess tax paid in previous years	80,000
Depreciation	1,20,000	Operating Expenses	40,000
Provision for tax	1,10,000	Proposed dividend	100000

A company having certain reserves and surplus has following year end details.

Equity shares	200000	Bills payable	20000
Bank balance	10000	Dividend payable	72000
Provision for tax	40000	Preference shares	135000
Land and building	200000	Debtors	160000
Plant and equipment	80000	Bills receivable	20000
Creditors	550000	General reserves	40000
Cash in hand	15000	Stock	77000

Prepare a balance sheet.

Prepare a profit and Loss account for ABC Industries with following data:

Cost of goods sold	12,20,000	Interest	1,90,000
Sales	18,10,000	Other income	1,20,000
Selling Expenses	1,00,000	General Expenses	40,000
Depreciation	2,00,000	Non Operating Expenses	40,000
Provision for tax	1,40,000		

Following are the financial status of a company as on 09^{tht} November 2011.Prepare a balance sheet.

Sundry Debtors	100000	Land and building	500000
Cash in hand	220000	Plant and equipment	900000
Bank loans	400000	Inventories	150000
Bills payable	200000	Creditors	300000
Equity shares	1130000	Bank Balance	160000

A company can purchase a new central computer for Rs 17500 or can lease it for 3 years with annual payments of Rs. 8400. Determine at what interest rate the leasing and purchasing costs would be equivalent?　　　　　(Assume payments to be at the end of the year).

Following are the items of Profit and loss account of XYZ co. for the year ended 31st march 2004. Arrange them systematically and indicate (i) Profit before taxation (ii) Profit after taxation.

	Rs. (Lakhs)		Rs.(Lakhs)
Operating and administrative expenses	10440.6	Depreciation	1382.6
Provision for tax	210.0	Interest	2595.3
Cost of sales and service	54773.9	Sales and service	69552.9
provision for wealth tax	3.5	Other income	517.6
Excess provision for tax in previous years	143.0	proposed dividend	643.8

For the above form Prepare a profit and Loss account of **Single Step Account Form**

Following is the financial status of a company as on 31st march 2006. Prepare a balance sheet

Share Capital	20,00,0000	Bills payable	50,000
Bank balance	1,00,000	Loans	2,00,000
Provision for dividend	30,000	Provision for tax	1,40,000
Land , building and equipment	20,00,000	Debtors	1,10,000
Unclaimed dividend	20,000	Bills receivable	50,000
Creditors	70,000	General reserves	5,00,000
Debentures	3,00,000	Investment	7,00,000
Interest receivable	5,000	Bank balance	1,00,000

Following are the financial status of a company as on 31st march 2009.Prepare a balance sheet.

Sundry Debtors	10000	Land and building	50000
Cash in hand	22000	Plant and equipment	90000
Bank loans	40000	Inventories	15000
Bills payable	20000	Creditors	30000
Equity shares	113000	Bank Balance	16000

Explain in detail various types of assets.

Explain the various sources of financial information and also mention the users of financial information.

Write a note on different concepts of profit.

What is a balance sheet? Illustrate forms and contents of a balance sheet.

Differentiate between Profit and loss account and balance sheet

Enumerate with expressions types of financial ratios.

List and explain various financial ratios

Discuss the need of ratio analysis in engineering organizations

What are merits and demerits of financial ratios.

Discuss the users of financial analysis

State and explain the relation between Assets liabilities and Owners equity

REPLACEMENT AND BREAK EVEN ANALYSIS

Write a note on reasons for replacement of a machine or equipment.

Explain: Economic life, physical life, service life, Useful life

A firm is considering replacement of an equipment, whose first cost is Rs 40000 and the scrap value is negligible at the end of any year. Based on experience it was found that the maintenance cost is zero during the first year and it increases by Rs 2000 every year thereafter. Evaluate
        i) When should the equipment be replaced with i=0% ?
        ii) When should the equipment be replaced with i=12%

The data given below are for a compound manufacturing machine. The purchase price of the machine is 25000 and anticipated cost of future salvage value and operating costs are given in the table. When should the equipment be replaced at i=0% and i=10%?

	1	2	3	4	5	6
Op Cost	6100	6800	7800	9300	11400	14000
Resale Value	15000	12000	9300	7100	5400	4300

The data given below are for a compound manufacturing machine. The purchase price of the machine is 250000 and anticipated cost of future salvage value and operating costs are given in the table. When should the equipment be replaced at i=0% and i=10%?

	1	2	3	4	5	6
Op Cost	61000	68000	78000	93000	114000	140000
Resale Value	150000	120000	93000	71000	54000	43000

A mechanical Machine with an initial cost of Rs 110000 closely follows the cost pattern shown below. Using 0% interest for preliminary evaluation and 10% interest rates determine the economic life.

	1	2	3	4	5	6	7
Op Cost	3700	3950	4200	4700	5400	6300	7200
Resale Value	8500	7600	6400	5000	3600	2200	800

A mechanical Machine with an initial cost of Rs 110000 closely follows the cost pattern shown below. Using 0% interest for preliminary evaluation and 10% interest rates determine the economic life.

	1	2	3	4	5	6	7
Op Cost	37000	39500	42000	47000	54000	63000	72000
Resale Value	85000	76000	64000	50000	36000	22000	8000

3	a.	Explain Present worth by "72 RULE"				
			(1)	(2)	(1)	(04)
	b.	Explain in brief: How to evaluate projects with unequal lives and projects having infinite lives?				
			(1)	(2)	(1)	(08)
	c.	An open air theatre having infinite life is to be built. The total amount allocated for the project is Rs. 10,00,000 which includes annual maintenance cost of Rs. 10000. Calculate the initial amount available for construction if prevailing rate of interest is 10%.				
			(2)	(2)	(1)	(08)
		OR				
4	a.	What are the situations for Equivalent annual worth comparisons (EAC)? Explain these situations with relevant examples and CFD.				
			(2)	(2)	(1)	(10)
	b.	A company is considering investing Rs.2,00,000 on a MACHINE TOOL. The equipment will last 6 years, at which time it will be sold for Rs. 40000. The maintenance cost at the end of the first year is estimated to be Rs. 10000. Maintenance costs for the machine tool are estimated to increase by Rs. 2000 per year over its life. As an alternative, the company may lease the TOOL for Rs. X per year, including maintenance. (a) Draw a cash flow diagram of both alternatives. (b) For what value of X should the company lease the machine TOOL? Assume end-of-year lease payments and interest rate of 8%.				
			(2)	(2)	(1)	(10)
		UNIT – III (Compulsory)	L	CO	PO	M
5	a.	A Tractor was purchased for Rs. 1200000 and the salvage value was estimated as Rs.300000 at the end of 8 years of useful life. (i) *Calculate* the book value of the tractor at the end of 4 years and 6 years by declining balance method and straight line method. (ii) *Evaluate* the accumulated depreciation at the end of 3rd year by declining balance method. iii) Year wise depreciation by SOYD method				
			(3)	(3)	(2)	(10)
	b.	Explain how the selling price of a product is estimated giving all elements of cost				
			(2)	(3)	(1)	(10)
		UNIT - IV	L	CO	PO	M
6	a.	List various financial ratios and explain any 4 ratios in detail.				
			(2)	(4)	(1)	(10)

	b.	Prepare a Profit and Loss account for ABC Industries with following data (all figures in Rs)				

Cost of goods sold	12,20,000	Interest	1,90,000
Sales	18,10,000	Other income	1,20,000
Selling Expenses	1,00,000	General Expenses	40,000
Depreciation	2,00,000	Non-operating Expenses	40,000
Provision for tax	1,40,000		

			(3)	(4)	(2)	(10)
		OR				
7	a.	Explain the various sources of financial information and also mention the users of financial information				
			(2)	(4)	(1)	(06)
	b.	Differentiate between Profit and Loss account and Balance Sheet				
			(1)	(4)	(1)	(06)
	c.	Following are the financial status of a company as on 31st march 2017. Prepare a balance sheet (all figures in Rs.).				

Sundry Debtors	10000	Land and building	50000
Cash in hand	22000	Plant and equipment	90000
Bank loans	40000	Inventories	15000
Bills payable	20000	Creditors	30000
Equity shares	113000	Bank Balance	16000

			(2)	(4)	(1)	(08)
		UNIT –V (Compulsory)	L	CO	PO	M
8	a.	A firm is considering replacement of equipment, whose first cost is Rs 40000 and the scrap value is negligible at the end of any year. Based on experience it was found that the maintenance cost is zero during the first year and it increases by Rs 2000 every year thereafter. Evaluate i) When should the equipment be replaced with i=0% ? ii) When should the equipment be replaced with i=12%				
			(3)	(5)	(2)	(14)
	b.	What are the reasons for replacement of a machine or equipment?				
			(1)	(5)	(1)	(06)

3	a.	What are the situations for equivalent annual worth comparisons? Explain in brief the conditions for present worth comparison method.				
			(1)	(2)	(1)	(10)

	b.	OMEGA company is evaluating 3 conveyers for use in its assembly operations. Data with these conveyers is presented in the table below. Assuming a technological life of 5 years and a desired interest rate of 10% determine which conveyer seems to be preferable? Use NPW evaluation.					

	A	B	C
First cost (Rs.)	110,000	1,30,000	1,20,000
Maintenance cost (Rs per year)	6000	4500	4000
Expected income (Rs.)	80000	88,000	84,000
Estimated salvage value (Rs)	10,000	12,000	8,000

			(3)	(2)	(2)	(10)
		OR				
4	a.	BEST ELECTRONICS is planning to procure a new programmable ROBOT for improvement in product quality. The ROBOT costs Rs.2,40,000 and the salvage value is predicted to be Rs. 20000 after a service life of 8 years. Maintenance and operating costs are expected to be Rs. 25000 for the first year of operation and increase by Rs. 5000 per year for each additional year of use. Using an interest rate of 12% calculate what annual savings must be obtained through the use of this equipment to make it economically justifiable. Draw CFD				
			(3)	(2)	(2)	(10)
	b.	Briefly explain the procedure for evaluation of assets with infinite lives. Two types of BUSSES are available for transportation use. They are needed for 12 years of service. Both busses deliver the same amount of work. Assuming an interest rate of 10%, which bus is to be preferred on PW basis? Use CFD for your analysis.				

	BUS A	BUS B
First cost (Rs.)	22,00,000	28,00,000
Annual maintenance cost (Rs)	80000	95000
Estimated Life. (years)	6	12
Estimated salvage value (Rs)	4,00,000	6,00,000

			(2)	(2)	(2)	(10)
		UNIT – III (Compulsory)	L	CO	PO	M
5	a.	List the various causes for depreciation. A bike was purchased for Rs.80000 and the salvage value was estimated as Rs.20000 at the end of 8 years of useful life. (i) Calculate the book value of the bike at the end of 5 years by declining balance method and straight line method. (ii) Evaluate the accumulated depreciation at the end of 3rd year by declining balance method..				

			(2)	(3)	(1)	(10)
	b.	LIST the components of cost. From the following data related to manufacturing of a product for the month of Jan 2019, Estimate the profit per unit. i) Raw materials used = Rs 40000, ii) Direct wages = Rs. 24000, iii) Machine hours worked = 9500 hrs, iv) Machine hour rate @ Rs 4 /hr , v) Office overhead = 20% of Works cost, vi) Selling overhead = Rs 1/unit, vii) Units produced = 20000				
			(2)	(3)	(1)	(10)

		UNIT - IV	L	CO	PO	M
6	a.	Following are the items of Profit and loss account of XYZ co. for the year ended 31st march 2014. Arrange them systematically and indicate (i) Profit before taxation (ii) Profit after taxation.				

	Rs. (Lakhs)		Rs.(Lakhs)
Operating and administrative expenses	10440.6	Depreciation	1382.6
Provision for tax	210.0	Interest	2595.3
Cost of sales and service	54773.9	Sales and service	69552.9
provision for wealth tax	3.5	Other income	517.6
Excess provision for tax in previous years	143.0	proposed dividend	643.8

			(3)	(4)	(2)	(10)
	b.	Bring out the differences between STEP form and ACCOUNT form of profit and loss account.				
			(1)	(4)	(1)	(4)
	c.	Write a note on various assets and liabilities				
			(2)	(4)	(1)	(6)
		OR				

7	a.	Explain different concepts of PROFIT.				
			(2)	(4)	(1)	(06)

| | b. | Following is the financial status of a company as on 31st march 2014. Prepare a balance sheet |

Share Capital	20,00,0000	Bills payable	50,000
Bank balance	1,00,000	Loans	2,00,000
Provision for dividend	30,000	Provision for tax	1,40,000
Land , building and equipment	20,00,000	Debtors	1,10,000
Unclaimed dividend	20,000	Bills receivable	50,000
Creditors	70,000	General reserves	5,00,000
Debentures	3,00,000	Investment	7,00,000
Interest receivable	5,000	Bank balance	1,00,000

			(3)	(4)	(1)	(08)
	c.	Explain the importance of ratio analysis and list various ratios.				
			(1)	(4)	(1)	(6)
		UNIT –V (Compulsory)	L	CO	PO	M
8	a.	Write a note on Break even analysis. Also briefly explain the situations for replacement of machinery.				
			(2)	(5)	(1)	(10)

| | b. | A mechanical Machine with an initial cost of Rs 11000 closely follows the cost pattern shown below. Using 0% interest as preliminary study, determine the economic life. |

	1	2	3	4	5	6	7
Op Cost (Rs)	3700	3950	4200	4700	5400	6300	7200
Resale Value(Rs)	8500	7600	6400	5000	3600	2200	800

			(3)	(5)	(1)	(10)

		UNIT - I	L	CO	PO	M
1	a.					
			(1)	(1)	(1)	(06)
	b.					
			(2)	(1)	(1)	(06)
	c.					
			(3)	(1)	(2)	(08)
		OR				
2	a.	.				
			(1)	(1)	(1)	(06)
	b.					
			(2)	(1)	(12)	(08)
	c.					
			(2)	(1)	(1)	(06)
		UNIT – II	L	CO	PO	M
3	a.	Explain the conditions for present worth comparisons				
			(1)	(1)	(1)	(06)
	b.	Mega electronics is considering the purchase of a new programmable circuit tester in order to improve its product quality. The equipment has a first cost of Rs.85000 and the salvage value is predicted to be Rs. 6000 after a service life of 5 years. Maintenance and operating costs are expected to be Rs. 8000 for the first year of operation and increase by Rs. 1500 per year for each additional year of use. Using an interest rate of 10% determine what annual savings must be obtained through the use of this equipment to make it economically justifiable.				
			(3)	(1)	(2)	(08)
	c.	A publication house offers a 3 year subscription for a down payment of Rs 10000 or a 5 year subscription for a down payment of 15000. Magazines worth 5200 are dispatched every year. Compare the two alternatives at an interest rate of 15% p.a. using EAC method.				
			(1)	(1)	(1)	(06)
		OR				
4	a.	Two types of trucks are available for transportation use. They are needed for 10 years of service. Both trucks deliver the same amount of work. Assume interest rate of 8%. Which truck is to be preferred on PW basis? Use CFD for your analysis.				

	Plan A	Plan B
First cost (Rs.)	10,00,000	15,00,000
Annual maintenance cost (Rs)	20000	15000
Estimated Life. (years)	5	10
Estimated salvage value (Rs)	2,00,000	5,00,000

			L	CO	PO	M
			(2)	(1)	(2)	(10)
	b.	List the situations for equivalent annual worth comparisons. A company is considering investing Rs.20, 000 in a heat exchanger. The heat exchanger will last 6 years, at which time it will be sold for Rs. 4,000. The maintenance cost at the end of the first year is estimated to be Rs. 2,000. Maintenance costs for the exchanger are estimated to increase by Rs. 1000 per year over its life. As an alternative, the company may lease the equipment for Rs.X per year,				

		including maintenance. (a) Draw a cash flow diagram of both alternatives. (b) For what value of X should the company lease the heat exchanger? Assume end-of-year lease payments and interest rate of 8% for your analysis.				
			(3)	(1)	(2)	(10)
		UNIT – III (Compulsory)	L	CO	PO	M
5	a.	What is depreciation? Explain the various causes of depreciation				
			(2)	(1)	(1)	(06)
	b.	A small firm is producing 500 pens per day. The direct material cost is found to be Rs. 40000, direct labor cost is Rs.35000, and factory overheads are Rs. 10000. If the selling on cost are 40% of factory cost, what must be the selling price of each pen to realize a profit of 15% of selling price?				
			(2)	(1)	(2)	(06)
	c.	A car was purchased for Rs.600000 and the salvage value was estimated as Rs.250000 at the end of 6 years of useful life. (i) Calculate the book value of the car at the end of 4 years by declining balance method and straight line method. (ii) Evaluate the accumulated depreciation at the end of 3rd year by declining balance method.				
			(3)	(1)	(2)	(08)
		UNIT - IV	L	CO	PO	M
6	a.	Explain the various sources of financial information and also mention the users of financial information.				
			(1)	(1)	(1)	(06)
	b.	Following is the financial status of a company as on 31st march 2016. Prepare a balance sheet (All numbers in Rs.)				

Share Capital	20,00,0000	Bills payable	50,000
Bank balance	1,00,000	Loans	2,00,000
Provision for dividend	30,000	Provision for tax	1,40,000
Land , building and equipment	20,00,000	Debtors	1,10,000
Unclaimed dividend	20,000	Bills receivable	50,000
Creditors	70,000	General reserves	5,00,000
Debentures	3,00,000	Investment	7,00,000
Interest receivable	5,000	Bank balance	1,00,000

			(3)	(1)	(12)	(08)
	c.	What is a financial ratio? Enlist different types of financial ratios.				
			(2)	(1)	(1)	(06)
		OR				
7	a.	Explain in detail various types of assets.				
			(1)	(1)	(1)	(04)
	b.	Following are the items of Profit and loss account of XYZ co. for the year ended 31st march 2014. Arrange them systematically and indicate (i) Profit before taxation (ii) Profit after taxation.				

	Rs.(Lakhs)		Rs.(Lakhs)
Operating and administrative expenses	10440.6	Depreciation	1382.6
Provision for tax	210.0	Interest	2595.3
Cost of sales and service	54773.9	Sales and service	69552.9
provision for wealth tax	3.5	Other income	517.6

				L	CO	PO	M
		Excess provision for tax in previous years	143.0	proposed dividend		643.8	
				(3)	(1)	(2)	(12)
	c.	Discuss the importance of financial analysis					
				(1)	(1)	(1)	(04)
		UNIT –V (Compulsory)		L	CO	PO	M
8	a.	A firm is considering replacement of an equipment, whose first cost is Rs 40000 and the scrap value is negligible at the end of any year. Based on experience it was found that the maintenance cost is zero during the first year and it increases by Rs 2000 every year thereafter. Evaluate i) When should the equipment be replaced with i=0% ? ii) When should the equipment be replaced with i=12%					
				(3)	(5)	(2)	(15)
	b.	Write a note on reasons for replacement of a machine or equipment.					
				(1)	(5)	(1)	(05)

		UNIT - I	L	CO	PO	M
1	a.	Explain simple, compound, nominal and effective interest rates.				
			(1)	(1)	(1)	(06)
	b.	Calculate the accumulated amount in 3 years and the effective interest rate for a deposit of Rs 30000 with an interest rate of 12% when compounded a) annually b) biannually c) quarterly c) monthly.				
			(2)	(1)	(1)	(08)
	c.	A deposit of Rs 1,80,000 is made for a period of 7 years. If the interest rates are 8% for simple interest and 6% for compound interest, calculate the interest earned in both cases and offer your comments.				
			(2)	(1)	(1)	(06)
		OR				
2	a.	Explain the law of demand and law of supply. Give examples and list the factors affecting them.				
			(1)	(1)	(1)	(06)
	b.	If you deposit Rs. 2,50,000 today, what equal amounts can you withdraw at the end of each quarter for next 4 years, when the nominal interest rate is 12%?				
			(1)	(1)	(1)	(06)
	c.	You have a chance to buy a car with a list price of Rs. 6,00,000. You have to pay a down payment of Rs. 1,50,000 and the dealer will finance the remainder at a nominal interest of 12 % compounded monthly for 5 years. Determine the amount of your monthly installment and total interest you pay over 5 years.				
			(2)	(1)	(2)	(08)
		UNIT – II	L	CO	PO	M
3	a.	Explain Present worth by "RULE 72".				
			(1)	(2)	(1)	(04)

	b.	The following alternatives are available to accomplish an objective of 12 years duration. Compare the PW of these alternatives using an interest rate of 7%.				

	Plan A	Plan B	Plan C
First cost (Rs.)	20000	80000	100000
Annual cost (Rs)	32000	7000	5000
Life cycle. (years)	6	3	4

			(2)	(2)	(2)	(10)
	c.	Two models of small machines perform the same function. Type 1 machine has a low cost of Rs 95000, relatively high operating costs of Rs 19000 per year more than that of type 2 machine and a short life of 4 years. The more expensive type 2 machine costs 250000 and can be kept in service economically for 8 years. The scrap value of either of the machines is negligible. Which machine is preferred with an attractive interest rate of 8%?				
			(3)	(2)	(2)	(06)
		OR				
4	a.	AUTOCON company is evaluating 3 robots for possible use in its assembly operations (one robot will be purchased). Data with these robots is in table. Assuming a technological life of 3 years and a desired interest rate of 12% determine which robot seems to be preferable? Assume all other factors remain same and use Net Present Worth evaluation.				

	Robot A	Robot B	Robot C
First cost (Rs.)	5,50,00	5,80,00	5,30,00
Operation and maintenance cost (Rs/year)	3000	4500	4000
Expected income (Rs.)	4,00,00	4,40,00	3,80,00
Estimated salvage value (Rs)	40,00	60,00	40,00

			(3)	(2)	(2)	(10)
	b.	Machine X has a first cost of Rs. 90000, no salvage value at the end of 6 years of useful life and annual operating costs of Rs.50000. Machine Y costs Rs.160000 and has an expected resale value of Rs. 42000 at the end of its 9 years of useful life. Operating costs of Machine Y are Rs. 45000 per year. Evaluate the two alternatives on the basis of present worth comparison at 10% annual interest rate.				
			(2)	(2)	(12)	(10)
		UNIT – III (Compulsory)	L	CO	PO	M
5	a.	Explain in brief various components of costs that are to be considered to arrive at the selling price during manufacturing of a product.				
			(2)	(3)	(1)	(05)
	b.	The data for a product is available as follows: Initial cost = Rs. 1,50,000, salvage value = Rs.10000 and life = 08 years. Find the depreciation and Book value after 4th and 6th year using a) Straight line method b) Declining balance method c) Sum of years digit method				
			(3)	(3)	(1)	(09)
	c.	From the following data related to manufacturing of a product for the month of Jan 2019, Estimate the profit per unit.				

i) Raw materials used = Rs 40000, ii) Direct wages = Rs. 24000,
iii) Machine hours worked = 9500 hrs, iv) Machine hour rate @ Rs 60 /hr ,
v) Office overhead = 20% of Works cost, vi) Selling overhead = Rs 10/unit,
vii) Units produced = 20000

| | | | (2) | (3) | (2) | (06) |

	UNIT - IV	L	CO	PO	M

6 a. Explain various types of liabilities

| | | (2) | (4) | (1) | (04) |

b. Following are the financial status of a company as on 31st march 2012.Prepare a balance sheet.

Sundry Debtors	10000	Land and building	50000
Cash in hand	22000	Plant and equipment	90000
Bank loans	40000	Inventories	15000
Bills payable	20000	Creditors	30000
Equity shares	113000	Bank Balance	16000

| | | (2) | (4) | (2) | (06) |

c. Discuss the need of ratio analysis in engineering organizations. What are merits and demerits of financial ratios.?

| | | (2) | (4) | (1) | (08) |

| | **OR** | | | | |

7 a. Briefly explain: Leverage Ratio and activity ratio, profitability ratio.

| | | (2) | (4) | (1) | (06) |

b. Explain various concepts of profit.
Prepare a profit and Loss account for PIONEER Industries with following data for the year ended 31 march 2017:

Cost of goods sold	12,00,000	Interest	1,30,000
Sales	18,50,000	Other income	1,20,000
Selling Expenses	1,00,000	Excess tax paid in previous years	80,000
Depreciation	1,20,000	Operating Expenses	40,000
Provision for tax	1,10,000	Proposed dividend	100000

| | | (3) | (4) | (2) | (14) |

	UNIT – V (Compulsory)	L	CO	PO	M

8 a. Write a note on Break even analysis

| | | (1) | (5) | (1) | (05) |

b. A mechanical Machine with an initial cost of Rs 110000 closely follows the cost pattern shown below. Using 0% interest for preliminary evaluation and 10% interest rates determine the economic life.

	1	2	3	4	5	6	7
Op Cost (Rs)	37000	39500	42000	47000	54000	63000	72000
Resale Value(Rs)	85000	76000	64000	50000	36000	22000	8000

| | | (3) | (5) | (2) | (15) |

OBJECTIBVE QUESTIONS

1) The various roles played by an engineer in modern days are : _____

2) Calculate the effective annual interest rate when an interest rate of 12% is compounded a)Yearly b) Half yearly c) Monthly d) Weekly
   Ans: a)   **b)**   **c)**   **d)**

3) If Rs 10000 is deposited in a bank at an interest rate of 6% compounded infinitely, the future amount after 5 years will be_____

4) For an interest rate of 18% compounded quarterly determine: a) Nominal interest rate_____
   b) Effective annual rate_____

5) Enumerate the different methods of evaluating the project proposals by present worth comparison when projects have unequal lives a)
   b)

6) List the formulae for a) Single series Future worth factor _____ b) Sinking fund factor _____

7) For a yearly deposit of 12000 for 5 years calculate the future sum if i=15%. **Ans:**

8) In the above situation, if the deposits are made at the beginning of the year, the amount will be: **Ans:**

9) If it is required to have a lump sum amount of Rs 10,00,000 after 10 years, how much should be the monthly installment starting from now, if the interest rate is 6% compounded monthly? **Ans:**

10) The rent for a building is Rs. 10000 per year now and increases by Rs. 1500 per year for the subsequent years. Evaluate the total rent paid after 10 years. **Ans:**

11) If Rs. 50,00,000 is deposited today, what will be the likely monthly receipt obtained for next 20 years, if the prevailing interest rate is 9% and likely to remain constant? **Ans:**

12) Enlist the different situations for Equivalent Annual worth Comparison (EAWC). a)   b)

13) An open air theatre having infinite life is to be built. The total amount allocated for the project is Rs. 10,00,000 which includes annual maintenance cost of Rs. 10000. Calculate the initial amount available for construction if prevailing rate of interest is 10%. **Ans:**

14) Formula for calculating the depreciation by Declining balance method is DC=

15) Using all the components of costs write the expression for Selling Price of a product.
   ANS: SP= profit +

16) List the types of Taxes: a)   b)   c)

17) Expand: a) MARR_____ b) SHEER_____

18) Given: for 50 units: DMC = 1000, DLC=1500, Factory OH=2000 Profit 15% of SP, **Evaluate SP Ans:**

19) List the users of financial information: **Ans:**

20) Write the correct order of preparing the following. a)Balance sheet b)Trading account c) P & L Account. ANS:**:**

21) If Sales=5 Lakhs, cost of goods=4 Lakhs & operating expenses =Rs. 50000 calculate OPERATING Profit :
   Ans:

22) If PAT is Rs.6,50,000 and provision for dividend is 4 Lakhs, appropriate the profit: **Ans:**

23) Write the relation between a) GP & OP:_____ b) PAT & PBT:_____

24) Give examples for a) Current assets:_____ b) Fixed assets:_____

25) Name different types of **Ratios**:
    26)Identify the following terms a) Debtors _____ b) Stock_____

26) As price of a commodity increases, the supply_____ ANS:_____

27) With each additional dose of input, the output also increases. This is known as: ANS_____

28) Calculate the effective annual interest rate when an interest rate of 12% is compounded a)Half yearly ANS:_____

29) Calculate the effective annual interest rate when an interest rate of 18% is compounded a)monthly ANS:_____

30) If Rs 10000 is deposited in a bank at an interest rate of 6% compounded infinitely, the future amount after 5 years will be

31) ANS:_____

32) For an interest rate of 18% compounded quarterly determine: a) Effective annual rate ANS:_____

33) For alternatives having lives of 3 & 6 years, the present worth comparision must be evaluated for _____years ANS:_____

34) List the formulae for Sinking fund factor _____ ANS:_____

35) List the formulae for Capital recovery factor_____ ANS:_____

36) For a yearly deposit of 12000 for 5 years calculate the future sum if i=15%. ANS:_____

37) In the above situation, if the deposits are made at the beginning of the year, the amount will be: ANS:_____

38) If it is required to have a lump sum amount of Rs 10,00,000 after 10 years, how much should be the monthly installment starting from now, if the interest rate is 6% compounded monthly? ANS:_____

39) An open air theatre having infinite life is to be built. The total amount allocated for the project is Rs. 10,00,000 which includes annual maintenance cost of Rs. 10000. Calculate the initial amount available for construction if prevailing rate of interest is 10%.
40) ANS:_____

41) Formula for calculating the rate of depreciation by Declining balance method is _____ ANS:_____

42) Using all the components of costs write the expression for Selling Price of a product.

43) ANS: SP=

44) Expand: a) MARR_____ b) SHEER_____

45) Given: for 50 units: DMC = 1000, DLC=1500, Factory OH=2000 Profit 15% of SP. ANS:_____

46) Write the correct order of preparing the following. a)Balance sheet b)Trading account c) P & L Account. ANS:_____

47) If Sales=5 Lakhs, cost of goods=4 Lakhs & operating expenses =Rs. 50000 calculate OPERATING Profit : ANS:_____

48) Types of ROR are a)_____ b)_____ c)_____

49) If PAT is Rs.6,50,000 and provision for dividend is 4 Lakhs, Transfer to R and S is: ANS:_____

50) Write the relation between a) GP & OP:_____ b) PAT & PBT:_____

51) Give examples for a) Current assets:_____ b) Fixed assets:_____

52) Identify the following terms as assets/liabilities a) Sundry Debtors _____ b) Stock_____ c) General reserves_____

53) List types of budgets: a)   b)   c)   d)