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Fifth Semester B.E. Degree Examination, December 2010
Management and Entrepreneurship

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting at least TWO questions from each part.*

PART – A

1 a. Define management. Explain the contributions of Taylor to the scientific management. (10 Marks)
   b. Briefly explain, whether management is a science or art. (10 Marks)

2 a. Briefly explain the important steps in planning. (10 Marks)
   b. Explain the hierarchy of plans. (10 Marks)

3 a. Briefly explain the principles of organization. (10 Marks)
   b. Briefly explain the steps in the selection procedure. (10 Marks)

4 a. Briefly explain the Maslow's hierarchy of needs. (10 Marks)
   b. Briefly explain some of the methods of establishing control. (10 Marks)

PART – B

5 a. Define the term 'Entrepreneur'. Explain the functions of an entrepreneur. (10 Marks)
   b. Explain the steps involved in the entrepreneurial process. (10 Marks)

6 a. Define "small scale industry" and state the characteristics of a SSI. (10 Marks)
   b. Explain the WTO. State its functions. (10 Marks)

7 a. What is the meaning of a "project". State and explain the classification of projects. (10 Marks)
   b. Explain the project appraisal and its methods. Briefly explain any two methods. (10 Marks)

8 Write short notes on the following :
   a. SISI
   b. Barriers in entrepreneurship
   c. SIDBI
   d. Project identification
                                                               (20 Marks)

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Fifth Semester B.E. Degree Examination, December 2010
Dynamics of Machines

Time: 3 hrs.   Max. Marks:100

Note: 1. *Answer any FIVE full questions, selecting*
at least TWO questions from each part.
2.*Use drawing sheets, if needed.*

PART – A

1 a. Discuss the equilibrium of the following systems:
       i) Two force members   ii) Three force members iii) Member with two forces and a torque.
       (09 Marks)

   b. With usual notations, explain the principle of virtual work, considering a slider crank mechanism.
       (11 Marks)

2 a. Discuss the following terms briefly:
       i)   Maximum fluctuation of energy   ii) Coefficient of fluctuation of energy
       iii) Maximum fluctuation of speed   iv) Coefficient of fluctuation of speed.   **(08 Marks)**

   b. A three cylinder single acting engine, has its cranks set equally at 120° and it runs at 600 rpm. The torque-crank angle diagram for each cycle is a triangle for the power stroke, with a maximum torque of 90 N.m at 60° from the dead centre of the corresponding crank. The torque on the return stroke is sensibly zero. Determine
       i)   Power developed
       ii)   Coefficient of fluctuation of speed, if the mass of the flywheel is 12kg and has a radius of gyration of 80mm.
       iii) Coefficient of fluctuation of energy
       iv)   Maximum angular acceleration of the flywheel.   **(12 Marks)**

3 a. Discuss the types of friction and the laws of friction.   **(08 Marks)**

   b. 2.5 kW of power is transmitted by an open belt drive. The linear velocity of the belt is   2.5 m/s. The angle of lap on the smaller pulley is 165°. The coefficient of friction is 0.3. Determine the effect on power transmission in the following cases:
       i)   Initial tension in the belt is increased by 8%.
       ii) Initial tension in the belt is decreased by 8%.
       iii) Angle of lap is increased by 8% by the use of an idler pulley, for the same speed and tension on the tight side and iv) Coefficient of friction is increased by 8% by suitable dressing to the friction sample of the belt.   **(12 Marks)**

4 a. Explain in depth, static balancing and dynamic balancing of rotating masses (Graphical and analytical conditions).   **(10 Marks)**

   b. Four masses m_1, m_2, m_3 and m_4 are 200 kg, 300 kg, 240 kg and 260 kg respectively. The corresponding radii of rotation are 0.2m, 0.15m, 0.25m and 0.3 m respectively. The angles between successive masses are 45°, 75% and 135°. Find the position and magnitude of the balance mass required, if its radius if rotation is 0.2m.   **(10 Marks)**

PART – B

5 a. With usual notations, explain the primary and secondary unbalanced forces of reciprocating masses. **(08 Marks)**

   b. A five cylinder in-line engine running at 750 rpm has successive cranks 144° apart; the distance between the cylinder centre lines being 375m. Piston stroke is 225 mm and the ratio of the connecting rod to the crank is 4. Examine the engine for balance of primary and secondary forces and couples. Find the maximum values of these and the position of the central crank, at which, these maximum values occur. The reciprocating mass for each cylinder is 15 kg. **(12 Marks)**

6 a. Explain the function and types of governors. **(06 Marks)**

   b. Define stability and isochromism of a Governor. **(04 Marks)**

   c. The upper arms of a Porter governor has lengths 350mm and are pivoted on the axis of rotation. The lower arms have lengths 300mm and are attacked to the sleeve at a distance of 40mm from the axis. Each ball has a mass of 4 kg and mass on the sleeve is 45 kg. Determine the equilibrium speed for a radius of rotation of 200mm and find the effect and power of the governor, for one percent speed change. **(10 Marks)**

7 a. With usual notations and diagram, derive an expression for the gyroscopic couple, produced by a rotating disc. **(08 Marks)**

   b. Each wheel of a motorcycle is 600mm diameter and has a moment of inertia of 1.2 kg.m^2. The total mass of motorcycle and the rider is 180 kg and the combined centre of mass is 580mm above the ground level. When the motorcycle is upright, the moment of inertia of the rotating part of the engine is 0.2 kg.m^2, the engine speed is five ties the speed of the wheel and is in the same sense. Determine the angle of heel necessary, when the motorcycle takes a turn of 35m radius at a speed of 54 km/hr. **(12 Marks)**

8 a. Classify the cams on the basis of their shapes and the follower movement. Write a note on displacement diagrams. **(08 Marks)**

   b. In a four stroke petrol engine, the exhaust valve opens 45° before TDC and closes 15° after the BDC. The valve has a lift of 12mm. The least radius of the circular arc type cam operating a flat faced follower is 25mm. The nose radius is 3mm. The crankshaft rotates at 1500 rpm. Calculate the maximum velocity of the valve and the minimum force exerted by the spring to overcome the inertia of the moving parts weighing 300 g. **(12 Marks)**

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Fifth Semester B.E. Degree Examination, December 2010
Energy Engineering

Time: 3 hrs.   Max. Marks:100

Note: *1. Answer any FIVE full questions, selecting*
at least TWO questions from each part.
2. Use of thermodynamic data handbook is permitted.

PART – A

1   a. With a neat sketch, explain the working of spreader stoker. State the limitations of it.
                                                                              (10 Marks)

    b. Draw a line diagram of pneumatic ash handling system and explain its working. Mention its advantages.   **(10 Marks)**

2   a. What are the advantages of high pressure boiler? With a neat sketch, explain the working of Benson boiler.   **(10 Marks)**

    b. Find the draught produced in mm of water by a chimney 40m high and discharging 20 kg of flue gases per kg of fuel burned in the combustion chamber. The temperature of the flue gases and ambient air are 270°C and 23°C respectively. Assuming the diameter of the chimney as 1.5m and 30% of the theoretical draught is lost in friction, find the mass of the flue gases passing through the chimney per minute.   **(10 Marks)**

3   a. Draw a line diagram to show the layout of diesel power plant. Describe it in brief. **(10 Marks)**

    b. State the applications of diesel engines in power field. List at least six advantages and four disadvantages of diesel power plant.   **(10 Marks)**

4   a. How are the hydro-electric power plant classified? With a neat sketch, explain the pumped storage plant.   **(10 Marks)**

    b. The runoff data of a river at a particular site is tabulated below:

Month	Mean discharger per month (millions of cu m)	Month	Mean discharger per month (millions of cu m)
January	40	July	75
February	25	August	100
March	20	September	110
April	10	October	60
May	0	November	50
June	50	December	40

   i)   Draw a hydrograph and find the mean flow.
   ii)   Draw the flow duration curve.
   iii)   Find the power in MW available at mean flow if the head available is 80m and overall efficiency of generation in 85%. Take each month of 30 days.   **(10 Marks)**

PART – B

5 a. Draw a schematic sketch of a PWR , label all the parts, state the function of each component. Mention its advantages. **(10 Marks)**

   b. Explain the following :
      i)   Reactor shielding
      ii)   Radio active waste disposal. **(10 Marks)**

6 a. What are the main applications of the solar pond? Explain with the help of a neat diagram, a solar pond electric power plant. **(10 Marks)**

   b. Wind at 1 standard atmospheric pressure and 15°C has velocity of 15 m/s. The turbine has diameter of 120m and its operating speed in 40 rpm at maximum efficiency. Calculate
      i)   The total power density in the wind stream.
      ii)   Maximum obtainable power density assuming $\eta = 35\%$.
      iii) Total power and torque. **(10 Marks)**

7 a. Name the components of the tidal power plants. With a neat sketch, explain the closed cycle OTEC. **(10 Marks)**

   b. What are the factors considered for selecting a suitable site for tidal power plants? List six advantages and four disadvantages of geothermal energy over other energy forms. **(10 Marks)**

8 a. What is meant by anaerobic digestion? What are the factors which affect biodigestion? Explain any two, in brief. **(10 Marks)**

   b. How are the gasifiers classified? With a schematic diagram, explain the working of downdraft gasifier. **(10 Marks)**

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Fifth Semester B.E. Degree Examination, December 2010
Turbomachines

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting
at least TWO questions from each part.*

PART – A

1 a. Are vane compressors and gear pumps turbomachines? Why? **(02 Marks)**
   b. Explain the physical significance of following non – dimensional numbers used in turbomachines : i) Specific capacity ; ii) Specific speed. **(04 Marks)**
   c. A blower develops 750 mm W.G. (Water Gauge) at a speed of 1480 rpm and a flow rate of 38 m^3/s. Determine the specific speed of the air blower. **(04 Marks)**
   d. Using Rayleigh's method of dimensional analysis, show that the performance of a turbocompressor is given by $\dfrac{P_{O_2}}{P_{O_1}} = f\left(\dfrac{m^o \sqrt{T_{O_1}}}{P_{O_1}}, \dfrac{N}{\sqrt{T_{O_1}}}\right)$ where the symbs have usual meanings.

   (10 Marks)

2 a. Explain the procedure to draw velocity triangles. Why velocity triangles are of utmost importance in the study of turbomachines? **(05 Marks)**
   b. Why the discharge blade angle has considerable effect in the analysis of a turbomachine? Give reasons. **(05 Marks)**
   c. In a certain turbomachine, the inlet whirl velocity is 15 m/s; inlet flow velocity is 10 m/s; blade speeds are 30 m/s and 8 m/s respectively. Discharge is radial with an absolute velocity of 15 m/s. If water is the working fluid, flowing at the rate of 1500 litres/s, calculate : i) Power in kW ; ii) the change in total pressure in bar ; iii) the degree of reaction ; iv) Utilization factor. **(10 Marks)**

3 a. Explain why turbines with reaction R > 1 and R < 0 are not in practical use? **(04 Marks)**
   b. Steam leaves the rotating blades as shown in the sketch. Evaluate the absolute velocity in magnitude and direction. **(04 Marks)**

Fig.Q.3(b).
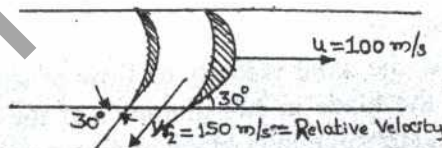
   c. A hydraulic reaction turbine of the radial inward flow type, works under a head of 160 m of water. At the point of fluid entry, the rotor blade angle is 119° and the diameter of the runner 3.65 m. At the exit, the runner diameter is 2.45m. If the absolute velocity at the wheel outlet is radially directed with a magnitude of 15.5 m/s and the radial component of velocity at the inlet is 10.3 m/s. Determine : i) the power developed by the machine, for a flow rate of 110 m^3/s ; ii) the degree of reaction and iii) the utilization factor. **(12 Marks)**

4 a. Define the following, with the help of a h – s diagram, for the power generating turbomachines :
   total – to – total efficiency
   total – to – static efficiency
   static – to – total efficiency
   b. static – to – static efficiency. **(06 Marks)**
   Define infinitesimal stage efficiency of a turbine. Show that the index 'n' of polytropic expansion in a turbine of infinitesimal stage efficiency η_p is given by

   $n = \dfrac{\gamma}{\gamma - (\gamma-1)\eta_p}$, where 'γ' is a ratio of specific heats. **(08 Marks)**

c. A low pressure air compressor develops a pressure of 120mm W.G. If the initial and final states of air are $P_1 = 1.02$ bar, $T_1 = 27°C$ and $T_2 = 42°C$, determine the compressor and infinitesimal stage efficiencies. **(06 Marks)**

PART – B

5 a. What is radial equilibrium in an axial flow compressor? Derive an expression for radial equilibrium in terms if flow velocity and whirl velocity of a fluid. **(10 Marks)**

b. A centrifugal compressor runs at a speed of 15000 rpm and delivers air at 20 kg/s. Exit radius is 0.35m, relative velocity and vane angles at exit are 100 m/s and 75° respectively. Assuming axial inlet and inlet stagnation temperature and stagnation pressure as 300 K and 1 bar respectively, calculate : i) the torque ; ii) the power required to drive the compressor; iii) the ideal head developed ; iv) the work done and v) the exit total pressure. Take $(c_p)_{air} = 1.005$ kJ/kg. **(10 Marks)**

6 a. Explain the following, with reference to the centrifugal pump.
   i) Slip and its effect.
   ii) Cavitation, its effect and remedies to it.
   iii) Difference between manometric head and NPSH. **(08 Marks)**

b. Why does a centrifugal pump always comes with a motor unit, not a single unit? **(02 Marks)**

c. A three stage centrifugal pump has impeller of 40 cm diameter and 2.5 cm wide at the outlet. The vanes are curved back at the outlet at 30° and reduce the circumferential area by 15%. The manomatric efficiency is 85% and overall efficiency is 75%. Determine the head generated by the pump when running at 12000 rpm, and discharging the water at 0.06 m³/s. Find the shaft power also. **(10 Marks)**

7 a. Why is compounding of steam turbine necessary? Describe the velocity compounding of steam turbines. **(04 Marks)**

b. Prove that the maximum blade efficiency for a single stage impulse turbine with equiangular rotor blades is given by $(\eta_b)_{max} = (1 + c_b)\dfrac{\cos^2\alpha_1}{2}$, where α_1 is the nozzle angle and c_b is blade velocity coefficient. **(08 Marks)**

c. In a Parson's turbine, the axial velocity of flow of steam is 0.5 times the mean blade speed. The outlet angle of the blade is 20°, diameter of the blade ring is 1.30m and the rotational speed is 3000 rpm. Determine inlet blade angles, power developed for steam flow of 65 kg/s and the isentropic enthalpy drop, if the stage efficiency is 80%. **(08 Marks)**

8 a. Show that the specific speed of a Pelton wheel is given by $N_s = 240\dfrac{\sqrt{n}}{m}$,
   where n = number of jets used for the flow.
   m = wheel diameter to jet diameter ratio.
   Assume the jet velocity coefficient as 0.97, speed ratio as 0.45 and efficiency of the turbine as 0.89. **(06 Marks)**

b. A conical draft tube has top diameter of 2.0 m and total height of 5m. The pressure head at the inlet is 6m vacuum, while the atmospheric pressure head is 10m. Discharge velocity of flow is 1.5 m/s and the discharge of water is 24 m³/s. Neglecting the losses, calculate the height of the draft tube immersed. **(06 Marks)**

c. A Kaplan turbine develops 10 MW under an effective head of 8m. The overall efficiency is 0.86, the speed ratio is 2.0 and the flow ratio 0.60. The Hub diameter of the wheel is 0.35 times the outside diameter of the wheel. Find the diameter and speed of the turbine. **(08 Marks)**

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Fifth Semester B.E. Degree Examination, December 2010
Engineering Economics

Time: 3 hrs.   Max. Marks:100

Note: 1. *Answer any FIVE full questions, selecting*
at least TWO questions from each part.
2. *Use of discrete interest factor table is permitted.*

PART – A

1   a. Briefly explain the problem solving process, with a diagram. How are the decisions taken?**(06 Marks)**

   b. Briefly explain the law of demand and the law of supply.   **(06 Marks)**

   c. A person is planning for his retired life. He has 15 more years of service. He would like to deposit 20% of salary, which is Rs.15000 at the end of 1st year and thereafter he wishes to increase his deposit by Rs.2500 more every year along with Rs.15000 for the next 14 years. What will be the maturity amount of this deposit, if the interest rates are 10% and 14% per year? **(08 Marks)**

2   a. Briefly explain the conditions for present worth comparisons.   **(06 Marks)**

   b. A company is considering two machines having same capability and satisfactory function. Machine A has a first cost of Rs.500000 and has no salvage value at the end of 6 yrs of useful life and operating costs of Rs.200000 per year. Machine B costs Rs.900000 and has an expected salvage value (resale) of Rs.225000 at the end of 9 yrs of useful life, operating costs of Rs.225000 per year. Compare the two alternatives on the basis of their present worth, using repeated projects assuming 10% annual interest rate. **(08 Marks)**

   c. A company is planning to buy an inspection and measuring device for Rs.450000. The expected life of the device is 6 years and expected annual operating costs and taxes are Rs.60000 for the first year with additional increase of Rs.10000 per year thereafter till   5 years. Maintenance costs will be zero due to warranty and are expected to be Rs.100000 for year 3 and Rs.50000 increase per year, thereafter in addition to third year maintenance cost. What is the minimum desired annual economic benefit of the device assuming that these benefits will just offset the annual costs? Company uses an interest rate of 10% for economic evaluation. **(06 Marks)**

3   a. A mining an excavating company uses a large number of light pick up trucks for crew transport and general utility duties. The truck has a first cost of Rs.190000 and owing to generally rough use, loose value at a rate approximately 30% of current value of asset per year. Operation and maintenance cost for two shift use amounts to Rs.40000 for the first year and increase about Rs.8000 per year for each additional year of service. Current company policy is to keep the vehicle for 5 years before they are sold. The maintenance supervisor has suggested that they be sold one year earlier in order to reduce maintenance expenses. Using an interest rate of 12%, determine equivalent annual cost effect of implementing the supervisor's suggestion. **(08 Marks)**

   b. An electric utility company is looking at two alternatives for three trimming equipment. One is to subcontract to an independent company. The subcontractors bid calls for Rs.980000 for the first year with additional costs of Rs.80000 per year for subsequent years. The utility company is considering buying equipment with a first cost of Rs.2200000 and annual operating expenses of Rs.650000 per year. The equipment is expected to have a salvage value of Rs.250000 at the end of its useful life (to utility company) of 5 years. Using an interest rate of 12%, evaluate the alternatives on EAC basis and suggest the best one. **(07 Marks)**

   c. A city maintenance crew has experienced with a conventional machine that suggest that its service life 6 years. A newly designed machine costs 50% more than the conventional machine but easier in operation, which will make it more adaptable to residential lanes. Both machines will have the same operating costs and salvage values are expected to be negligible. What will be the service life of newly designed machine to make its costs comparable to that of conventional machine at i = 10%? **(05 Marks)**

4   a. A company is in the process of selecting the best alternative among the following three mutually exclusive alternatives. Find the best alternative based on rate of return (calculation) comparisons.   **(10 Marks)**

Alternative	Initial investment	Annual revenue	Life in years
A_1	Rs.50,00,000	Rs.10,00,000	10 years
A_2	Rs.80,00,000	Rs.14,00,000	10 years
A_3	Rs.40,00,000	Rs.8,25,000	10 years

4 b. A car was purchased for Rs.4,00,000 and salvage value was estimated as Rs1,00,000 at the end of 8 years of useful life. Calculate the book value of the car at the end of 5th year by declining balance method and straight line method of depreciation. Also find the accumulated depreciation at the end of 6th year by declining balance method and sum of the years digit method of depreciation.**(10 Marks)**

PART – B

5 a. Briefly explain the contents of elements of cost.   **(06 Marks)**

b. A product XYZ manufactured in a small scale industry has the following details:
Variable overheads = Rs.25/- per unit, fixed overheads = Rs.60000 per month, units manufactured = 60000 units per month. Find : i) The normal overhead cost per unit, ii) IF production drops to 80%, find overhead charges per unit and iii) If production increases to 120%, find overhead charges per unit corresponding to above description.   **(08 Marks)**

c. MICO factory produces 6000 spark plugs per day involving a direct material costs of Rs.500000. Direct labour cost of Rs.400000 and factory overheads of Rs.150000. Assume a profit of 20% of selling price and selling overheads are 30% of factory costs. Calculate the selling price of each sparkplug.   **(06 Marks)**

6 a. What are the objectives of financial statements?   **(05 Marks)**

b. From the following trial balance of M/s Sri Ram & Co., for the year ending 31st March 2005, prepare a trading account, profit and loss a/c and balance sheet.

	Rs. (in '000)		Rs. (in '000)
Stock on 1st April 2004	500	Return outwards	250
Bill receivable	2250	Trade expenses	100
Purchases	19500	Office furniture	500
Wages	1400	Cash in hand	250
Insurance	550	Cash at bank	2375
Sundry debtors	15000	Rent and taxes	550
Carriage inwards	400	Carriage outwards	725
Commission (Dr)	400	Sales	25000
Allow interest on capital	350	Bills payable	1500
Stationary	225	Creditors	9825
Return inwards	650	Capital	8950
Commission (Cr)	200		

Closing stock was valued at Rs.12,500,000 as on 31st March 2005.   **(15 Marks)**

7 a. Briefly explain atleast three ratios coming under following headings:
i) Liquidity ratios   ii) Leverage ratios   iii) Profitability ratios.   **(10 Marks)**

b. Jai Hind Company has made plans for the next year. It is estimated that the company will employ total assets of Rs.8,00,000. 50% of the assets are financed by borrowed capital at an interest rate of 8 percent per year. The direct costs for the year are estimated at Rs.4,80,000 and all other operating expenses are estimated at Rs.80000. The goods will be sold to customers at 150 percent of direct costs. Tax rate is assumed to be 50 percent. You are required to calculate : i) Gross profit margin, ii) Net profit margin , iii) Return on assets, iv) Assets turnover and v) Return on owners equity.
                                                                                                  (10 Marks)

8 a. What are the objectives of profit planning?   **(08 Marks)**

b. Draw a flexible budget for the overhead expenses on the following data and determine the overhead rate at 70%, 80% and 90% plant capacity.   **(12 Marks)**

Particulars	Plant capacity (80%)
Variable overheads :	
Indirect labour	Rs. 1,25,000
Stores including spares	45,000
Semi variable overheads :	
Power (50% fixed)	2,25000
Repairs and maintenance (60% fixed)	20,000
Fixed Overheads:	
Depreciation	1,20,000
Insurance	35,000
Salaries	1,25,000
Estimated labour hours	1,60,000 hours

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