

# CBCS Scheme

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15ME51

**Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018**

## Management and Engineering Economics

Time: 3 hrs.

Max. Marks: 80

- Note: 1. Answer FIVE full questions, choosing one full question from each module.  
2. Use of chart is permitted.**

### Module-1

- 1 a. Define Management and bring out its nature and characteristics. (08 Marks)  
b. Explain the Modern Management Approaches. (08 Marks)

OR

- 2 a. Briefly explain the important steps in planning. (08 Marks)  
b. What are the types of decision? Explain with example. (08 Marks)

### Module-2

- 3 a. Briefly explain the principles of organization. (08 Marks)  
b. What is Recruitment? Explain the recruitment process. (08 Marks)

OR

- 4 a. Explain the different leadership styles. (08 Marks)  
b. Explain the essentials of a sound control system. (08 Marks)

### Module-3

- 5 a. With the help of sketch, explain the problem solving process in decision making. (08 Marks)  
b. A Professor 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 First 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)

OR

- 6 a. Briefly explain the law of supply and demand. Enlist the demand determinants. (08 Marks)  
b. Determine the effective interest rate for a nominal annual rate of 8% that is compounded :  
i) Daily (Assume 365 days/year) ii) Monthly iii) Quarterly iv) Semi – Annually. (08 Marks)

### Module-4

- 7 a. Explain the conditions for present worth comparisons. (08 Marks)  
b. The lease on a warehouse amounts to Rs 5000 per month for five years. If the payments are made on the first of each month, what is the future worth at the end of five years at 12% interest rate compounded monthly? (08 Marks)

OR

- 8 a. Explain IRR, ERR and MARR. Enlist the misconcepts of IRR. (08 Marks)  
b. A farm house can be purchased for Rs 90,000 and expected resale value after 20 years is Rs 60,000. If the annual rental income is Rs 11800 and expenses Rs 4700. What will be the rate of return earned on this farm house? (08 Marks)

**Module-5**

- 9 a. Explain how the selling price is fixed for a job, giving all the components of cost, with suitable example. (08 Marks)
- b. A firm is producing 100 units per day. The direct material cost is found to be Rs 160. The direct labour cost is Rs 200. The factory overheads chargeable to it is Rs 250. If the selling expenses are 40% of the factory cost, what must be the selling price of each unit to realize a profit of 15% of selling price? (08 Marks)

**OR**

- 10 a. What is Depreciation? List and discuss the causes of depreciation. (08 Marks)
- b. The initial cost of machine is Rs 25000 and it will have a salvage value of Rs 2000 after a period of six years. Using reducing balance method, calculate the book value of the machine at the end of each year and plot a graph of depreciation against number of years. (08 Marks)

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# CBCS Scheme

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15ME52

## Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018 Dynamics of Machinery

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

### Module-1

- 1 a. Explain the equilibrium with respect to two force of three force member. (02 Marks)
- b. A four link mechanism with the following dimensions is acted upon by a force 80N  $150^\circ$  on the link DC. Determine the input torque on the link AB for the static equilibrium of the mechanism for the given configuration. AB = 400mm ; BC = 1000mm, CD = 750mm and DE = 350mm, AD = 500mm. (14 Marks)



Fig. Q7(b)

OR

- 2 a. State 'D' Alembert's principle. (08 Marks)
- b. The crank and connecting rod of a vertical single cylinder gas engine running at 1800 rpm are 60mm and 240mm respectively. The diameter of the Piston is 80mm and the mass of the reciprocating is 1.2kg. At a point during the power stroke when the Piston has moved 20mm from the top dead centre position, the pressure on the Piston is  $800 \text{ kN/m}^2$ . Determine :
- Net force on the piston
  - Thrust in the connecting rod
  - Thrust on the sides of cylinder wall
  - Engine speed at which the above values are zero.
- (08 Marks)

### Module-2

- 3 For masses  $m_1 = 100\text{kg}$ ,  $m_2 = 175\text{kg}$ ,  $m_3 = 200\text{kg}$  and  $m_4 = 125\text{kg}$  are fixed to the crank of 200mm radius and revolve in planes I<sup>st</sup>, II<sup>nd</sup>, III<sup>rd</sup> respectively. The angular position of the planes II<sup>nd</sup>, III<sup>rd</sup> and IV<sup>th</sup> with respect to I<sup>st</sup> plane are  $75^\circ$ ,  $135^\circ$  and  $240^\circ$  take in the same sense. Distance of plane II<sup>nd</sup>, III<sup>rd</sup> and IV<sup>th</sup> from I<sup>st</sup> are 600mm, 1800mm and 2400mm. Determine the magnitude and position of the balancing masses at the radius 600mm in planes L and M located in the middle of I<sup>st</sup> and II<sup>nd</sup> and in the middle of III<sup>rd</sup> and IV<sup>th</sup> respectively. (16 Marks)

OR

- 4 The piston of a 4 cylinder vertical inline engine reach their upper most position at  $90^\circ$  interval in order of their axial position, pitch of the cylinder = 0.35m ; length of the connecting rod = 0.42m. the engine runs at 600 rpm. If the reciprocating parts of each engine has a mass of 2.5kg. Find the unbalanced primary and secondary forces and couples. Take central plane of engine as reference plane. (16 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42-8 = 50, will be treated as malpractice.

**Module-3**

- 5 a. Derive an expression for gyroscopic couple. (06 Marks)  
 b. A porter governor has equal arms each 250mm long and pivoted on the axis of rotation. Each ball has a mass of 5kg and the mass of the central load on the sleeve is 25kg. The radius of rotation of the ball is 150mm when the governor begins to lift and 200mm when the governor is at maximum speed. Find the minimum and maximum speeds and range of speed of the governor. (10 Marks)

OR

- 6 a. Define: i) Sensitiveness ii) Isochronism. (04 Marks)  
 b. A turbine rotor of a ship has a mass of 2.2 and Tonnes and rotates at 1800rpm clockwise when viewed from the stern. The radius of gyration of the rotor is 320mm. Determine the gyroscopic couple and its effect when the  
 i) Ship turns right at a radius of 250m with a speed of 25km/hr.  
 ii) Ship pitches with bow rising at an angular velocity of 0.8 rad/sec.  
 iii) Ship rolls at an angular velocity of 0.1 rad/sec. (12 Marks)

**Module-4**

- 7 a. Briefly explain, Free, Forced, damped and undamped vibration. (08 Marks)  
 b. Split up the harmonic motion  $X = 6 \cos(\omega t + 45^\circ)$  into two harmonic motions. One of them having phase angle of zero degree and other having phase angle of  $60^\circ$ . Check solution by graphically. (08 Marks)

OR

- 8 a. Obtain the equivalent stiffness of spring when springs are connected in series and parallel. (08 Marks)  
 b. Obtain the natural frequency of the system shown in Fig Q8 (b). (08 Marks)

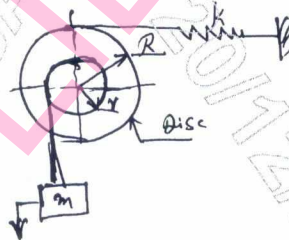


Fig. Q8(b)

**Module-5**

- 9 a. Define logarithmic decrement and derive the equation for same. (08 Marks)  
 b. Vibration system consisting of a mass 3kg a springs of stiffness 100kN/m and damper. Damping coefficient 30Ns/m. Determine Damping factor, critical damping coefficient logarithmic decrements, Ratio of two consecutive amplitudes. Number of cycles after which the initial amplitude is reduced to 20%? (08 Marks)

OR

- 10 a. Derive an expression for magnification factor or amplitude ratio for spring mass system with viscous damping subjected to harmonic force. (08 Marks)  
 b. A vibratory body of mass 150kg supported on springs of total stiffness 1050kN/m has a rotating unbalance force of 525N at a speed of 6000rpm. If the damping factor is 0.3. Determine :  
 i) The amplitude caused by the unbalance and its phase angle  
 ii) The transmissibility  
 iii) The actual force transmitted and its phase angle. (08 Marks)

# CBCS Scheme

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15ME53

## Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018 Turbo Machines

Time: 3 hrs.

Max. Marks: 80

*Note: Answer any FIVE full questions, choosing one full question from each module.*

### Module-1

- 1 a. Define and give the significance of specific speed, head coefficient and power coefficient with respect to turbo machines. (06 Marks)
- b. Explain the effect of Reynold number on the performance analysis of turbomachines. (04 Marks)
- c. It is desired to deliver  $5 \text{ m}^3/\text{sec}$  at a head of 640 m in a single stage pump.
  - i) If the specific speed is not to exceed 40, what should be the speed of the impellers?
  - ii) If the speed is reduced to 1450 rpm, how many stages are required? (06 Marks)

OR

- 2 a. Explain static and stagnation state for a fluid. Obtain an expression relating static and stagnation temperature for a perfect gas. (06 Marks)
- b. An axial flow compressor has eight stages of equal pressure ratio of 1.35 and the flow rate through the compressor and the overall efficiency are 50 kg/sec and 0.82 respectively. If the conditions of air at the entry are 1.0 bar and 300 K. Determine:
  - i) The state of air at the compressor exit
  - ii) Polytropic efficiency
  - iii) Efficiency of each stage
  - iv) Power required to drive the compressor assuming mechanical efficiency of 90%. (10 Marks)

### Module-2

- 3 a. Draw the velocity triangles at inlet and outlet of a turbo machine and derive the Euler turbine equation with usual notations. (08 Marks)
- b. In an inward flow water turbine, the water enters the runner through a guide vane at an angle of  $30^\circ$  and at a velocity of 30 m/sec. The inner diameter is 1.8 m and the outlet diameter is half the inlet diameter. The water leaves the runner at an absolute velocity of 3 m/sec at an angle of  $130^\circ$  to the wheel tangent with a slight positive whirl. Find the power developed by the turbine if the discharge is  $0.4 \text{ m}^3/\text{sec}$  and also the blade angles at inlet and outlet, if the speed of the turbine is 300 rpm. (08 Marks)

OR

- 4 a. A radial outward flow turbo machine has no inlet whirl. The blade speed at the exit is twice that at inlet. Radial velocity is constant throughout. Taking the inlet blade angle as  $45^\circ$ , show that the degree of reaction is given by  $R = \frac{2 + \cot\beta_2}{4}$  where  $\beta_2$  is the blade angle at exit with respect to tangential direction. (10 Marks)
- b. The impeller of a centrifugal pump has an outer diameter of 1.5 m. It lifts water at a rate of 2000 kg/sec. The blade is making an angle is  $145^\circ$  with the direction of motion at outlet and the speed being 3000 rpm. Radial velocity of flow is 3m/sec. Find the power required to drive the impeller. (06 Marks)

**Module-3**

- 5 a. Define and explain diagram efficiency and stage efficiency. (04 Marks)
- b. A velocity compounded impulse wheel has two rows of moving blades with a mean diameter of 70 cm. The speed of rotation is 3000 rpm and the nozzle angle is  $16^\circ$  and the estimated steam velocity at the nozzle outlet is 610 m/sec. The mass of steam passing through the blades per second is 5.5 kg. Assuming that the energy loss in each row of blades (moving and fixed) is 24% of the kinetic energy of the steam entering the blades. The outlet angles of the blades are:
1. First row of moving blades =  $18^\circ$
  2. Intermediate guide blades =  $22^\circ$
  3. Second row of moving blades =  $38^\circ$

Draw the diagram of relative velocities and derive the following:

- i) Blade inlet angles
- ii) Power developed in each row of moving blades
- iii) Efficiency of the wheel as a whole.

(12 Marks)

**OR**

- 6 a. For a 50% reaction steam turbine, show that  $\alpha_1 = \beta_2$  and  $\alpha_2 = \beta_1$  where  $\beta_1$  and  $\beta_2$  are the inlet and outlet blade angles,  $\alpha_1$  and  $\alpha_2$  are the angles with respect to fixed blades. (08 Marks)
- b. A certain stage of a Parsons turbine consists of one row of fixed blades and one row of moving blades. The details of the turbine are as follows:

Mean blade speed = 107 m/sec

Mass of steam passing per second = 13.5 kg

Steam velocity at exit from fixed blades = 143.7 m/sec

Nozzle inlet angle =  $20^\circ$

Calculate the power developed in the stage and gross efficiency, assuming carry over coefficient as 0.74 and the efficiency of conversion of heat energy into kinetic energy in the blade channels as 0.92. (08 Marks)

**Module-4**

- 7 a. Derive an expression for the hydraulic efficiency of a Pelton wheel turbine in terms of jet velocity,  $V_1$ , blade velocity,  $U$  and blade angles. (08 Marks)
- b. The supply to a single jet pelton wheel is from a reservoir 310 m above the nozzle centre ( $C_v$  of nozzle = 0.97) through a pipe 67.5 cm diameter, 5.6 km long. Take friction coefficient for the pipe = 0.008. Jet diameter = 9 cm. The blade speed ratio = 0.47 and buckets deflect the water through  $170^\circ$ . The relative velocity of water is reduced by 15% in passing over the buckets. If the mechanical efficiency = 85%. Determine the power given to runner, hydraulic efficiency and overall efficiency. (08 Marks)

**OR**

- 8 a. With a neat sketch, explain the working of a Kaplan turbine. Draw the velocity triangles at inlet and outlet of the turbine. Also explain the function of draft tube. (08 Marks)
- b. The following data is given for a Francis turbine. Net head = 70 m, speed = 600 rpm, shaft power = 368 KW, overall efficiency,  $\eta_0 = 85\%$  and hydraulic efficiency,  $\eta_h = 95\%$ , flow ratio = 0.25, breadth ratio = 0.1, outer diameter of runner = 2 x inner diameter of runner, velocity of flow is constant at inlet and outlet and the thickness of the vanes occupy 10% of the circumferential area of the runner and discharge is radial at outlet. Determine:
- i) Guide blade angle
  - ii) Runner vane angles at inlet and outlet
  - iii) Diameter of the runner at inlet and outlet
  - iv) Width of wheel at inlet.

(08 Marks)

**Module-5**

- 9 a. Show that the pressure rise in the impeller of a centrifugal pump when frictional and other losses in the impeller are reflected is given by

$$\frac{1}{2g} [V_{f_1}^2 + U_2^2 - V_{f_2}^2 \operatorname{cosec}^2 \beta_2]$$

where  $V_{f_1}$  and  $V_{f_2}$  are the velocity of flow at inlet and outlet,  $U_2$  = tangential velocity of impeller at outlet,  $\beta_2$  = vane angle at outlet. (06 Marks)

- b. A three stage centrifugal pump has impeller 40 cm in diameter and 2.5 cm wide at outlet. The vanes are curved back at an angle of  $30^\circ$  and reduces the circumferential area by 15%. The manometric efficiency = 85% and overall efficiency = 75%. Determine the head generated by the pump when running at 1200 rpm and discharges  $0.06 \text{ m}^3/\text{sec}$ . Find the shaft power also. (10 Marks)

**OR**

- 10 a. Explain the phenomenon of (i) surging (ii) choking in the centrifugal compressor. (06 Marks)
- b. Define work done factor for an axial flow compressor. (02 Marks)
- c. An axial flow compressor of 50% reaction design has blades with inlet and outlet angles with respect to axial direction as  $45^\circ$  and  $10^\circ$  respectively. The compressor is to produce a pressure ratio of 6:1 with an overall isentropic efficiency of 0.85 when the inlet static temperature is  $37^\circ\text{C}$ . The blade speed and axial velocity are constant throughout the compressor. Assuming a value of 200 m/sec for blade speed find the number of stages required if the work done factor is 0.87 for all stages. (08 Marks)

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# CBCS Scheme

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15ME54

**Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018**

## Design of Machine Elements – I

Time: 3 hrs.

Max. Marks: 80

- Note:* 1. Answer any FIVE full questions, choosing one full question from each module.  
 2. Use of design data hand book is allowed.  
 3. Assume suitable missing data.

### Module-1

- 1 a. Define standards and codes. (04 Marks)  
 b. A circular rod of diameter 50 mm is subjected to loads as shown in Fig.Q1(b). Determine the nature and magnitude of stresses at the critical points.

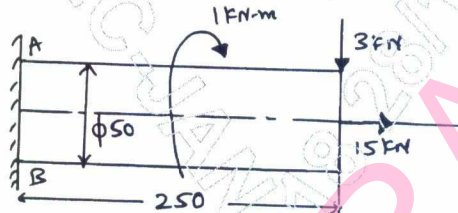


Fig.Q1(b)

(12 Marks)

OR

- 2 a. Briefly explain the phases of design process (Shigley's). (04 Marks)  
 b. A flat bar shown in Fig.Q2(b) is subjected to an axial load of 100 kN. Assuming that the stress in the bar is limited to 200 N/mm<sup>2</sup>, determine the thickness of bar.

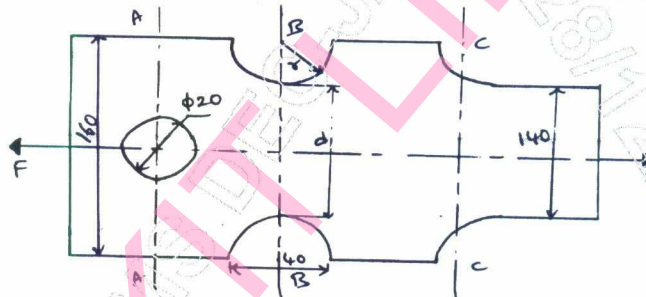


Fig.Q2(b)

(12 Marks)

### Module-2

- 3 a. A cantilever beam of span 800 mm has a rectangular cross section of depth 200 mm. The free end of the beam is subjected to a transverse load of 1 kN that drops on to it from a height of 40 mm. Selecting C40 steel ( $\sigma_y = 328.6$  MPa) and FoS = 3, determine the width of rectangular cross section.

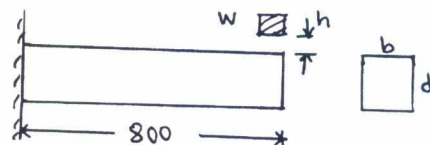


Fig.Q3(a)

(08 Marks)

- b. A rectangular cross section bar 200 mm long is subjected to an impact by a load of 1 kN that falls on to it from a height of 10 mm from rest. Determine the cross section dimension of rectangular bar, if the allowable stress of material of bar is 125 N/mm<sup>2</sup>. Assume the thickness depth is twice width. Also find the deformation due to impact. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
 2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8=50, will be treated as malpractice.



OR

- 4 A round rod of diameter  $1.2d$  is reduced to a diameter ' $d$ ' with a fillet radius of  $0.1d$ . This stepped rod is to sustain a twisting moment that fluctuates between  $2.5 \text{ kN-m}$  to  $1.5 \text{ kN-m}$  together with a bending moment of  $+1 \text{ kN-m}$  to  $-1 \text{ kN-m}$ . The rod is made of carbon steel C40 ( $\sigma_y = 328.6 \text{ MPa}$ ;  $\sigma_u = 620 \text{ MPa}$ ). Determine suitable value for ' $d$ '. (16 Marks)

Module-3

- 5 A solid steel shaft running at  $600 \text{ rpm}$  is supported on bearings  $600 \text{ mm}$  apart. The shaft receives  $40 \text{ kW}$  through a  $400 \text{ mm}$  diameter pulley weighing  $400 \text{ N}$  located  $300 \text{ mm}$  to the right of left bearing by a vertical flat belt drive. The power is transmitted from the shaft through another pulley of diameter  $600 \text{ mm}$  weighing  $600 \text{ N}$  located  $200 \text{ mm}$  to the right of right bearing. The belt drives are at right angles to each other and ratio of belt tension is  $3$ . Determine the size of shaft necessary, if the allowable shear stress in the shaft material is  $40 \text{ MPa}$  and the loads are steady. (16 Marks)

OR

- 6 Design a flange coupling to connect the shafts of a motor and centrifugal pump for the following specifications: Pump output =  $3000 \text{ liters/minute}$ , total head =  $20 \text{ m}$ , pump speed =  $600 \text{ rpm}$ , pump efficiency =  $70\%$ . Select C40 steel ( $\sigma_y = 328.6 \text{ MPa}$ ) for shaft and C35 steel ( $\sigma_y = 304 \text{ MPa}$ ) for bolts with factor of safety  $2$ . Use allowable shear stress in cast iron flanges equal to  $15 \text{ N/mm}^2$ . (16 Marks)

Module-4

- 7 a. A double riveted lap joint is to be made between  $9 \text{ mm}$  plates. If the safe working stresses in tension, crushing and shear are  $80, 120$  and  $60 \text{ N/mm}^2$  respectively, design the riveted joint. (08 Marks)
- b. Determine the diameter of rivet for the joint shown in Fig.Q7(b). The allowable stress in the rivet is  $100 \text{ N/mm}^2$ .

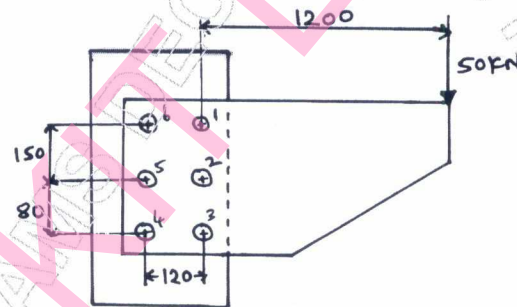


Fig.Q7(b)

(08 Marks)

OR

- 8 a. A  $16 \text{ mm}$  thick plate is welded to a vertical support by two fillet welds as shown in Fig.Q8(a). Determine the size of weld, if the permissible shear stress for the weld material is  $75 \text{ MPa}$ .

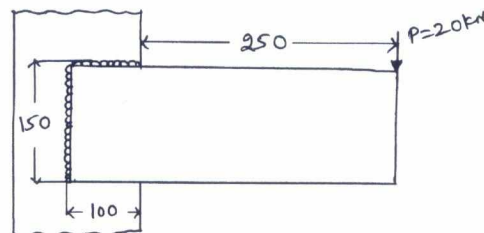


Fig.Q8(a)

(08 Marks)

- b. Determine the allowable stress in the joint shown in Fig.Q8(b), if size of weld is 10 mm.

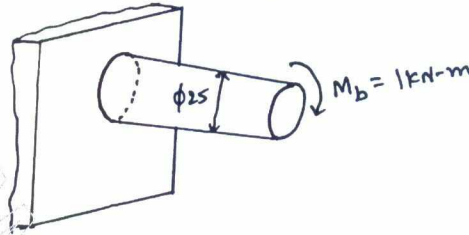


Fig.Q8(b)

(08 Marks)

**Module-5**

- 9 a. The structure in Fig.Q9(a) is subjected to eccentric load  $P = 10 \text{ kN}$  with eccentricity of 500 mm. All bolts are identical made of carbon steel having yield strength in tension is 400 MPa and factor of safety is 2.5. Determine size of bolt.

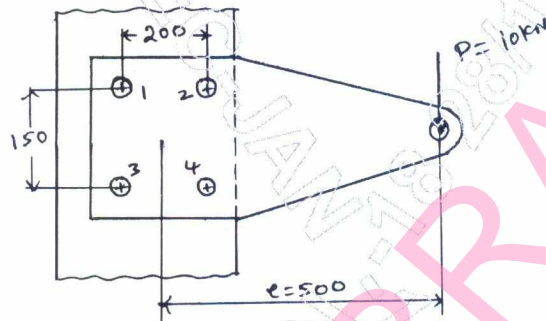


Fig.Q9(a)

(08 Marks)

- b. A bracket is fixed to wall by 4 bolts and loaded as shown in Fig.Q9(b). Calculate the size of bolts if the load is 10 kN and allowable shear stress in bolt material is 40 MPa.

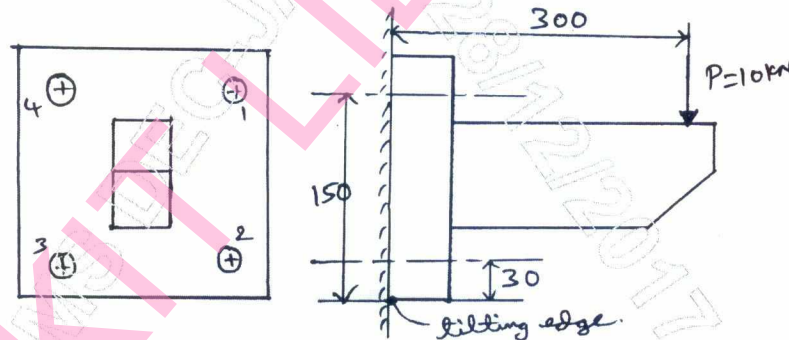


Fig.Q9(b)

(08 Marks)

**OR**

- 10 Design a Screw Jack (complete design) with a lift of 300 mm to lift a load of 50 kN. Select C40 steel ( $\sigma_y = 328.6 \text{ MPa}$ ) for the screw and soft phosphor bronze ( $\sigma_{ut} = 345 \text{ MPa}$  and  $\sigma_v = 138 \text{ MPa}$ ) for nut. (16 Marks)

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# CBCS Scheme

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15ME554

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018

## Non – Traditional Machining

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

### Module-1

- 1 a. Differentiate between Traditional and Non-traditional machining process. (08 Marks)  
b. Explain the need for Non-Traditional machining processes. (08 Marks)

OR

- 2 a. Classify the NTM processes on the basis of type of energy, mechanism of metal removal, transfer media, energy source. (10 Marks)  
b. Write in brief note on the selection of non-traditional machining processes. (06 Marks)

### Module-2

- 3 a. Sketch and explain the principle, equipment and operation of ultrasonic machining process. (10 Marks)  
b. Discuss the influence of the following parameter on USM process : (06 Marks)  
i) Amplitude and frequency of vibration  
ii) Abrasive grain size  
iii) Effect of slurry

OR

- 4 a. Explain the process variables that influence the metal removal rate in abrasive jet machining. (10 Marks)  
b. What are applications of water jet machining process? (06 Marks)

### Module-3

- 5 a. Explain with a neat sketch, the Electro chemical Grinding process. (08 Marks)  
b. Explain the effect of following parameters on Electrochemical machining process. (08 Marks)  
i) Current density  
ii) Tool feed rate  
iii) Type of electrolyte  
iv) Velocity of electrolyte flow.

OR

- 6 a. Explain with a neat sketch, the sequence of process steps involved in chemical blanking process. (10 Marks)  
b. Briefly explain the process characteristics in chemical machining process. (06 Marks)

### Module-4

- 7 a. Explain with the help of neat sketches the different types of Flushing used in EDM process. (10 Marks)  
b. What are the essential requirements of a dielectric fluid, used in EDM process? What functions does the dielectric fluid performs? (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8=50, will be treated as malpractice.

**OR**

- 8 a. With a neat sketch, explain the construction and working of plasma arc machining process. (08 Marks)  
b. Write the applications and advantages of plasma Arc machining. (08 Marks)

**Module-5**

- 9 a. Draw a neat sketch of Laser Beam machining (LBM). And explain briefly. (10 Marks)  
b. What are the advantages and limitations of LBM process? (06 Marks)

**OR**

- 10 a. Explain with sketch, the working of Electron Beam Machining (EBM). (10 Marks)  
b. Write the applications and limitations of Electron Beam Machining (EBM). (06 Marks)

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# CBCS Scheme

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15ME562

**Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018**

## **Energy and Environment**

Time: 3 hrs.

Max. Marks: 80

*Note: Answer any FIVE full questions, choosing one full question from each module.*

### Module-1

- 1 a. Explain briefly world energy scenario with respect to production and consumption using relevant statistics. (08 Marks)  
b. Elaborate the effect of various social and environmental aspects on India's energy development. (08 Marks)

**OR**

- 2 a. Discuss briefly the various key energy trends in India. (12 Marks)  
b. List and explain various forms of energy in a brief manner. (04 Marks)

### Module-2

- 3 a. List the different types of thermal energy storage systems. Explain any two of them. (08 Marks)  
b. Elaborate the different phases involved in detailed energy audit methodology. (08 Marks)

**OR**

- 4 a. A power plant of 210 MW installed capacity has the following particulars:  
Capital cost = Rs.18000/KW installed  
Interest and depreciation = 12%  
Annual load factor = 60%  
Annual capacity factor = 54%  
Annual running charges = Rs.2 × 10<sup>8</sup>  
Energy consumed by auxiliaries = 6%.  
Calculate the cost of power generation per kWh. (10 Marks)  
b. What are the general characteristics of capital investments? (06 Marks)

### Module-3

- 5 a. Identify the need for public awareness on environment management. Discuss the effort of important institutions and people in environment management. (10 Marks)  
b. Discuss how carbon is utilized in the ecosystem with the help of a simple flow diagram. (06 Marks)

**OR**

- 6 a. Define ecosystem. Explain the different types of forest ecosystems in India. (10 Marks)  
b. Explain the following terms:  
i) Food chain  
ii) Food web  
iii) Ecological pyramid (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8= 50, will be treated as malpractice.

**Module-4**

- 7 a. Explain the main sources and effects of air pollution. (10 Marks)  
b. Discuss the role of an individual in prevention of pollution. (06 Marks)

**OR**

- 8 a. Discuss strategy and techniques involved in solid waste management. (10 Marks)  
b. Illustrate a case study related to environmental pollution in detail. (06 Marks)

**Module-5**

- 9 a. Write a short note on Global warming. (06 Marks)  
b. What is the need for wasteland reclamation? Explain the methods for reclaiming wasteland. (10 Marks)

**OR**

- 10 a. What are the objectives of Water (prevention and control of pollution) Act? Explain its salient features and penalties for violation. (10 Marks)  
b. Explain the role of environment impact Assessment (EIA) in Enforcing Environmental Legislation. (06 Marks)

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# CBCS Scheme

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15ME562

**Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018**

## **Energy and Environment**

Time: 3 hrs.

Max. Marks: 80

*Note: Answer any FIVE full questions, choosing one full question from each module.*

### Module-1

- 1 a. Explain briefly world energy scenario with respect to production and consumption using relevant statistics. (08 Marks)  
b. Elaborate the effect of various social and environmental aspects on India's energy development. (08 Marks)

**OR**

- 2 a. Discuss briefly the various key energy trends in India. (12 Marks)  
b. List and explain various forms of energy in a brief manner. (04 Marks)

### Module-2

- 3 a. List the different types of thermal energy storage systems. Explain any two of them. (08 Marks)  
b. Elaborate the different phases involved in detailed energy audit methodology. (08 Marks)

**OR**

- 4 a. A power plant of 210 MW installed capacity has the following particulars:  
Capital cost = Rs.18000/KW installed  
Interest and depreciation = 12%  
Annual load factor = 60%  
Annual capacity factor = 54%  
Annual running charges = Rs.2 × 10<sup>8</sup>  
Energy consumed by auxiliaries = 6%.  
Calculate the cost of power generation per kWh. (10 Marks)  
b. What are the general characteristics of capital investments? (06 Marks)

### Module-3

- 5 a. Identify the need for public awareness on environment management. Discuss the effort of important institutions and people in environment management. (10 Marks)  
b. Discuss how carbon is utilized in the ecosystem with the help of a simple flow diagram. (06 Marks)

**OR**

- 6 a. Define ecosystem. Explain the different types of forest ecosystems in India. (10 Marks)  
b. Explain the following terms:  
i) Food chain  
ii) Food web  
iii) Ecological pyramid (06 Marks)

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