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06ME61

Sixth Semester B.E. Degree Examination, June/July 2011
Design of Machine Elements - II

Time: 3 hrs. Max. Marks:100

Note: *1. Answer FIVE full questions selecting at least TWO questions from each part.*
2. Use of Design data hand book is permitted.
3. Any missing data may be suitably assumed.

PART – A

1 a. Determine the dimensions of the curved bar shown in Fig.Q1 (a). Assume $\sigma_{yt} = 400 N/mm^2$ and FoS = 3.5. **(12 Marks)**

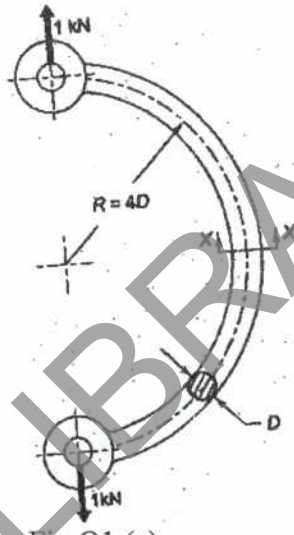

Fig.Q1 (a)

b. Briefly discuss about any four types of springs, with simple sketches. **(08 Marks)**

2 A tube, with 50mm and 75mm inner and outer diameters respectively is reinforced by shrinking a jacket of outer diameter 100mm. The compound tube has to withstand an internal pressure of 35Mpa. Calculate the shrinkage allowance such that the maximum tangential stress in each tube has same magnitude. Also calculate the shrinkage pressure and show the distribution of tangential stresses. Assume E = 207 kN/mm^2. **(20 Marks)**

3 a. Design a helical compression spring for a service load ranging from 2250N to 2750N. The axial deflection of the spring for the load range is 6mm. Assume a spring index of 5, permissible shear stress of 420 MPa and modulus of rigidity of 84 kN/mm^2. **(12 Marks)**

b. A truck spring has 12 leaves, two of which are full length leaves. The spring supports are 1.05m apart and the central band is 85mm wide. The central load is 5.4 kN and the permissible stress in spring material is 280 MPa. If the ratio of total depth to width of the spring is 3, determine the thickness & width of the spring leaves and also the deflection of the spring. **(08 Marks)**

4 A 12 kw motor running at 1170rpm drives a fan through a pair of spur gears (Forged steel SAE 1030 pinion & CI gear) with a reduction ratio of 3.9:1. Design the gear and check for dynamic & wear loads. **(20 Marks)**

PART – B

5 A Pair of straight bevel gears are used to transmit 15kw at 1500rpm input speed. The number of teeth on pinion is 20 and the speed ratio is 5. Design the gears for strength only assuming $14\frac{1}{2}^{\circ}$ full depth form. **(20 Marks)**

6 a. Determine the dimensions of a simple cone clutch to transmit 20kw at 1000rpm. The minimum diameter is to be 300mm and the cone angle 20^0. Assume $\mu = 0.2$ and permissible pressure = 0.1 N/mm^2. Also determine the axial force required to engage the clutch. **(12 Marks)**

b. A differential band brake is shown in Fig. Q6 (b). The width and the thickness of the steel band are 100mm and 3mm respectively and the maximum tensile stress in the band is 50 N/mm^2. The coefficient of friction between the friction lining and the brake drum is 0.25. Calculate:
i) The tensions in the band,
ii) The actuating force and
iii) The torque capacity of the brake.
Check whether the brake is self locking.

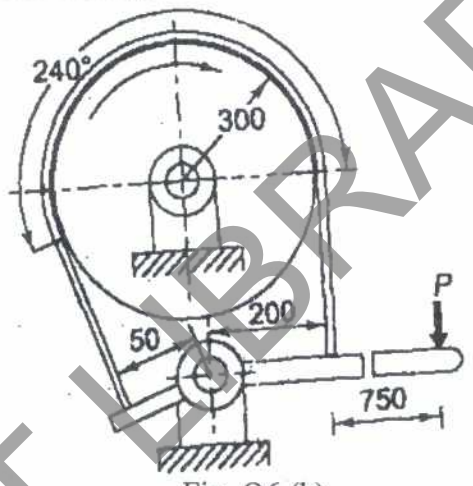

Fig. Q6 (b) **(08 Marks)**

7 a. A 75mm long full journal bearing of diameter 75mm supports a radial load of 12kN at the shaft speed of 1800rpm. Assume the ratio of diameter to the diametral clearance as 1000. The viscosity of oil is 0.01 $\frac{N-sec}{m^2}$ at the operating temperature. Determine:
i) Sommerfeld number
ii) Coefficient of friction and
iii) Amount of heat generated. **(12 Marks)**

b. Derive Petroff's equation for coefficient of friction in journal bearings. **(08 Marks)**

8 a. Select a wire rope for a vertical mine hoist to lift a load of 55kN from a depth of 300 meters. A rope speed of 500m/min is to be attained in 10secs. **(12 Marks)**

b. Select a V-belt drive to connect a 15kw, 2880rpm motor to a centrifugal pump, running at approximately 2400rpm, for a service of 18hrs per day. The center distance should be approximately 400mm. Assume the pitch diameter of driving pulley as 125mm. **(08 Marks)**

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06ME62

Sixth Semester B.E. Degree Examination, June/July 2011
Mechanical Vibration

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Define the following :
   i) Forced vibration.
   ii) Simple harmonic motion.
   iii) Degree of freedom. **(06 Marks)**

b. What is beats phenonenon? Briefly explain. **(04 Marks)**

c. Add the following motions analytically and check the solution graphically :
$x_1 = 2 \cos (t + 0.5)$
$x_2 = 5 \sin (wt + 1.0)$. **(10 Marks)**

2 a. Explain energy method that is used to determine the natural frequency of undamped free vibratory system. **(04 Marks)**

b. A semicircular disc of radius r and mass m is pivoted freely about the center as shown in Fig.Q.2(b). Determine its natural frequency of oscillation for small displacement. Use energy method. **(08 Marks)**

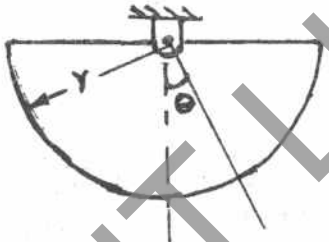

Fig.Q.2(b).

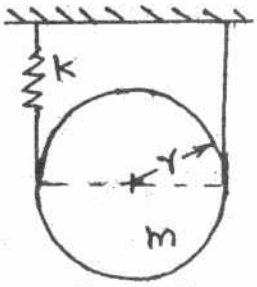

Fig.Q.2(c).

c. A homogeneous cylinder of mass 'm' and radius 'r' is suspended by a spring and an inextensible cord as shown in Fig.Q.2(c). Obtain the equation of motion and find the natural frequency of vibration of the cylinder. **(08 Marks)**

3 a. What is critical damping coefficient? **(02 Marks)**

b. A spring – mass – dashpot system consists of a spring of stiffness 343 N/m. The mass is 3.43 kg. The mass is displaced 20 mm beyond the equilibrium position and released. Find the equation of motion for the system, if the damping coefficient of the dashpot is 13.72 N-sec/m. **(10 Marks)**

c. A spring – mass – damper system is having a mass of 10 kg and a spring of such stiffness which causes a static deflection of 5mm.The amplitude of vibration reduces to ¼ the initial value in 10 oscillations. Determine :
   i) Logarithmic decrement.
   ii) Actual damping present in the system.
   iii) Damped natural frequency. **(08 Marks)**

4 a. Define "transmissibility". Derive an expression for "motion transmissibility". **(12 Marks)**

b. A machine of mass 500 kg is supported on spring of stiffness 10^6 N/m. If the machine has a rotating unbalance of 0.25 kg-m, determine :

i) The force transmitted to the floor at 1200 rpm.

ii) The dynamic amplitude at this speed. **(08 Marks)**

PART – B

5 a. Discuss the principle of operation of a vibrometer and an accelerometer. **(08 Marks)**

b. A rotor of mass 12 kg is mounted in the middle of 25mm diameter shaft supported between two bearings placed at 900 mm from each other. The rotor is having 0.02mm eccentricity. If the system rotates at 3000 rpm, determine the amplitude of steady state vibrations and the dynamic force transmitted to the bearing. Neglect damping and weight of the shaft. Take $E = 2 \times 10^5$ N/mm^2. **(12 Marks)**

6 a. Determine the two natural frequencies and the corresponding mode shapes for the system shown in Fig.Q.6(a). The string is stretched with a large tension T. Also sketch the mode shapes. **(12 Marks)**

Fig.Q.6(a).

b. Explain the principle of dynamic vibration absorber. **(08 Marks)**

7 a. Derive the differential equation for the

i) Lateral vibration of a string.

ii) Longitudinal vibration of a bar. **(14 Marks)**

b. Specify the boundary condition for a cantilever beam, simply supported beam and fixed – fixed beam to determine the lateral vibration frequency. **(06 Marks)**

8 a. Determine the fundamental natural frequency and mode shape of the system shown in Fig.Q.8(a) using Stodola's method. **(10 Marks)**

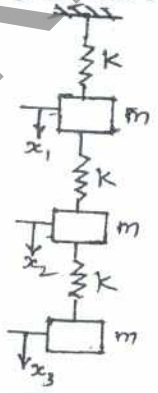

Fig.Q.8(a)

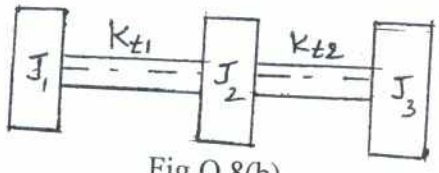

Fig.Q.8(b)

b. Calculate all the natural frequencies of a three rotor system shown in Fig.Q.8(b) by Holzer's method. Take $J_1 = J_2 = J_3 = 1$ and $K_{t_1} = K_{t_2} = 1$ **(10 Marks)**

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06ME63

Sixth Semester B.E. Degree Examination, June/July 2011
Modeling & Finite Element Analysis

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Explain plane stress and plane strain cases with examples. **(04 Marks)**

b. Find an expression for the displacement at the loading point for the bar shown in Fig. Q1 (b).

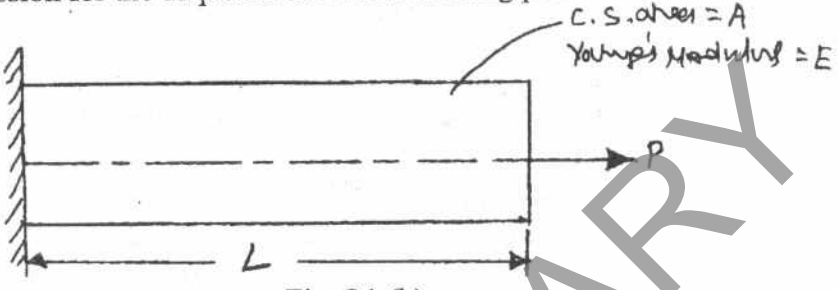


Fig. Q1 (b) **(10 Marks)**

c. Evaluate the following integral using two-point Gauss integration method:

$$I = \int_{-1}^{+1} (a_0 + a_1 x + a_2 x^2 + a_3 x^3 + a_4 x^4)\,dx.$$ **(06 Marks)**

2 a. Write the general description of the finite element method. **(10 Marks)**

b. Write down the properties of stiffness matrix. **(05 Marks)**

c. Explain node numbering scheme for a finite element mesh. **(05 Marks)**

3 a. Write down the general guidelines for selecting the interpolation polynominal. **(03 Marks)**

b. Derive shape function for a 1-D bar element in terms of global coordinates. **(07 Marks)**

c. Derive shape function bar a 2-D simplex triangular element in terms of local coordinates. **(10 Marks)**

4 a. Derive interpretation polynomial (Shape functions) for 1-D quadratic element. **(10 Marks)**

b. Derive shape functions for Isoparametric Linear Quadrilateral element in terms of local coordinates. **(10 Marks)**

PART –B

5 a. Explain different approaches used in developing element stiffness matrices and load vectors in FEM. **(05 Marks)**

b. Derive stiffness matrix for a 1-D bar element under axial loading. **(05 Marks)**

c. Derive strain-displacement matrix [B] for a isoparametric linear triangular element. **(10 Marks)**

6 a. Write down the differential equation governing the heat conduction in an orthotropic solid body and describe each term. **(06 Marks)**

b. Find the temperature distribution in the 1-D fin shown in Fig. Q6 (b). Take two elements for FE idealisation.

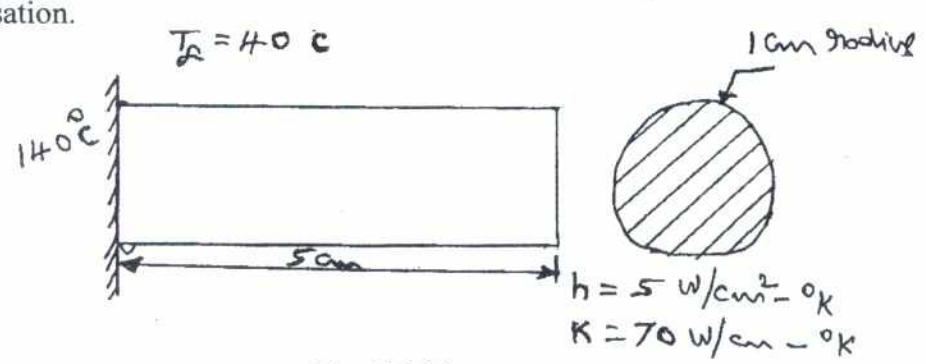


Fig. Q6 (b) **(14 Marks)**

7 a. Describe different methods of applying boundary conditions in FEM. **(06 Marks)**

b. For the two-bar truss shown in Fig. Q7 (b), determine the modal displacements through FEM. Take $E = 210 \times 10^9$Pa; $A = 0.01m^2$.

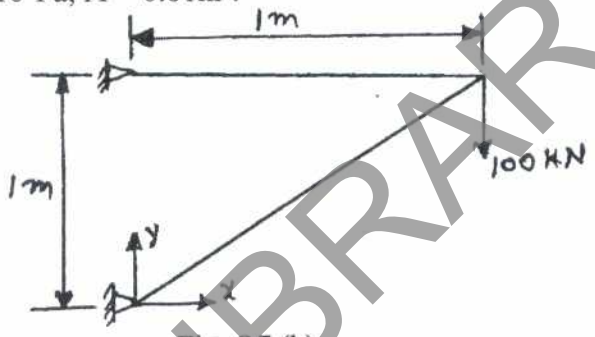
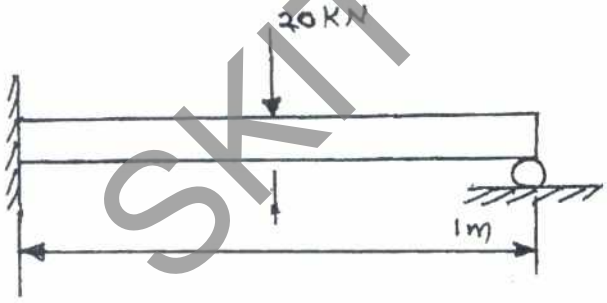


Fig. Q7 (b) **(14 Marks)**

8 A uniform cross sectional beam is fixed at one end and supported by a roller at the other end. A concentrated load 20kN is applied at the mid length of the beam as shown in Fig. Q8. Determine the reflection under load.



E = 210GPa
I = 2500mm^4

Fig. Q8 **(20 Marks)**

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06ME64

Sixth Semester B.E. Degree Examination, June/July 2011
Mechatronics and Microprocessor

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. What are the objectives of Mechatronics? **(05 Marks)**

b. What are the advantages, disadvantages and applications of Mechatronics? **(05 Marks)**

c. Explain control system, their elements and functions with examples. **(10 Marks)**

2 a. Explain the following:
i) Primary and Secondary transducer.
ii) Active and Passive transducer.
iii) Analog and Digital transducer. **(06 Marks)**

b. Explain "Hall Effect" and explain how this effect can be used to construct a sensor? **(07 Marks)**

c. Explain the working principle of the following (with sketch):
i) Eddy current proximity sensors.
ii) Capacitive proximity sensors. **(07 Marks)**

3 a. What is the bouncing in mechanical switches? Explain the hardware solution to the bouncing problems. **(08 Marks)**

b. Differentiate between a diode, thyristors and transistor. **(05 Marks)**

c. Sketch and explain the working of a stepper motor. **(07 Marks)**

4 a. Write the basic relationship of an operational amplifier. **(08 Marks)**

b. Explain the wheat stone bridge circuit used for strain measurement. **(07 Marks)**

c. Write a note on data acquisition. **(05 Marks)**

PART – B

5 a. With the help of a neat sketch explain the organization of a micro processor and state the functions of each element of the microprocessor. **(06 Marks)**

b. In brief, explain the evolution of microprocessors. **(04 Marks)**

c. State Demorgan's theorems. Draw logic circuits. **(04 Marks)**

d. Explain different methods of representing negative number. **(06 Marks)**

6 a. What are micro controllers? Distinguish between a micro processor and a micro controller. **(06 Marks)**

b. Define the following:
i) Write cycle ii) State bus iii) Interrupts iv) Assembler **(08 Marks)**

c. Give the classification of micro controllers. **(06 Marks)**

7 a. With the help of a neat sketch, explain the following:
i) Address bus.
ii) Data bus.
iii) Control signals (bus) **(07 Marks)**

b. Explain the following:
   i) Machine language.
   ii) Assembly Language.
   iii) Compiler and Interpreter. **(06 Marks)**

c. With reference to 8085, classify the instruction set and explain the following:
   i) Program counter.
   ii) Flags.
   iii) Registers.
   iv) Stack pointer.
   v) Accumulator. **(07 Marks)**

8 a. With the help of a neat sketch explain the data and instruction flow in a 8085 microprocessor. **(06 Marks)**

b. What are different types of registers in a micro processor (Give classification). Explain each one of them in brief. **(06 Marks)**

c. Explain the following with sketches:
   i) Fetch operation (cycle).
   ii) Execute operation (cycle).
   iii) Instruction cycle.
   iv) System clock. **(08 Marks)**

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06ME65

Sixth Semester B.E. Degree Examination, June/July 2011
Heat and Mass Transfer

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Derive general 3-dimensional conduction equation in Cartesian co-ordinates. **(08 Marks)**

b. Write the mathematical formulation of one-dimensional, steady-state heat conduction for a hollow sphere with constant thermal conductivity in the region $a \le r \le b$, when heat is supplied to the sphere at a rate of 'q_0' W/m^2 from the boundary surface at r = a and dissipated by convection from the boundary surface at r = b into a medium at zero temperature with a heat transfer coefficient 'h'. **(04 Marks)**

c. A stream pipe with internal and external diameters 18 cm and 21 cm is covered with two layers of insulation each 30 mm thick with thermal conductivities 0.18 W/m.K and 0.09 W/m.K. The difference in temperature between inside and outside surfaces is 250°C. Calculate the quantity of heat lost per meter length of the pipe if its thermal conductivity is 60 W/m.K. What is the percentage error if the calculation is carried out considering the pipe as a plane wall? **(08 Marks)**

2 a. Clearly define i) Fin efficiency and ii) Fin effectiveness. **(04 Marks)**

b. Derive an expression for rate of heat transfer and temperature distribution for a plane wall with variable thermal conductivity. **(08 Marks)**

c. Thin fins of brass whose K = 75 W/m.K are welded longitudinally on a 5 cm diameter brass cylinder which stands vertically and is surrounded by air at 20°C. The heat transfer coefficient from metal surface to the air is 17 W/m^2.K. If 16 uniformly spaced fins are used each 0.8 mm thick and extending 1.25 cm from the cylinder, what is the rate of heat transfer from the cylinder per meter length to the air when the cylinder surface is maintained at 150°C? **(08 Marks)**

3 a. Define i) Biot number and ii) Fourier number. **(04 Marks)**

b. Show that the temperature distribution under lumped analysis is given by, $\frac{T - T_\infty}{T_0 - T_\infty} = e^{-BiFo}$, where T_0 is the initial temperature and T_∞ is the surrounding temperature. **(08 Marks)**

c. A long cylinder 12 cm in diameter and initially at 20°C is placed into a furnace at 820°C with local heat transfer coefficient of 140 W/m^2.K. Calculate the time required for the axis temperature to reach 800°C. Also calculate the corresponding temperature at a radius of 5.4 cm at that time. Take $\alpha = 6.11 \times 10^{-6}$ m^2/s, K = 21 W/m.K. **(08 Marks)**

4 a. Using Buckingham π theorem, obtain a relationship between Nu, Pr and Gr for free convection heat transfer. **(08 Marks)**

b. Explain the development of hydrodynamic boundary layer for flow over a flat surface. **(06 Marks)**

c. Considering the body of a man as a vertical cylinder of 300 mm diameter and 170 cm height, calculate the heat generated by the body in one day. Take the body temperature as 36°C and atmospheric temperature as 14°C. **(06 Marks)**

5 a. Define clearly and give expressions for
i) Reynolds number ii) Prandtl number iii) Nusselt number iv) Stanton number. **(08 Marks)**

b. 50 kg of water per minute is heated from 30°C to 50°C by passing through a pipe of 2 cm diameter. The pipe is heated by condensing the steam on its surface at 100°C. Find the length of the pipe required. Take for water at 90°C, $\rho = 965$ kg/m^3, $K = 0.585$ W/m.K, $C_p = 4200$ J/kg.K and $\gamma = 0.33\times10^{-6}$ m^2/s. **(06 Marks)**

c. Air at a temperature of 20°C flows through a rectangular duct with a velocity of 10 m/s. The duct is 30cm ×20cm in size and air leaves at 34°C. Find the heat gain by air when it is passed through 10m long duct. **(06 Marks)**

6 a. Give the classification of heat exchangers with relevant sketches. **(06 Marks)**

b. With proper assumptions derive an expression for LMTD for a parallel flow heat exchanger. **(08 Marks)**

c. A heat exchanger has an effectiveness of 0.5 when the flow is counter and the thermal capacity of one fluid is twice that of the other fluid. Calculate the effectiveness of the heat exchanger if the direction of flow of one of the fluids is reversed with the same mass flow rate as before. **(06 Marks)**

7 a. With a neat diagram explain the regimes of pool boiling. **(08 Marks)**

b. With proper notations and sketch define Fick's law of diffusion. **(05 Marks)**

c. A vertical cooling fin approximates a flat plate of 40 cm height and is exposed to saturated steam at 100°C ($h_{fg} = 2257$ kJ/kg). The fin is maintained at a temperature of 90°C. Calculate,
i) Thickness of film at bottom of fin.
ii) Average heat transfer coefficient and
iii) Heat transfer rate after incorporating Mc Adam's correction.
Take the following properties: $\rho = 965.3$ kg/m^3; $K = 0.68$ W/w.K and $\mu = 3.153\times10^{-4}$ kg/m.s **(07 Marks)**

8 a. Clearly define:
i) Black body ii) Planck's law iii) Wein's displacement law iv) Lambert's law
v) View factor vi) Radiation shield. **(09 Marks)**

b. It is desired to calculate the net radiant heat exchange between the floor of a furnace 4m×2m and a side wall 3m×2m. The emissivity of the floor material is 0.63 and that of the side wall material is 0.2. If the temperature of the floor and side wall are 600°C and 400°C respectively. Calculate the net heat exchange between them. **(05 Marks)**

c. Two large parallel planes with emissivity 0.6 are at 900 K and 300 K. A radiation shield with one side polished and having emissivity of 0.05 and the other side unpolished with emissivity of 0.4 is proposed to be used between them. Which side of the shield should face the hotter plane, if the temperature of the shield is to be kept minimum? Justify you answer. **(06 Marks)**

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06ME665

Sixth Semester B.E. Degree Examination, June/July 2011
Non – Traditional Machining

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions selecting atleast TWO questions from each part.***

PART – A

1 a. Explain the need for development of non traditional machining. **(04 Marks)**

b. Write a note on the source of energy harnessed and mechanism of material removal in nontraditional machining. **(06 Marks)**

c. Write a note on abrasive and liquid media in USM. **(10 Marks)**

2 a. Discuss the influence of the following parameters on USM process :
i) Amplitude and frequency of vibration
ii) Grain size
iii) Slurry **(10 Marks)**

b. Write a note on process capability of USM. **(05 Marks)**

c. Briefly explain the process of "water jet machining". **(05 Marks)**

3 a. How does the following parameters affect MRR in abrasive jet machining?
i) Nozzle gap distance ii) Abrasive size iii) Nozzle pressure. **(12 Marks)**

b. Write a note on abrasives used in AJM with examples. **(08 Marks)**

4 a. Describe various process parameters affecting ECM. **(10 Marks)**

b. Calculate MRR and electrode feed rate in an ECM of iron (Fe) that has a cross sectional area of 25 × 25 mm with NaCl in water as electrolyte. The gap between the tool and work piece is 0.25 mm. The supply voltage is 12 VDC and specific resistance of electrolyte is 3 Ω cm. Given the atomic weight of iron 55.85, valence = 2 ; density 7.87×10^6 g/m^3. **(07 Marks)**

c. Differentiate between "fludging" and "non – fludging" electrolyte. **(03 Marks)**

PART – B

5 a. Discuss the factors to be considered for selection of 'Maskants' and the types that are used in 'chemical machining' **(10 Marks)**

b. Differentiate between 'chemical milling' and chemical blanking'. **(04 Marks)**

c. Write a note on 'etchants' in 'chemical milling'. **(06 Marks)**

6 a. Describe 'dielectric fluid' used in EDM. **(10 Marks)**

b. Briefly explain effects of
i) Current / supply voltage
ii) Spark frequency. **(10 Marks)**

7 a. Write a note on "generation of plasma" in plasma arc machining. **(05 Marks)**

b. Sketch and explain any one type of plasma torch. **(10 Marks)**

c. Explain a typical laser system adopted for machining process. **(05 Marks)**

8 a. With a sketch, explain the principle of EBM. **(08 Marks)**

b. Comment on the parameters influencing MRR in EBM. **(08 Marks)**

c. Briefly discuss the merits and demerits of EBM. **(04 Marks)**

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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.

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06AL61

Sixth Semester B.E. Degree Examination, June/July 2011
Management and Entrepreneurship

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting atleast TWO questions each from Part – A and Part - B.***

PART – A

1 a. Explain the different skills and their importance at different levels of management. **(08 Marks)**

b. What are the nature and characteristics of management? **(07 Marks)**

c. Distinguish between management and administration. **(05 Marks)**

2 a. Briefly describe the general principles of management as laid down by Henri Fayol. **(08 Marks)**

b. State and explain the steps in decision making. **(07 Marks)**

c. Differentiate between strategic and tactical planning. **(05 Marks)**

3 a. What is line and staff organization? **(08 Marks)**

b. Explain the nature and importance of staffing. **(07 Marks)**

c. What is MBO? Explain. **(05 Marks)**

4 a. What are the essentials of sound controlling? **(08 Marks)**

b. Explain the importance of leadership in organization. **(07 Marks)**

c. What are the barriers of successful communication? **(05 Marks)**

PART – B

5 a. What are the qualities of entrepreneur? **(08 Marks)**

b. Differentiate between entrepreneur, intrapreneur and manager. **(07 Marks)**

c. What are the various stages of entrepreneurship process? Explain. **(05 Marks)**

6 a. Explain the steps involved in setting up of a small scale industry. **(08 Marks)**

b. What is the influence of LPG on SSIs? Explain. **(07 Marks)**

c. Explain the role of SSI in economic development. **(05 Marks)**

7 a. What are the objectives and functions of NSIC? **(08 Marks)**

b. Narrate the function of SIDO for growth of SSI's. **(07 Marks)**

c. What are the objectives of SFC's? **(05 Marks)**

8 a. Write the need and significance of project report. **(08 Marks)**

b. What do you mean by project feasibility study? Explain. **(07 Marks)**

c. Define the project. What is its nature? **(05 Marks)**

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06ME662

Sixth Semester B.E. Degree Examination, June/July 2011
Mechanics of Composite Materials

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. List the desired properties of matrix and the reinforcement in a composite material. **(05 Marks)**

b. What are the advantages and limitations of composites over the other class of materials? **(10 Marks)**

c. Define aspect ratio. Explain its significance. **(05 Marks)**

2 a. Explain with sketch the Vacuum bag moulding technique of fabricating PMCs. **(10 Marks)**

b. Explain with sketch the Blow moulding technique of fabricating PMCs. **(10 Marks)**

3 a. Discuss the applications of fiber reinforced composites in automobiles. **(10 Marks)**

b. Explain the salient features of PMCs leading to successful applications in aerospace engineering. **(10 Marks)**

4 a. Differentiate between lamina and laminate. **(02 Marks)**

b. Write stress-strain relationship in matrix form for a lamina and explain the terms involved. **(10 Marks)**

c. Explain the relationship between engineering constants reduced stiffness and compliances. **(08 Marks)**

PART – B

5 a. Explain the basic assumptions in the analysis if laminated composites. **(10 Marks)**

b. Explain interlaminar stresses and edge effects in laminated composites. **(10 Marks)**

6 a. List the various types of reinforcements used in metal matrix composites. **(05 Marks)**

b. Explain the processes in the production of carbon fibers. **(10 Marks)**

c. Explain briefly the need for developing the metal matrix composites. **(05 Marks)**

7 a. Explain the powder metallurgy technique of producing metal matrix composites. **(12 Marks)**

b. Explain the In-situ fabrication process of metal matrix composites. **(08 Marks)**

8 a. Compare the performance of metal matrix composites against bare metals with respect to the following properties:
i) Tensile strength ii) Fatigue strength. **(10 Marks)**

b. Explain the effect of size, shape and distribution of particulates in metal matrix composites. **(10 Marks)**

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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.