Hall Ticket Number :										

R-11 / R-13

Code: 1G554

III B.Tech. I Semester Supplementary Examinations May 2017

Design of Machine Elements-I

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

Answer any ***five*** questions
All Questions carry equal marks (**14 Marks** each)

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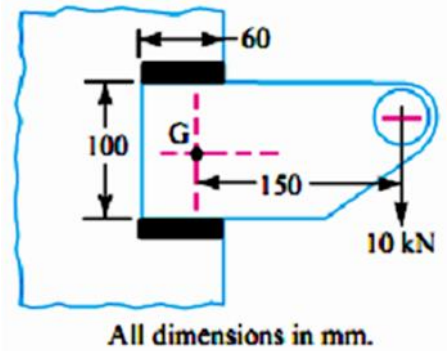
1. a) How do you classify the materials for engineering use? Explain. 7M
   b) Explain various manufacturing considerations in design. 7M
2. a) Discuss the following
      i) Maximum Principal strain theory
      ii) Distortion Energy theory 7M
   b) A shaft of 25mm diameter is subjected to a torque of 60N-m and a bending moment of 90N-m and an axial load of 6kN. Calculate factor of safety according to
      i) Max. Normal stress Theory
      ii) Max. Shear Stress Theory.

   Assume yield strength of the shaft material as 400MPa. 7M
3. a) What is endurance strength? 2M
   b) A pulley is keyed to a shaft mid-way between two anti-fraction bearings the bending moment at the pulley varies form -170N-m to 510N-m, as the torsional moment varies from 55N-m to 165N-m. The variation of the load is as that of the shaft speed. The shaft is made of cold drawn steel having an ultimate strength of 538MP and yield strength of 400MPa. Determine the diameter for an infinite life. The stress concentration factor for the key way in bending and torsion may be taken as 1.6 and 1.3 respectively. Correction factors A= 1 for bending and A=0.6 for torsion, B= 0.85, C=0.88. use factor of safety as 2. 12M
4. a) What are the advantages of riveted joints? 2M
   b) A triple riveted lap joint with zig-zag riveting is to be designed to connect two plates of 6 mm thickness. Determine the dia. of rivet, pitch of rivets and distance between the rows of rivet. Indicate how the joint will fail. Assume: σ_t = 120 MPa ; τ = 100 MPa and σ_c = 150 MPa. 12M
5. a) List various types of welded joints. 2M
   b) A bracket, as shown in Fig. carries a load of 10 kN. Find the size of the weld if the allowable shear stress is not to exceed 80 MPa.



12M

6. Design a Knuckle joint to connect two tension rods to carry a load of 25kN. Take Tensile strength: 80MPa, shear strength: 50MPa. 14M

7. a) Define terms
   (i) Equivalent bending moment
   (ii) Equivalent twisting moment 2M

   b) A hollow shaft of 0.5m outside diameter and 0.3m inside diameter is used to drive a propeller of a marine vessel. The shat is mounted on bearings 6m apart and transmits 5600kW at 150 rpm. The maximum axial propeller thrust is 500kN and the shaft weighs 70kN. Determine the maximum shear stress induced in the shaft. 12M

8. a) What is the function of coupling? 2M

   b) Design a cast-iron flange coupling to connect two shafts in order to transmit 7.5kWat 720rpm. The following permissible stresses are given below.
   Permissible shear stress for shaft, bolt and key material is 33MPa.
   permissible crushing stresses for bolt and key material 60MPa, permissible shear stress for cast-iron is 15MPa 12M

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Hall Ticket Number :										

R-11 / R-13

Code: 1G552

III B.Tech. I Semester Supplementary Examinations May 2017

Dynamics of Machinery

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

Answer any ***five*** questions
All Questions carry equal marks (**14 Marks** each)

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1. a) Define gyroscopic couple. 2M
   b) The mass of the turbine rotor of a ship is 8tonnes and the radius of gyration 0.6m. It rotates at 1800rpm clockwise when viewed from stern. Determine the gyroscopic effects in the following cases i) If the ship travelling at 100kmph steers to the starboard side in a curve of 75m radius. ii) If the ship is pitching and the bow is descending with maximum velocity, the periodic time is being 20seconds and the total angular movement between the extreme positions is 10^0. iii) If the ship is rolling at a certain instant has an angular velocity of 0.03rad/sec clockwise when looking from stern, In each case, explain clearly how you determine the direction in which the ship tends to move as a result of the gyroscopic action. 12M
2. a) What is meant by the expression 'friction circle'? Deduce an expression for the radius of friction circle in terms of the radius of the journal and the angle of friction. 6M
   b) An effort of 1500 N is required to just move a certain body up an inclined plane of angle 12º, force acting parallel to the plane. If the angle of inclination is increased to 15º, then the effort required is 1720 N. Find the weight of the body and the coefficient of friction. 8M
3. a) Describe with a neat sketch a centrifugal clutch and deduce an equation for the total torque transmitted. 6M
   b) A single plate clutch, with both sides effective, has outer and inner diameters 300 mm and 200 mm respectively. The maximum intensity of pressure at any point in the contact surface is not to exceed 0.1 N/mm^2. If the coefficient of friction is 0.3, determine the power transmitted by a clutch at a speed 2500 r.p.m. 8M
4. A machine punching 38 mm holes in 32 mm thick plate requires 7 N-m of energy per sq. mm of sheared area, and punches one hole in every 10 seconds. Calculate the power of the motor required. The mean speed of the flywheel is 25 metres per second. The punch has a stroke of 100 mm. Find the mass of the flywheel required, if the total fluctuation of speed is not to exceed 3% of the mean speed. Assume that the motor supplies energy to the machine at uniform rate. 14M
5. a) Show that the height of a Watt governor is inversely proportional to the square of the speed and comment on the applicability of Watt governor. 7M
   b) What is isochronism in governors? Comment on whether Porter governor can exhibit isochronism. Derive necessary equations 7M
6. a) Explain the role of reference plane in balancing masses of rotation in different planes? 6M
   b) Four masses A, B, C and D revolve at equal radii and are equally spaced along a shaft. The mass B is 7 kg and the radii of C and D make angles of 90° and 240° respectively with the radius of B. Find the magnitude of the masses A, C and D and the angular position of A so that the system may be completely balanced. 8M
7. The firing order of a six cylinder vertical four stroke in-line engine is 1-4-2-6-3-5. The piston stroke is 80mm and the length of each connecting rod is 180mm. The pitch distances between the cylinder center lines are 80mm, 80mm, 120mm, 80mm and 80mm respectively. The reciprocating mass per cylinder is 1.2kg and the engine speed is 2400RPM. Determine the out of balance primary and secondary forces and couples of the engine taking a plane midway between the cylinder 3and 4 as the reference plane. 14M
8. a) What do you understand by 'Torsionally equivalent shaft'? 6M
   b) Describe in detail the method of finding the frequency of torsional vibration of a two rotor system? 8M

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Hall Ticket Number :										

R-11/R-13

Code: 1G555

III B.Tech. I Semester Supplementary Examinations May 2017

Heat Transfer

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any* ***five*** questions

All Questions carry equal marks (**14 Marks** each)

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1. a) Explain the mechanism of different modes of heat transfer with a suitable example. 5M
   b) Beginning with the 3D heat conduction equation in Cartesian coordinates, obtain the general heat conduction equation in cylindrical coordinate system. 9M
2. a) Derive an expression for the critical radius of insulation for sphere. 5M
   b) An exterior wall of a house may be approximated by a 4 cm layer of common brick (k= 0.7 W/m ºC) followed by a 1.5 cm layer of gypsum plaster (k=0.48 W/m ºC). What thickness of loosely packed rock-wool insulation (k=0.065 W/m ºC) should be added to reduce the heat loss (or gain) through the wall by 80%? 9M
3. a) Derive the expression of temperature distribution for unsteady heat conduction mechanism. 5M
   b) The temperature of a gas stream is to be measured by a thermocouple whose junction is approximated as a sphere of 1 mm diameter. The properties of the junction are k = 35 W/mK, ρ = 8500 kg/m^3, and C_P = 320 J/kgK, and the convective heat transfer coefficient between the junction and the gas is 210 W/m^{2}K. Determine the time taken for the thermocouple to read 99 percent of the initial temperature difference. 9M
4. a) List out the importance of 5 non-dimensional numbers used in convection, with their mathematical expression. 5M
   b) Derive the general form of Continuity and Momentum equation for convective heat transfer mechanism. 9M
5. a) The local Nusselt number for the flow in a rough plate is correlated as $Nu_x = 0.04\ Re_x^{0.9}\ Pr^{0.33}$. Determine the average value of Nusselt number for a length 'L' of the plate. 5M
   b) Air flows across a 4 cm^2 cylinder with a velocity of 10 m/s. The air is at 25°C while the surface is at 75°C. Determine the heat transfer rate if (**i**) flow is along the diagonal (**ii**) flow is along face (or perpendicular to face). 9M
6. a) Why are high heat transfer rates experienced in drop wise condensation as compared to film condensation? How do you define Reynolds number in film condensation? 5M
   b) How the mechanism of evaporation is different from boiling? Draw the boiling curve and identify the different boiling regimes. Also, explain the characteristics of each regime. 9M
7. a) Derive an expression for Logarithmic mean temperature difference (LMTD) for counter flow heat exchanger. 5M
   b) Steam in the condenser of a power plant is to be condensed at a temperature of 30°C with cooling water from a nearby lake, which enters the tubes of the condenser at 14°C and leaves at 22°C. The surface area of the tubes is 45 m^2, and the overall heat transfer coefficient is 2100 W/m^{2}K. Determine the mass flow rate of the cooling water and steam. The enthaply of vaporisation of steam at 30°C is 2431 kJ/kgK. Assume Parallel flow Heat exchanger. 9M
8. a) Consider two infinitely long thin concentric tubes of circular cross section. If D_1 and D_2 are the diameter of the inner and outer tubes respectively, then determine the view factor F_{22}. 5M
   b) A radiation shield that has the same emissivity on both sides is placed between two large parallel plates, which are maintained at uniform temperatures of 650 K and 400 K respectively, and have emissivities of 0.6 and 0.9 respectively. Determine the emissivity of the radiation shield, if the radiation heat transfer between the plates is to be reduced to 15% to that without the radiation shield. 9M

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Hall Ticket Number :										

R-11 / R-13

Code: 1GA51

III B.Tech. I Semester Supplementary Examinations May 2017

Managerial Economics and Financial Analysis

(Common to CE, ME and ECE)

Max. Marks: 70 Time: 3 Hours

Answer any **Five** questions
All Questions carry equal marks (**14 Marks** each)

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1. What is Managerial Economics? Discuss its relation with other areas of Management?

2. Explain various Demand forecasting techniques with suitable examples?

3. Define Production function? Explain about Cobb-Douglas production function?

4. How do you classify markets? Discuss price output determination in monopoly market?

5. What is the need of Public Sector business organizations? Explain various public sector organizations in detail?

6. What is Capital budgeting? Discuss various methods of capital budgeting?

7. What is Trail balance? Explain its role and importance in financial accounting?

8. What is Ratio Analysis? Discuss various financial ratios in financial analysis?

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Hall Ticket Number :										

R-11/R-13

Code: 1G553

III B.Tech. I Semester Supplementary Examinations May 2017

Machine Tools

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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1.	a)	Differentiate orthogonal and oblique cutting.	6M
	b)	What is the use of a chip breaker? Discuss the various types of chips produced during metal machining process.	8M
2.	a)	With a neat sketch, explain how taper turning operation is performed by tail stock set over method.	6M
	b)	Explain the construction and working of multi spindle automatic lathe.	8M
3.	a)	What is double housing planner? Explain its working.	6M
	b)	Estimate the shortest machining time required to machine a plate of 200mm x 90 mm in a shaper under the following condition. Cutting speed = 13.3 m/min. Feed = 0.57 mm / double stroke. Number of passes =1 Approach+ over run (longitudinal) =20mm. Approach+ over run (lateral) = 4 mm. Ratios of cutting speed and return = 0.83	8M
4.	a)	Draw a twist drill and explain its nomenclature.	6M
	b)	Write short notes on Deep hole drilling machine and Fine boring machine.	8M
5.	a)	Explain up milling and down milling with their advantages.	6M
	b)	Explain different types of tool holding devices used in milling machine.	8M
6.	a)	Explain the term Grit, Grade and structure of a grinding wheel.	6M
	b)	Explain the working of a cylindrical grinding machine with neat a sketch.	8M
7.	a)	Compare grinding, lapping and honing process	6M
	b)	Explain the working of a vertical type broaching machine	8M
8.	a)	What is the difference between jig and fixture?	6M
	b)	Explain different method of clamping and holding the work piece.	8M

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Hall Ticket Number :										

R-11 / R-13

Code: 1G551

III B.Tech. I Semester Supplementary Examinations May 2017

Thermal Engineering II

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

Answer any ***five*** questions
All Questions carry equal marks (**14 Marks** each)

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1. a) With the help of a neat diagram explain the working principle of a combined cycle power plant and derive the equation for overall efficiency. 7M

   b) In a regenerating cycle the inlet conditions are 40 bar & 400^0C. Steam is extracted at 10 bar for regenerative heating. The exit pressure is 0.8 bar. Neglecting the pump work calculate the efficiency of the cycle. 7M

2. a) With the help of a neat sketch explain the working principle of Babcock & Wilcox boiler 7M

   b) Give the differences between fire tube boilers & water tube boilers 7M

3. a) Write a brief note on heat balance sheet of a boiler 5M

   b) A chimney has a height of 50m. Temperature of atmospheric air is 27^0C and air used is 16 kg/kg of fuel. For maximum discharge of gases calculate (i) temperature of gases (ii) draught pressure in mm of water (iii) draught in terms of height of hot gas column. 9M

4. a) Explain super saturated flow in nozzles and what are the effects of super saturated flow 7M

   b) Steam at a pressure of 10 bar and 0.9 dry discharges through a nozzle having throat area of 450 mm^2. If the back pressure is 1 bar, find (i) final velocity of the steam and (ii) cross sectional area of the nozzle at exit for maximum discharge. 7M

5. In an impulse turbine the mean diameter of the blades is 1.05m and speed is 3000 rpm. The nozzle angle is 18^0,the ratio of the blade speed to steam speed is 0.42 and the ratio of the relative velocity at outlet from the blades to that at inlet is 0.84 .The outlet angle of the blade is to be made 3^0 less than the inlet angle. The steam flow rate is 10kg/s. Draw the velocity diagram for the blades and derive the following: (i) Tangential thrust (ii) Axial thrust (iii) Resultant thrust (iv) Power (v) Blade efficiency. 14M

6. a) Give the differences between Impulse turbine and Reaction turbine. 6M

   b) Explain the concepts of (i) Degree of reaction (ii) Governing of Turbines 8M

7. a) Explain (i) Vaccum efficiency (ii) Condenser efficiency. 6M

   b) The pressure under the air baffle of a surface condenser is 52 mm of Hg. Temperature of the mixture leaving the cooler suction is 25^0C. assuming available water at 15.5^0C, and external water might lower the temperature further to 20^0C. Explain the effect of this on the quantity of vapour accompanying the air to the air pump suction. 8M

8. a) Give the detailed classification of steam engines. 7M

   b) With the help of neat sketches explain the methods of governing of steam engines 7M

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