Solved Paper 2nd Autumn 2024

3607

B.Tech. (ME) 7th Semester G-Scheme

Examination, December–2024

DESIGN OF MACHINE ELEMENTS-II

Paper-PCC-ME-401G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : ***Question 1st is compulsory.*** *Attempt total* ***five*** *questions selecting* ***one*** *question from each unit. All questions carry equal marks.*

1. Explain following terms : 6×2.5

(a) Interchangeability

(b) Fits and Tolerance

(c) Torsional rigidity

(d) Thin and Thick film lubrication

(e) Function of spring

(f) Define interference in gears.

Unit-I

2. (a) Write a brief note on the design of castings? 7.5

(b) What are the salient features for design of forging? Explain. 7.5

3. (a) Elaborate fluctuating load, repeated load, stress, reversed stress. Draw stress strain diagram and S-N curve. 7.5

(b) Discuss the Ergonomics and value engineering consideration in design process. 7.5

Unit-II

4. A shaft made up of mild steel is required to transmit 100 kW at 300 r.p.m. The supported length of the shaft is 3 meter. It carries two pulley weighing 1500 N supported at a distance of 1 meter from ends respectively. The allowable shear strength of shaft material is 60 MPa. Determine diameter of shaft. 15

5. A helical spring is made from a wire of 6 mm diameter and has outside diameter of 75 mm. If the permissible shear stress is 350 MPa and modulus of rigidity 84 kN/mm^2, find the axial load which the spring can carry and the deflection per active turn. 15

Unit-III

6. A footstep bearing supports a shaft of 150 mm diameter which is counter bored at the end with a hole diameter of 50 mm. If the bearing pressure is limited to 0.8 N/mm and the speed is 100 r.p.m.; find : (i). The load to be supported ; (ii). The power lost in friction and (iii). The heat generated at the bearing. Assume coefficient of friction = 0.015. 15

7. (a) A single row angular contact ball bearing number 310 is used for an axial flow compressor. The bearing is to carry a radial load of 2500 N and an axial or thrust load of 1500 N. Assuming light shock load, determine the rating life of the bearing. 10

(b) Classify rolling contact bearing. 5

Unit-IV

8. (a) How the gears classified and what are the various terms used in spur gear terminology? 10

(b) Explain law of gearing. 5

9. A bronze spur pinion rotating at 600 r.p.m. drives a cast iron spur gear at a transmission ratio of 4:1. The allowable static stress for the bronze pinion and cast iron gear are 84 MPa and 105 Mpa respectively. The pinion has 16 standard 20 full depth involute teeth of module 8 mm. The face width of both the gear is 90 mm. Find the power that can be transmitted from the standpoint of strength. 15

B. Tech 7th Semester (ME) G-Scheme

Examination, December, 2024

ENTREPRENEURSHIP DEVELOPMENT

Paper : PCC-ME-403-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note: ***Question 1 is compulsory.*** *Attempt total* ***five*** *questions selecting* ***one*** *question from each unit. All questions carry equal marks.*

1. (a) Discuss the different Non economic factor affecting Entrepreneurial growth.

(b) Difference between Manager and Entrepreneur.

(c) Discuss the different criteria to select a product.

(d) What are the major problems faced by SSI

(e) Explain the different requirements for formation of a Private Limited Company.

(f) Define MSME Schemes? 6×2.5=16

Unit-I

2. What are the key factors that influence successful entrepreneurship in today's rapidly changing economic environment, particularly in the context of emerging technologies and global market dynamics? 15

3. What is the significance of entrepreneurship training programs in equipping aspiring entrepreneurs with the necessary skills and knowledge to launch and manage successful ventures? 15

Unit-II

4. What are the critical steps and considerations involved in successfully launching a new product in a competitive market? 15

5. What are the essential components and best practices for preparing a comprehensive project report that effectively communicates the objectives, methodologies and outcomes of a project? 15

Unit-III

6. Discuss the impact of workplace culture and employee engagement on the productivity of small-scale industries. 15

7. Identify the key challenges faced by MSMEs in accessing finance and how these challenges can be mitigated. 15

Unit-IV

8. Identify and describe various support institutions, such as government agencies, non-governmental organizations (NGOs), industry associations and incubators. How do these institutions provide essential resources, guidance and networks to small businesses? Evaluate the effectiveness of these supports in addressing specific challenges faced by small enterprises. 15

9. What role does the Small Industries Corporation (SIC) play in promoting small-scale industries in India and how effective are its various schemes and initiatives in enhancing the competitiveness and sustainability of small businesses? 15

B.Tech. (ME) - PEC-II 7th Semester (G-Scheme)
Examination, December-2024
REFRIGERATION AND AIR CONDITIONING
Paper - PEC-ME-401-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : ***Question No. 1 is compulsory.*** *Attempt a total of* ***five*** *questions, selecting* ***one*** *question from each unit. All questions carry equal marks.*

1. Explain the following : 6×2.5=15

(a) One ton of refrigeration

(b) Name the various components of VCRS.

(c) Sensible heat factor

(d) Psychometry

(e) Classify various types of compressor.

(f) Name the refrigeration used in a domestic refrigerator.

Unit-I

2. Explain the Reversed Carnot Cycle and represent it on P-V and T-S diagrams. Also, derive an expression for its COP. 15

3. A simple air-cooled system is used for an aeroplane having a load of 10 tonnes. The atmospheric pressure and temperature are 0.9 bar and 10°C respectively. The pressure increases to 1.013 bar due to ramming. The temperature of the air is reduced by 50°C in the heat exchanger. The pressure in the cabin is 1.01 bar and the temperature of air leaving the cabin is 25°C. Determine: 1 Power required to take the load of cooling in the cabin; and 2. C.O.P. of the system. Assume that all the expansions and compressions are isentropic. The pressure of is 3.5 bar. 15

Unit-II

4. A vapour compression refrigerator used methyl chloride (R-40) and operates between temperature limits of 10°C and 45°C. At entry to the compressor, the refrigerant is dry saturated and after compression, it acquires a temperature of 60°C. Find the C.O.P. of refrigerator. The relevant properties of methyl chloride are as follows : 15

Saturation temp °C	Enthalpy Liquid KJ/kg	Enthalpy Vapour KJ/kg	Entropy of saturated Liquid (KJ/kg-k)	Entropy of saturated Vapour (KJ/kg-k)
–10	45.4	460.7	0.183	1.637
–45	133	483.6	0.485	1.587

5. Explain the practical vapour absorption refrigeration system with a neat sketch and derive the relation for its COP. 15

Unit-III

6. (a) Explain various Psychrometric processes and represent them on a psychrometric chart. 10

   (b) Explain the various factors that affect the comfort condition. 5

7. What are the classification of air conditioning system and explain summer and winter air conditioning system with neat sketch. 15

Unit-IV

8. (a) Explain the workings of the centrifugal compressor. 7.5

   (b) Explain air cooled and water cooled condenser. 7.5

9. Explain the following : 15

(a) Thermostatic expansion valve

(b) Automatic expansion valve

B. Tech. (ME) 7th Semester (G-Scheme)
Examination, November–2023
DESIGN OF MACHINE ELEMENT - II
Paper– PCC-ME-401-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note: *Attempt any **Five** Questions in total, at least **one** question from each section. **Question no. 1 is compulsory.** Each question carries equal marks (15 marks).*

Note: *Use of following Design Data book is permitted:*

(i) Design Data Handbook (In SI and Metric Units) for Mechanical Engineers by Mahadevan.

(ii) Design Data Book PSG College of Technology Coimbatore.

1. Explain following:

(a) Function of a lubricant

(b) Law of gearing

(c) Goodman criterion

(d) Value engineering

(e) Torsional rigidity of shaft

(f) Dynamic load for a bearing $6 \times 2.5 = 15$

Section-A

2. (a) Write a short note on stress concentration and stress concentration factor. 7

   (b) Explain different types of fluctuating stresses. 8

3. A rotating beam specimen made of steel 45C8 (S_{ut} = 630 N/mm²) is subjected to a completely reversed bending stress. Calculate the endurance strength of the specimen for a life of 90,000 cycles. 15

Section-B

4. What is dynamic loading? Design a shaft for dynamic loading conditions along with the assumptions made. 15

5. A helical compression spring is made of music wire. The spring has to support a load of 150N. Due to space limitations, the outer diameter of the spring should not exceed 25mm, the solid length should not to exceed 40mm and the free length of the spring is not to exceed 100 mm. Allowable shear stress for music wire is 800 MPa and G= 81000 N/mm². 15

Section-C

6. The following data is given for a full hydrodynamic bearing:

Journal speed= 1440 rpm, journal diameter= 60 mm.

Bearing length= 60 mm, radial clearance= 0.06 mm.

Radial load= 3 kN, viscosity of lubricant= 30 cP.

Assume that total heat generated due to friction in bearing is carried by the total lubricant flow. Calculate (a) coefficient of friction, (b) minimum oil thickness, (c) flow requirement, (d) temperature rise and (e) power lost in friction. 15

7. For a single row, deep groove ball bearing, Dynamic load capacity= 5590 N and static load capacity= 2500 N. Actual loads on a bearing are P_a= axial load= 625 N and P_r= radial load = 1250 N. Determine the equivalent load and life of ball bearing if: (a) Inner race is rotating and (b) outer race is rotating. 15

Section-D

8. A pair of straight bevel gears has a velocity ratio of 2: 1. The pitch circle diameter of the pinion is 80mm at the large end of the tooth. A 5 kW power is supplied to the pinion, which rotates at 800 rpm. The face width is 40mm and the pressure angle is 20°. Calculate the tangential, axial and radial components of the resultant tooth force acting on the pinion. 15

9. A pair of helical gears consists of a pinion of 20 teeth and gear of 50 teeth. Helix angle for gears is 15^0 and normal pressure angle is 20^0. If the normal module of gear teeth is 4 mm, Calculate: (a) transverse module, (b) transverse pressure angle, (c) addendum and dedendum circle diameters of both pinion and gear, (d) minimum widths of gears for smooth operation. 15

B. Tech. 7th Semester (ME) (G-Scheme)
Examination, November–2023
ENTREPRENEURSHIP DEVELOPMENT
Paper– PCC-ME-403-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note: *Attempt **five** questions in all, selecting **one** question from each unit. **Question no. 1 is compulsory.** All questions carry equal marks.*

1. Write short notes in 40 -50 words: 6×2.5=15

(i) Types of entrepreneurs

(ii) Feasibility study

(iii) Sources of finance for entrepreneurs

(iv) Meaning of MSME enterprises

(v) SIDBI

(vi) Entrepreneurial myths

Unit-I

2. Define Entrepreneurship . Explain different types of entrepreneurship? Which one do you think is most suitable for mechanical industries and why? 15

3. Define Entrepreneur. Explain various qualities/traits of an entrepreneur. 15

Unit-II

4. What do you mean by Project Appraisal? Explain different methods of Project Appraisal. 15

5. Define Entrepreneurial Opportunity. Explain various sources of entrepreneurial opportunities. 15

Unit-III

6. Give the definition of Small Scale Industry. Explain its objectives and scope. 15

7. What are MSME Industries? Explain various steps involved in starting an MSME. 15

Unit-IV

8. What do you mean by Venture Capital? Explain various venture capital schemes offered by various financial institutions of India. 15

9. Write short notes on: 3×5=15

   (a) SIDBI

   (b) SISI

   (c) NSIC

B. Tech. (ME) PEC-II 7th Semester (G-Scheme)
Examination, November–2023
REFRIGERATION & AIR CONDITIONING
Paper– PEC-ME-401-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note: *Attempt any **five** Questions in total, at least **one** question from each section. **Question no. 1 is compulsory.** Each question carries equal marks (15 marks).*

1. Explain following:

(a) Cryogenics

(b) Ram effect

(c) Infiltration

(d) Superheating horn

(e) Sensible heat gain

(f) Duct friction $6\times2.5=15$

Section-A

2. (a) A domestic refrigerator set at 2°C handles a refrigeration load of 8000 kJ/day. The ambient temperature is 30°C. The COP of refrigerator is 0.15 times of maximum COP Then find the daily electricity. 8

(b) Discuss four thermodynamic properties of refrigerants. 7

3. (a) State limitations of reversed carnot cycle for use as refrigeration cycle. 8

(b) Explain reduced ambient air refrigeration system with it's application. 7

Section-B

4. (a) Compare throttling vs isentropic expansion. 5

(b) Describe single compressor and multiple expansion valve refrigeration system. 10

5. (a) Describe ammonia- water vapor absorption refrigeration system. 10

(b) In a vapor absorption refrigeration system, the refrigeration temperature is –10°C. The generator is operated by solar heat here the temperature reached is 100°C. The temperature of the sink is 50°C? What is the maximum possible COP of the system? 5

Section-C

6. (a) The degree of saturation of air at 30°C and 100kPa is 24%. The saturation pressure at 30°C is 4 kPa. Find relative humidity and specific humidity. 8

(b) Describe cooling and dehumidification process with it's applications. 7

7. An air conditioned space is maintained at 27°C DBT and 50% RH when the outside conditions are 36°C DBT and 27°C WBT. If the space has a sensible heat gain of 18.6kW and air is supplied to the room at a condition of 9°C saturated. Calcuate (a) mass and volume flow rates of air supplied to room, (b) latent heat gain of the space and (c) the cooling load of refrigeration plant if 15% of the total weight of air supplied to the space is fresh air and remaining is recirculated air. 15

Section-D

8. (a) Discuss role of humidity and temperature sensors in an air conditioner. 7

(b) Explain winter air conditioning system with 30% fresh air and remaining is re-circulated air. 8

9. Compare the use of rotary and reciprocating compressor with their applications and performance curves. 15

B. Tech. 7th Semester (ME) PEC-II (G-Scheme)
Examination, November–2023
SOLAR ENERGY ENGINEERING
Paper– PEC-ME-411-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note: *Attempt **five** questions, selecting **one** question from each section. **Question no. 1 is compulsory.** All questions carry equal marks.*

1. Explain:

(a) Differentiate between terrestrial and extraterrestrial regions.

(b) Significance of solar collector

(c) Heliostat

(d) Advantages of concentrators

(e) Working of solar cooker

(f) Greenhouse effect $6 \times 2.5 = 15$

Section-A

2. Explain the working construction of solar measuring instruments. 15

3. Explain the heat transfer through the walls and roofs. 15

Section-B

4. Explain the working of a typical liquid flat plate collector with a neat diagram. 15

5. How does a solar water heater work? Explain with a neat diagram. 15

Section-C

6. Explain the solar-operated absorption system with a neat diagram. 15

7. With a schematic sketch, define the intermittent absorption cooling system. 15

Section-D

8. Describe the principle of a solar cell with a diagram. 15

9. What is photovoltaic thermal? Explain its applications in detail. 15