INTERNAL ASSESSMENT (Machine Design) **Time: 1hr**

[Full Marks: 20]

Note: Answer any two questions out of 2, 3, 4.

Q1. Write short notes on (**Any five**)

a) Creep
b) Resilience
c) Fatigue
d) Factor of Safety
e) Caulking
f) Toughness

[Marks. 10]

Q2. A double riveted lap joint is made between 15mm thick plate. The rivet diameter and pitch are 25mm and 75mm, respectively. If the ultimate stresses are 400MPa in tension, 320MPa in shear and 640MPa in crushing. Find the minimum force per pitch which will rupture the joint.

If the above joint is subjected to a load such that the factor of safety is 4, find out the actual stresses developed in the plates and the rivets.

[Marks: 5]

Q3. Determine the length of the weld run for a plate of size 120mm wide and 15mm thick to be welded to another plate by means of

i) A single transverse weld
ii) Double parallel fillet welds, when the joint is subjected to variable load

(The tensile stress and the shear stress for static loading are 70MPa and 56MPa, respectively. The stress concentration factor for the transverse and fillet are 1.5 and 2.7, respectively).

[Marks: 5]

Q4. Design a shaft to transmit power from an electric motor to a lathe head stock through a pulley by means of a belt drive. The pulley weighs 200N and is located at 30mm from the centre of the bearing. The diameter of the pulley is 200mm and the maximum power transmitted is 1KW at 120rpm. The angle of lap of the belt is 180° and the coefficient of friction between the belt the pulley is 0.3. The shock and the fatigue factors for the bending and twisting are 1.5 and 2.0, respectively. The allowable shear stress in the shaft may be taken as 35MPa. [Marks: 5]

1st INTERNAL EXAM

SUB- EIM DATE- 06/12/2021 F.M-20

Answer any two of the following questions: (10*4=40)

Q1) Define the term Entrepreneur and Entrepreneurship. Explain the various needs of it.

Q2) Briefly explain the qualities of an entrepreneur.

Q3) Explain the various functions of an entrepreneur.

Q4) Differentiate between entrepreneur and manager.

DEPARTMENT OF MECHANICAL ENGINEERING

INTERNAL EXAMINATION

SUB-MECHATRONICS DATE-08/12/2021 F.M-20

Answer any two of the following questions (3*10)

Q1)Explain the detailed architecture of a PLC with diagram.

Q2)Explain in brief the various types of temperature sensors.

Q3)Write short notes on:

a)Light sensors

b)LVDT

UTKALMANI GOPABANDHU INSTITUTE OF ENGINEERING
ROURKELA

Internal – I **Semester: –5th (Mech)**
Subject: -HM&IFP(Th-03)
Full Marks: -20 **Time: - 1 Hr**

Answer any four questions including Question No. 1 which is compulsory.

Q1. **[1x5]**

a. Define the term speed ratio, flow ratio?
b. Define impulse and reaction turbine with example?
c. Define specific speed of turbine?
d. Define hydraulic efficiency, mechanical efficiency and overall efficiency for turbine?
e. State the difference between Kaplan turbine and a propeller turbine?

Q2. An inward flow reaction turbine has an external diameter of 1.2m. the turbine runs at 450r.p.m. The velocity of flow at inlet 12m/s and the guide blade angle is 12^0. Determine **[5]**

(i) Absolute velocity of water at inlet
(ii) Velocity of whirl at inlet
(iii) Inlet angle of blade of runner
(iv) Relative velocity of water at inlet

Q3. A pelton wheel working under an effective head of 50m produces 100kW as brake power at 250 r.p.m. If overal efficiency of the wheel is 85% and coefficient of velocity of the nozzle is 0.97, determine the discharge required to develop above power. **[5]**

Q4. Explain the working of Francis turbine with diagram **[5]**

Q5. Obtain the expression for work done per second by water on the runner of a Pelton-wheel turbine and condition of maximum efficiency. **[5]**

INTERNAL EXAMINATION (RAC)

Branch: MECHANICAL **Semester-5th** **TIME : 1 Hour** **Full Marks: 20**

Answer any two from question number 4,5,6. Question number 1,2,3 are compulsory.

1.Answer all the questions **[1×5=5]**

a) Define Refrigeration and write its unit.

b) Write definition of Refrigeration Effect and Write its unit.

c) Define dryness fraction and write its unit.

d) Define superheated steam.

e) Write the relationship of COP between heat pump and refrigerator.

2.A Refrigerator has working temperatures in the evaporator and condenser coils of -30 and +30°C respectively. What is the maximum possible COP of the refrigerator? **[2]**

3.Show different points in T-S diagram for pure substance (water). **[3]**

4.Draw schematic diagram of VCR system and discuss about it with P-h and T-S diagram.**[5]**

5.A VCR works between the pressure limits of 60 bar and 25 bar. The working fluid is just dry at the end of compression and there is no undercooling of the liquid before the expansion valve. Determine C.O.P of the cycle.

Data:

Pressure (bar)	Saturation temperature (K)	Enthalpy (kJ/kg)		Entropy	
		liquid	vapour	liquid	vapour
60	295	151.96	293.29	0.554	1.0332
25	261	56.32	322.58	0.226	1.2464

6.Derive the COP formula of Bell-Coleman cycle, discussing with P-V and T-S diagram.**[5]**

Date 7th Dec, 2021

INTERNAL EXAMINATION (PRODUCTION TECHNOLOGY)

TIME : 1 Hour

[Full Marks: 20]

Answer all the Questions

1) Define Extrusion? [2]
2) Define Rolling? Explain with diagram of the different rolling stand arrangement. [6]
3) Define Welding? What is the functions of flux in welding? [4]
4) What is Resistance Welding? With diagram explain the welding process. [5]
5) Explain Projection Welding. [3]

DEPARTMENT OF MECHANICAL ENGINEERING

3rd SEMESTER INTERNAL EXAM

SUB-TE(TH-4) DATE-08/12/2021 TIME-1HR F.M-20

1a)Define thermal engineering and thermodynamics. (2)

b)State the thermodynamical system. (2)

c)State the thermodynamic properties. (2)

2a)What is the difference between heat and work? (3)

b)Compare the intensive and extensive properties. (3)

3)State the 1st law of thermodynamics and its limitations. (5)

4)Describe the thermodynamic equilibrium. (3)

OR

Describe the quasi static process with a neat sketch.

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3rd SEMESTER INTERNAL EXAM

SUB-EM(TH-3) DATE-08/12/2021 TIME-1HR *F.M-20*

Q1)Answer any 5 questions of the following (6*2=12)

Q)Define a)Toughness
b)Resilience
c)Corrosion

Q)What is the effect of the following elements on steel d)tungsten e)Carbon f)chromium

Q2)Draw the iron- carbon diagram and explain in detail the critical temperature lines. *(10)*

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ROURKELA

Semester: –3rd(Mech)

Internal – I
Subject: -EVS(Th-5)
Full Marks: -20 **Time: - 1 Hr**

Answer any four questions including Question No. 1 which is compulsory.

Q1. **[1x5]**

a. Define environment?
b. What is an ecosystem? What are the components of ecosystem? Give some examples?
c. What are renewable and non-renewable resources? Gives example.
d. Define food chain and food web?
e. What is sustainable development?

Q2. Explain the scope and significance of environmental studies . **[5]**

Q3. What is meant by energy flow in an ecosystem and explain how it takes place?**[5]**

Q4. Explain the following
1) Desertification
2) Land degradation **[5]**

Q5. What is renewable energy? Write a brief note on an y two renewable energy sources **[5]**

Q6. What are the causes of soil erosion and the methods of preventing it?**[5]**

INTERNAL ASSESSMENT (Strength of Material)

Time: 1hour

[Full Marks: 20]

Note: Answer any four questions, including question no. 1 & 2.

Q1. Write short notes on (**Any five**)

a) State the Hooke's Law?
b) Define Hoop stress.
c) Define Resilience.
d) Define shear force & bending moment.
e) What is the difference between stress & strain
f) Define principle of superposition.
g) Define Poisson's ratio. [Marks: 10]

Q2. a) A simply supported beam of 6m span carries a point load of 50KN at a distance of 5m from its left and draw the shear force and bending moment of beam.

OR

b) A cantilever beam of span 1.5m carrying 2 point loads of 1.5KN & 2 KN at the free end and a distance 1m from the fixed end. Draw the shear force and bending moment of beam.

[Marks: 4]

Q3. A Cylindrical shell 2m long & 1m internal diameter is made up of 20 mm thick plates. Find the circumferential & longitudinal stress in the shell material, if it is subjected to internal pressure of 5MPa. [Marks: 3]

Q4. A steel bar 2m long & 150 mm^2 in cross section is subjected to an axial pull of 15KN. Find the elongation of the bar. Take E=200GPa. [Marks:3]

Q5. A brass rod 2 meter long is fixed at both its ends. If thermal stress is not to exceed76.5 MPa Calculate the temperature through which the rod should be heated. $\alpha = 17 \times 10^{-6}/K$, E=90Gpa. [Marks: 3]

Date 9th Dec, 2021

INTERNAL EXAMINATION (EME)

Branch: ELECTRICAL **Semester: 3rd** **Full Marks: 20** ***TIME : 1 Hour***

Answer any two from question number 4,5,6. Question number 1,2,3 are compulsory.

1.Answer all the questions **[1×5=5]**

a) Define Heat and Work.

b) Define intensive and extensive properties with examples.

c) Write units of enthalpy and entropy.

d) Define superheated steam.

e) Define first law of thermodynamics.

2.Derive the relationship between specific heat at constant pressure and specific heat at constant volume. ***[2]***

3.Derive workdone formula for adiabatic process. ***[3]***

or

Show different points in T-S diagram for ideal gas.

4. Write difference between 4-stroke petrol and 4-stroke diesel engine. ***[5]***

5.A stationary fluid system goes through following cycle.**[5]**

a) Process 1-2 isochoric heat addition of 235 kJ/kg.

b) Process 2-3 adiabatic expansion to its original pressure with loss of 70kJ/kg in internal energy.

c) Process 3-1 isochoric compression to its original volume with heat rejection of 200 kJ/kg.

Prepare a balance sheet of energy quantities and find the overall changes during the cycle.

6.Find the enthalpy and entropy of steam when the pressure is 2MPa and the specific volume is 0.09 m3/kg.**[5]**