

5th Sem. COMMON 2020(W)

Th1- Entrepreneurship and Management & Smart Technology

Full Marks: 80

Time- 3 Hrs

Answer the questions as per the instruction.
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10
 - a. Write the full form of NABARD.
 - b. Enlist at least four characteristics of an entrepreneur.
 - c. Why should an entrepreneur prepare the project himself?
 - d. Define financial management.
 - e. Distinguish between debit and credit.
 - f. Define market.
 - g. Why does an organization need advertisement?
 - h. Differentiate a manager with a leader.
 - i. Define IoT.
 - j. Define IPR (Intellectual Property Right).

2. Answer **Any Six** Questions 5 x 6
 - a. Differentiate entrepreneur with manager.
 - b. What are the factors to be taken into account to select a technology for an enterprise?
 - c. Write the objectives of financial management.
 - d. Write the different functions of marketing.
 - e. Briefly discuss different types advertising media.
 - f. Briefly explain the functions of HRM.
 - g. Briefly discuss the smart transportation system, the advantages and

- disadvantages related to it.
- h. Explain the Maslow's theory of motivation.

3 Answer any three questions

10x3

- a. Briefly explain different barriers in entrepreneurship.
- b. How do you select a business opportunity? Explain different components (at least five) related to business opportunity.
- c. What is PPR (Preliminary Project Report)? Briefly explain the structure of PPR.
- d. Explain the five functions of management briefly.
- e. Briefly explain the general recruitment process in an organization.
- f. Briefly explain different types of budgets.

**5TH SEM/MECH/MECH(MAIN.)/MECH.(PROD.)/MECH(IND.INT)/
MECH(SAND)/ 2020(W)NEW
Th-2 Design of Machine Elements**

Full Marks: 80

Time- 3 Hrs

**Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks**

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|----|---|--------|
| 1. | Answer All questions | 2 x 10 |
| | a. Define factor of safety | |
| | b. State function of shaft. | |
| | c. What is a key? State its function. | |
| | d. What are the materials used for helical spring? | |
| | e. What is modulus of rigidity? | |
| | f. What is surge in springs? | |
| | g. What is the difference between toughness and stiffness? | |
| | h. What are the different types of shaft couplings? | |
| | i. Define Diagonal pitch. | |
| | j. What is welded joint? Write two application of welded joint. | |
| 2. | Answer Any Six Questions | 6 x 5 |
| | a. What are the advantages of welded joint over riveted joints? | |
| | b. Explain mechanical properties of the material. | |
| | c. Draw stress-strain diagram for mild-steel. Explain various points. | |
| | d. Explain the failures of a riveted joint. | |
| | e. A plate 100mm wide and 12.5mm thick is to be welded to another plate by means of parallel fillet welds. The plates are subjected to a load of 50KN. Find the length of the weld so that the maximum stress does not exceed 56mpa. Consider the joint first under static loading and then under fatigue loading. | |
| | f. How are the keys classified? Draw neat sketches of different types of keys and state their applications. | |
| | g. A line shaft rotating at 200r.p.m is to transmit 20kW. The shaft may be assumed to be made of mild steel with an allowable shear stress of 42mPa. Determine the diameter of the shaft, neglecting the bending moment on the shaft. | |
| 3 | Design a clamp coupling to transmit 30kW at 100r.p.m The allowable shear stress for the shaft and key is 40mPa and the number of bolts connecting the two halves are six. The permissible tensile stress for the bolts is 70mPa. The co-efficient of friction between the muff and the shaft surface may be taken as 0.3. | 10 |
| 4 | Describe the Design procedure in details. | 10 |
| 5 | A helical spring is made from a wire of 6mm diameter and has outside diameter of 75mm. If the permissible shear stress is 350mpa and modulus of rigidity 84kN/mm ² . Find the axial load which the spring can carry and the deflection per active turn. | 10 |
| 6 | Two plates of 10mm thickness each are to be joined by means of a single riveted double strap butt joint. Determine the rivet diameter; rivet pitch, strap thickness and efficiency of the joint. Take the working stresses in tension and shearing as 80mPa and 60mPa respectively. | 10 |
| 7 | Design the rectangular key for a shaft of 50mm diameter. The shearing and crushing stresses for the key material are 42mPa and 70mPa. | 10 |

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10
 - a. Write down the definition of hydraulic turbine and give one example.
 - b. What is the mathematical formula for hydraulic efficiency of Francis turbine?
 - c. Write the formula for speed ratio of Kaplan turbine.
 - d. Define about suction lift and delivery lift for centrifugal pump.
 - e. Define about hydraulic pump.
 - f. Define positive slip and negative slip for reciprocating hydraulic pump.
 - g. Why air regulator is used in the pneumatic control system?
 - h. What is the function of flow control valve in pneumatics?
 - i. Write the purpose of using actuators in hydraulic control system.
 - j. Draw symbols for bi-directional motor and check valve of hydraulic control.
2. Answer **Any Six** Questions 6 x 5
 - a. Distinguish between impulse and reaction turbine.
 - b. Write a short note about working of centrifugal hydraulic pump.
 - c. A single acting reciprocating pump running at 100 rpm delivers $0.012 \text{ m}^3/\text{sec}$ of water. The diameter and stroke of the cylinder are 0.2 m and 0.3 m respectively. Calculate the coefficient of discharge and percentage of slip.
 - d. Explain briefly about air lubricator.
 - e. Write down short note on single-acting cylinder for pneumatic control.
 - f. Write about the advantages and limitations of hydraulic system.
 - g. Write briefly about direct acting relief valve.
3. The mean bucket speed of a pelton wheel is 10 m/s. Jet of water flows at the rate of $0.8 \text{ m}^3/\text{sec}$ under a head of 35m. The buckets deflect the jet through an angle of 165° . If the coefficient of velocity of the jet is 0.98, then find power developed by water in the turbine and hydraulic efficiency of turbine. 10
4. Find the manometric efficiency and vane angle at inlet of a centrifugal pump delivering water at the rate of $0.2 \text{ m}^3/\text{s}$ against a total head of 80m. The pump runs at 1450 rpm. The inner and outer diameter of the pump are 25 cm and 50 cm respectively. The area of flow through the impeller is 0.08 m^2 . The vanes are curved in backward direction at an angle of 30° at exit. 10
5. Explain in detail about construction and working of double acting reciprocating pump with neat sketch. 10
6. Explain in detail about 3/2 DCV and 5/2 DCV with proper diagrams for pneumatic control systems. 10
7. Explain about external and internal gear pumps used in hydraulic controls. 10



5TH SEM./MECH/AUTO/DIP.MECH/MECH[MAIN]/MECH[PROD]
/MECH[SAND]/MECH[IND.INT]/MECH[AUTO] 2020(W) NEW
Th-4 Mechatronics

09/04/2021 (2020(W))

TR-4
5th

Full Marks: 80

Time- 3 Hrs

Answer any five Questions including Q No.1 & 2
Figures in the right hand margin indicates marks

1. Answer **All** questions: 2 x 10
 - a. Define Mechatronics.
 - b. "The System Mechatronics" is employed with how many systems?
 - c. What is thermocouple?
 - d. Define kinematic link.
 - e. Define sensor. State its advantages.
 - f. What is meant by solenoid?
 - g. State the function of an actuator.
 - h. Define spur gear.
 - i. Define relay.
 - j. What is mnemonics?
2. Answer **Any Six** Questions: 6 x 5
 - a. Explain Mechatronics system and Measurement system with appropriate block diagram with advantages and disadvantages?
 - b. Explain Electromechanical transducer with its application.
 - c. Briefly describe about transducer actuating mechanism and various types of transducer.
 - d. Explain briefly about light sensor, temperature sensor with a neat sketch.
 - e. Give a brief description about Bolt and Belt drive mechanism.
 - f. Explain different types of Industrial Robot.
 - g. Explain functioning of CAD/CAM system.
3. Explain briefly the Architecture basic internal structure of PLC and also the selection and use of PLC. 10
4. Classify the different types of Kinematic pair. Explain working principle of slider crank mechanism with neat sketch. 10
5. Calculate the velocity ratio and the output speed of the driver pulley on a lawn mower belt and pulley, where the input speed is 300rpm and diameter of driver pulley is 150mm and diameter of driven pulley is 15mm? 10
6. Explain Electrical Actuator and the working principle of Electrical solenoid Actuator with its application. 10
7. Write short notes on: 10
 - a) Switches
 - b) Guideways
 - c) Spindle drive
 - d) Master and Jump control
 - e) DC motor

Full Marks: 80

Th-5 Refrigeration & Air Conditioning

Time- 3 Hrs

Answer any five Questions including Q No.1 & 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10
 - a. What do you mean by refrigeration?
 - b. Define 'tonne' of refrigeration.
 - c. Differentiate between primary refrigerant and secondary refrigerant.
 - d. What are the chemical formulae of refrigerant R-11, R-13, R-21 and R-22?
 - e. What are the equipments used in an Air-conditioning system?
 - f. What is the use of Air filter and blower in air conditioning system?
 - g. Define sensible heat factor.
 - h. What is Dry-bulb temperature?
 - i. What are the physical properties of refrigerant?
 - j. Give the classification of evaporators.
2. Answer **Any Six** Questions 6 x 5
 - a. Describe chemical properties of refrigerants.
 - b. With the help of neat diagram explain the working of a thermostatic expansion valve.
 - c. Enumerate the desirable properties of an ideal refrigerant.
 - d. With the help of Psychrometric chart, Explain sensible cooling and sensible heating.
 - e. Draw the P-V and T-S diagram for a reversed Brayton cycle and derive the expression for its COP.
 - f. What are the applications of refrigeration? Explain ice plant layout.
 - g. In vapour absorption refrigeration system, heating, cooling and refrigeration take place at the temperatures of 100°C, 20°C and -5° respectively. Find the maximum C.O.P of the system.

- 3 With neat sketch, describe practical vapour absorption refrigeration system. 10
- 4 Explain in details about the summer air conditioning and winter air-conditioning system. 10
- 5 Explain with the help of neat sketch, the principle of operation of a single stage, single acting reciprocating compressor. 10
- 6 In an ammonia vapour compression system, the pressure in the evaporator is 2bar. Ammonia at exit is 0.85 dry and at entry its dryness fraction is 0.19. During compression the work done per kg of ammonia is 150kJ. Calculate the C.O.P. and the volume of vapour entering the compressor per minute. If the rate of ammonia circulation is 4.5kg/min. The latent heat and specific volume at 2bar are 1325kJ/kg and $0.58\text{m}^3/\text{kg}$ respectively. 10
- 7 In an absorption type refrigerator, the heat is supplied to NH_3 generator by condensing steam at 2bar and 90% dry. The temperature in the refrigerator is to be maintained at -5°C . Find the maximum C.O.P. possible. If the refrigeration load is 20 tonnes and actual C.O.P. is 70% of the maximum C.O.P., Find the mass of steam required per hour. Take temperature of the atmosphere as 30°C . 10

Examination
Winter 2020

5th Sem
Th-1, 2, 3, 4, 5
Except: Th-5
Comp-5C