R-15

Code: **5G564**

III B.Tech. II Semester Supplementary Examinations Nov/Dec 2018
Applied Thermodynamics-III
(Mechanical Engineering)

Max. Marks: 70   Time: 3 Hours
Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)
****

Note: Refrigeration & Air-Conditioning tables are allowed
Symbols and abbreviations are having their regular meaning.

UNIT–I

1.   In a gas turbine power plant, air is compressed through a pressure ratio of 7:1 from 20ºC. After compression air is heated to a maximum permissible temperature of 800ºC and expanded in two stages. Expansion ratio in each stage of turbine is 2.45. The air is being reheated in between the expansion stages to 750ºC. Exhaust gases from turbine stages are preheated in a heat exchanger with an effectiveness of 0.8. Calculate: (i) The cycle efficiency, (ii) The work ratio, (iii)The work done per kg of air.

Assume the isentropic efficiencies of compressor and turbines are 0.82 and 0.84 respectively.   14M

OR

2. a) Briefly explain the working principle of Pulse Jet engine with a neat sketch   7M
    b) Write the basic differences between Propeller Jet and Turbojet engines.   7M

UNIT–II

3.   An air-refrigeration systems operating on Bell Coleman cycle, takes in air from cold room at -6ºC and compresses it from 1.2 bar to 6.4 bar. The index of compression being 1.24. The compressed air is cooled to 30ºC. The ambient temperature is 20ºC. Air expands in an expander in an polytropic expansion with index 1.34. Calculate: (i) COP of the system, (ii) Quantity of air circulated per minute for production of 1450 kg of ice per day at 0ºC from water at 20ºC., (iii) Capacity of the plant in terms of kJ/s. Consider, C_p =4.184 kJ/kgK for water, C_p = 1.005 kJ/kgK for air and latent heat of ice = 335 kJ/kg.   14M

OR

4. a) Write the merits and demerits of vapour compression refrigeration system over air refrigeration system.   7M
    b) Discuss briefly with *T-s* and *P-h* charts, the effect of (i) Sub-Cooling and (ii) Super-Heating of refrigerant on performance of VCR system.   7M

UNIT–III

5.   Describe the working of a LiBr-H_2O vapour absorption refrigeration system with a neat sketch   14M

OR

6.   The generator, evaporator and ambient temperatures in an vapour absorption refrigeration system are 125ºC, -10ºC and 32ºC respectively. The actual COP is 55% of theoretical COP. If the plant capacity is 120 TOR, calculate the fuel consumption per hour. Consider calorific value of fuel is 42 MJ/kg.   14M

UNIT–IV

7.   Atmospheric air at 40ºC and 60% relative humidity is to be cooled and dehumidified to a state of saturated air at 15ºC. The mass flow rate of atmospheric air entering the dehumidifier is 50 km/h. Neglecting any pressure drop, calculate:
        (i)   The mass of water vapour removed
        (ii)   The quantity of heat removed.   14M

OR

8. a) Describe the working of a summer air-conditioning system with a neat sketch.   7M
    b) Explain the concepts of (i) RSHF and (ii) GSHF   7M

UNIT–V

9.   What are the different impurities in atmospheric air? Briefly explain the effect of these impurities on human health.   14M

OR

10. a) Briefly explain the working of an impact type humidifier with a neat sketch.   7M
    b) Explain different methods of air cleaning.   7M

***

Code: 5G562

R-15

III B.Tech. II Semester Supplementary Examinations Nov/Dec 2018

CAD/CAM
(Mechanical Engineering)

Max. Marks: 70   Time: 3 Hours

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

****

UNIT–I

1. a) Explain the basic structure and basic configuration of CAD/CAM software. 7M
   b) With a neat sketch, explain the working principle of Refresh display and DVST. 7M

OR

2. a) What is data base? Explain the popular database models with an example. 7M
   b) Discuss the concept of obtaining a rotation about an arbitrary point in XY plane. 7M

UNIT–II

3. a) How do you classify the various modeling systems on the basis of their capabilities? 4M
   b) What is meant by Sweep? Discuss in detail the various types of sweep techniques. 10M

OR

4. a) What are the primitive elements in CAD? Explain in detail. 7M
   b) What are the differences and applications of Coons and Bezier surfaces? 7M

UNIT–III

5. a) Briefly describe about the various types of drives used in CNC machine tools 7M
   b) How is cutter compensation given in the case of a machining center? Explain with the help of example how it is operational. 7M

OR

6. a) Differentiate between
      (i) Absolute and Incremental positioning system
      (ii) Fixed and Floating zero method 8M
   b) Compare and contrast between several input systems used in NC system. 6M

UNIT–IV

7. a) State the benefits of Group Technology. 4M
   b) Explain Opitz classification and coding system in GT. 10M

OR

8. a) Define part family in GT. Explain one method of parts coding system 7M
   b) State the principles of material handling system. 7M

UNIT–V

9. a) With CIM wheel diagram, explain communication network of the system. 7M
   b) State the benefits of integrating CAQC with CAD/CAM. 7M

OR

10. a) What are the objectives of material requirement planning? 7M
    b) Differentiate between computer aided inspection and computer aided testing. 7M

***

III B.Tech. II Semester Supplementary Examinations Nov/Dec 2018
Design of Machine Elements-II
(Mechanical Engineering)

Max. Marks: 70   Time: 3 Hours
Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)
****

UNIT–I

1. a) Discuss in detail the design procedure for journal bearing. 8M

   b) Discus the principle of hydrodynamic lubrication. 6M

OR

2. Design a journal bearing for a centrifugal pump with the following data. Diameter of journal=140mm, load on the bearing=50kN and speed of the journal = 800rpm. 14M

UNIT–II

3. a) Why are taper roller bearings used in pairs? Discuss. 6M

   b) A ball bearing with a dynamic load capacity of 22.8 kN is subjected to a radial load of 10 kN. Calculate (i) the expected life in million revolutions that 90% of the bearings will reach; (ii) the corresponding life in hours, if the shaft is rotating at 1450 rpm; and (iii) the life that 50% of the bearings will complete or exceed before fatigue failure. 8M

OR

4. A system involves four identical ball bearings, each subjected to a radial load of 2500 N. The reliability of the system, i.e., one out of four bearings failing during the lifetime of five million revolutions, is 82%. Determine the dynamic load carrying capacity of the bearing, so as to select it from the manufacturer's catalogue based on 90% reliability. 14M

UNIT–III

5. Design a side crank for an IC engine to the following specifications. Bore diameter=150mm, stroke=190mm, length of the connecting rod=380mm, maximum pressure = 320Mpa, RPM=600, brake mean effective pressure =70Mpa. Design stress for the crank shaft=30Mpa. 14M

OR

6. Discuss in detail the design procedure of connecting rod for an IC engine. State the significance of whipping stresses. 14M

UNIT–IV

7. a) How leaf spring is modeled for stress and deflection analysis. Discuss the importance of uniform strength beam. 6M

   b) A semi-elliptic leaf spring consists of two extra full-length leaves and six graduated -length leaves, including the master leaf. Each leaf is 7.5 mm thick and 50 mm wide. The centre-to-centre distance between the two eyes is 1 m. The leaves are pre-stressed in such a way that when the load is maximum, stresses induced in all the leaves are equal to 350 N/mm2. Determine the maximum force that the spring can withstand. 8M

OR

8. Discuss the V-belt selection procedure from manufactures catalogue. 14M

| UNIT–V |

9. A pair of spur gears with 20° pressure angle consists of a 25 teeth pinion meshing with a 60 teeth gear. The module is 5 mm, while the face width is 45 mm. The pinion rotates at 500 rpm. The gears are made of steel and heat treated to a surface hardness of 220 BHN. Assume that dynamic load is accounted by means of the velocity factor. The service factor and the factor of safety are 1.75 and 2 respectively. Calculate

    i. wear strength of gears;

    ii. the static load that the gears can transmit without pitting; and

    iii. rated power that can be transmitted by gears.   14M

OR

10. a) State any two reasons for adopting involute curve for gear tooth profile.   4M

   b) In a pair of spur gears, the number of teeth on the pinion and the gear are 20 and 100 respectively. The module is 6 mm. Calculate

    (i) the centre distance;

    (ii) the pitch circle diameters of the pinion and the gear;

    (iii) addendum and dedendum;

    (iv) tooth thickness and bottom clearance;

    (i) the gear ratio.   10M

***

Code: 5G561

R-15

III B.Tech. II Semester Supplementary Examinations Nov/Dec 2018
Instrumentation and Control Systems
(Mechanical Engineering)

Max. Marks: 70   Time: 3 Hours

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

****

UNIT–I

1. a) Explain the Dynamic characteristics of measuring instruments.   7M
    b) Discuss briefly about the classification of instruments.   7M

OR

2. a) Classify the different types of transducers. Explain the working principle of Capacitive transducers.   6M
    b) Discuss about the Static characteristics of measuring instruments.   8M

UNIT–II

3. Describe the principle of operation of a Ionization gauge with a neat sketch and mention its applications, merits and demerits.   14M

OR

4. a) Explain the working principle of Hot wire anemometer.   6M
    b) Discuss briefly about the temperature measurement instruments.   8M

UNIT–III

5. a) Explain the working principle of Pneumatic load cell with a neat sketch.   7M
    b) Describe the working principle of Piezoelectric accelerometer with a neat sketch. 7M

OR

6. a) Explain the strain gauge torsion meter with a neat sketch.   7M
    b) Illustrate the working principle of Vibrometer with a neat sketch.   7M

UNIT–IV

7. a) Discuss briefly about the Strain gauge alloys and materials.   7M
    b) Explain about resistance strain gauges with a neat sketch.   7M

OR

8. a) Classify the bonding techniques and explain with any one method.   7M
    b) Describe about temperature compensation in strain gauges.   7M

UNIT–V

9. a) Explain the differences between Open loop and Closed loop systems with suitable examples.   8M
    b) Discuss briefly about the transfer functions of elements.   6M

OR

10. a) Represent the Mathematical models for Mechanical systems with an example.   8M
    b) Discuss briefly about the Signal flow graphs.   6M

***

III B.Tech. II Semester Supplementary Examinations Nov/Dec 2018
Industrial Management
(Mechanical Engineering)

Max. Marks: 70   Time: 3 Hours
Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)
****

UNIT–I

1. a) List and explain the functions of Management.   07M
   b) Explain about contributions of Taylor to scientific management.   07M

OR

2. Discuss in detail about Functional organization. Also explain the merits and demerits of Functional organization.   14M

UNIT–II

3. Define plant location. Describe clearly about the factors affecting the plant location.   14M

OR

4. A small project is composed of seven activities. Time estimates are listed in the table below:

Activity	Estimated duration (weeks)		
	Optimistic	Most likely	Pessimistic
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

   (a) Draw the project network.
   (b) Find the critical path and expected duration of the project.   14M

UNIT–III

5. a) Define Time study. Explain about the steps in Time study.   07M
   b) Describe about any one chart with example in conducting method study.   07M

OR

6. a) Explain in detail about work sampling.   07M
   b) A work sampling study showed that 20% of a work week of 48 hours was consumed by avoidable delays. Every time a work sampling observation was made, the operator was rated and the average of such ratings was 110%. If 110 units were produced per week, determine the standard per unit.   07M

UNIT–IV

7. a) Describe about the duties of a purchase manager.   07M
   b) Explain about various inventory classification techniques.   07M

OR

8. a) Write short note on control chart for attributes.   07M
   b) Explain about single sampling plan with an example.   07M

UNIT–V

9. Define Job Evaluation. Explain about the methods of Job Evaluation.   14M

OR

10. With a neat sketch explain about the product life cycle.   14M

***

III B.Tech. II Semester Supplementary Examinations Nov/Dec 2018
Metrology and Surface Engineering
(Mechanical Engineering)

Max. Marks: 70　　　　　　　　　　　　　　　　　　　　　　　Time: 3 Hours
Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)
****

UNIT–I

1. a) Explain the unilateral and bilateral systems of writing tolerances with suitable examples. Which system is preferred in interchangeable manufacturing? Why?　7M
   b) Describe interchangeability and selective assembly concepts in detail?　7M

OR

2. Design the general type Go and No-Go gauges for components having 20 H7/f8 fit. Fundamental deviation of 'f' shaft= -5.5$D^{0.41}$. 20 mm falls in the diameter step of 18mm and 30mm. Tolerance factor i(microns) = 0.45$(D)^{1/3}$+0.001D and IT7=16i ; IT8 = 25i. Take wear allowance as 10% of the gauge tolerance.　14M

UNIT–II

3. a) Distinguish between end standard and line standard.　7M
   b) What types of measuring systems are used for angle measurement? Explain angle gauges.　7M

OR

4. a) What is the difficulty in using the optical flat alone? How do you overcome this difficulty in an interferometer?　7M
   b) Explain the beam comparator method of testing flatness of a surface plate.　7M

UNIT–III

5. a) Differentiate between surface roughness and waviness.　4M
   b) Describe with a neat sketch the construction, principle and operation of Talysurf.　10M

OR

6. a) Describe in brief the construction and working of a sigma comparator.　8M
   b) List out the advantages and applications of pneumatic comparators　6M

UNIT–IV

7. a) Explain the effective diameter measurement by two wire method.　7M
   b) What is the best wire size? Derive an expression for the same in terms of pitch 'p' and angle of the thread.　7M

OR

8. a) Explain the measurement of gear tooth thickness with aid of neat sketch.　8M
   b) List various types of CMMs and write the industrial applications.　6M

UNIT–V

9. a) What is the need of machine alignment tests? Explain alignment test on milling.　8M
   b) Explain the tests for the flatness of bed and for the straightness and parallelism of bed ways of a lathe machine.　6M

OR

10. a) Write short notes on the following
    i) Overlay coatings and ii) Sheradising　7M
    b) What are the advantages of surface treatments? Explain about mechanical modification of surfaces.　7M

***