

Code: 4G565

III B.Tech. II Semester Supplementary Examinations Nov/Dec 2019

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. Design a journal bearing for a centrifugal pump from the following data:
 Load on journal = 20 kN, Speed of the journal = 900 rpm, type of oil = SAE10 for which the absolute viscosity at 55°C = 0.017kg/m-s. Ambient temperature of the oil is 15.5°C. Maximum bearing pressure for the pump = 15 N/mm². Calculate the mass of the lubricating oil required for artificial cooling, if rise of temperature of oil be limited 10°C. Heat dissipation coefficient = 1232 W/m²/°C

14M

OR

2. Design a full hydrodynamic journal bearing with the following specification for machine tool application:
 Journal diameter = 75 mm Radial load = 10 kN
 Journal speed = 1440 rpm Minimum oil film thickness = 22.5 microns
 Inlet temperature = 40°C Bearing material = Babbitt
 Determine the length of the bearing and select a suitable oil for this application.

14M

UNIT-II

3. A bearing for an axial flow compressor is to carry a radial load of 2500 N and thrust of 1500 N. The service imposes light shock and the bearing will be in use for 40hours/week for 5 years. The speed of the shaft is 1000 rpm. Select suitable ball bearing for the purpose and give the required tolerances on the shaft and the housing. Diameter of the shaft is 50 mm.

14M

OR

4. The radial reaction on a bearing is 8000 N. It also carries a thrust of 5000 N. The shaft diameter is 140 mm and it rotates at 1700 rpm. Outer ring is stationary. Load is smooth, 8 hours/day for a life of 17000 hours.
 (a) Select a deep groove ball bearing
 (b) What is the rated 90% life of the selected bearing?
 (c) For b = 1.34, compute the probability of the selected bearing surviving 17000 hours.

14M

UNIT-III

5. a) What are the forces acting on the connecting rod? 2M
 b) A vertical cylinder petrol engine has a bore of 100 mm and stroke 120 mm. The length of the connecting rod between centres is 250 mm. The mass of the piston is 1.1 kg. The speed of the engine is 1500 rpm. In the expansion stroke with a crank at 30° from TDC, the gas pressure is 700 kN/m². Determine:
 (i) Net force on the piston
 (ii) Force on the connecting rod
 (iii) Thrust on the cylinder wall
 (iv) Speed above which the gudgeon pin force would reverse in direction.

12M

OR

6. a) A cast iron flywheel for a blanking press has a mean diameter of 1.5 m. the normal operating speed of 275 rpm slows down to 250 rpm during the punching operation. The required energy fluctuation is 6500 joules and the density of the cast iron is 7000 kg/m^3 . Find the area of flywheel rim if the arms and hub provide 7% of the flywheel effect. 12M
- b) Explain the functions of oil rings and compression rings on piston. 2M

UNIT-IV

7. a) Design a close coiled helical compression spring for a service load ranging from 2250 N to 2750 N. The axial deflection of the spring for the load range is 6 mm. Assume a spring index of 5. The permissible shear stress intensity is 420 MPa and modulus of rigidity, $G = 84 \text{ kN/mm}^2$. Neglect the effect of stress concentration. Draw a fully dimensioned sketch of the spring, showing details of the finish of the end coils. 12M
- b) What is nipping in a leaf spring? Discuss its role. 2M

OR

8. Two pulleys, one 450 mm diameter and the other 200 mm diameter, on parallel shafts 1.95 m apart are connected by a crossed belt. Find the length of the belt required and the angle of contact between the belt and each pulley. What power can be transmitted by the belt when the larger pulley rotates at 200 rev/min, if the maximum permissible tension in the belt is 1 kN, and the coefficient of friction between the belt and pulley is 0.25? 14M

UNIT-V

9. A motor shaft rotating at 1500 r.p.m. has to transmit 15 kW to a low speed shaft with a speed reduction of 3:1. The teeth are $14\frac{1}{2}^\circ$ involute with 25 teeth on the pinion. Both the pinion and gear are made of steel with a maximum safe stress of 200 MPa. A safe stress of 40 MPa may be taken for the shaft on which the gear is mounted and for the key. Design a spur gear drive to suit the above conditions. Also sketch the spur gear drive. Assume starting torque to be 25% higher than the running torque. 14M

OR

10. a) A pair of helical gears consist of a 20 teeth pinion meshing with a 100 teeth gear. The pinion rotates at 720 r.p.m. The normal pressure angle is 20° while the helix angle is 25° . The face width is 40 mm and the normal module is 4 mm. The pinion as well as gear are made of steel having ultimate strength of 600 MPa and heat treated to a surface hardness of 300 B.H.N. The service factor and factor of safety are 1.5 and 2 respectively. Assume that the velocity factor accounts for the dynamic load and calculate the power transmitting capacity of the gears. 12M
- b) What is a herringbone gear? Where they are used? 2M

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R-14

Code: 4G566

III B.Tech. II Semester Supplementary Examinations Nov/Dec 2019

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. Explain clearly about Fayol's principles of Management. CO1 14M

OR

2. Describe Line organization, Line and staff organization, and Functional organization. Also list the merits and demerits of each organization. CO1 14M

UNIT-II

3. a) Define plant layout. Explain about the objectives of good plant layout. CO2 7M

b) Describe the criteria for locating plant at rural and urban sites. CO2 7M

OR

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

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

- (a) Draw the project Network.
 (b) Find the expected duration of the project.
 (c) Calculate the variance and standard deviation of project length. What is the probability that the project will be completed
 (i) At least four weeks earlier than expected?
 (ii) No more than 4 weeks later than expected?

CO2 14M

UNIT-III

5. a) Distinguish between micro-motion and memo-motion studies. CO3 7M

b) Define Work Study. Explain its objectives. CO3 7M

OR

6. a) Illustrate briefly about time study equipment. CO3 7M

b) An 8 hours work measurement study in a plant reveals the following:
 Number of units produced = 320 Idle time = 15%
 Performance rating = 120% Allowances = 12% of normal time
 Determine the standard time per unit produced. CO3 7M

UNIT-IV

7. a) Discuss about various costs associated with inventory models. CO4 7M

b) Describe the duties of a purchase manager. CO4 7M

OR

8. a) Distinguish between Inspection and Quality Control. CO4 7M

b) Explain about single sampling plan with an example. CO4 7M

UNIT-V

9. Define Merit rating. Explain about different methods of Merit rating. CO5 14M

OR

10. Define wage incentive. Explain about various types of wage incentive schemes. CO5 14M

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R-14

Code: 4G563

III B.Tech. II Semester Supplementary Examinations Nov/Dec 2019

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. Design a Go & NoGo limit gauge for checking of a hole having a size $40 \pm 0.02\text{mm}$. Assume gauge tolerance as 10 % of working tolerance and wear allowance equal to 10 % of gauge tolerance. Draw the diagrammatic presentation.

OR

2. Explain the difference between interchangeable and selective assembly. For what type of application is selective assembly used?

UNIT-II

3. Explain interferometry applied to flatness testing by using optical flat.

OR

4. Describe with neat sketches of Auto collimator and sine bar.

UNIT-III

5. What do you mean by waviness and roughness? Describe the methods for numerical assessment of surface texture.

OR

6. Explain working, construction of any one mechanical comparator and what are its limitations?

UNIT-IV

7. Explain three wire method used in screw thread measurement.

OR

8. Derive an expression for best wire size for measuring effective diameter. Calculate effective diameter and best wire dia. For M22x2.5 screw plug gauge by using floating carriage Micrometer for which reading were taken as diameter of standard cylinder 20mm micrometer reading over standard cylinder with two wire is = 15.9334mm micrometer reading over plug screw gauge with two wire is=15.2245mm.

UNIT-V

9. What are the Requirements of Machine Tool Alignment Tests? Name the different alignment tests to be performed on a drilling machine.

OR

10. What is Coating? Write down the types of coating and explain any one of the coating with neat sketch.
