

FACULTY OF ENGINEERING
BE VI Semester (CBCS)(A.E) (MAIN) Examination, April/May 2019

Subject: DESIGN OF AUTOMOTIVE COMPONENTS

Time: 3 Hours

Max.Mark:70

Notes: Answer all questions from part-A & answer any five question from part-B

PART – A (20 Marks)

1. What are the differences between Dry and Wet Liner?
2. Why connecting rod made of "I" section?
3. List out any four advantages of chain drive over belt drives.
4. Maximum load applied on the leaf spring is 75 KN. Distance between eyes of the spring is 1m, total number of leaves 8, $b = 9t$, $t = 12\text{mm}$. find out equivalent stress on the spring?
5. Classifying the Roller Bearing according to the rolling element.
6. Radial clearance is 0.025mm, radius of the journal bearing 25mm, viscosity NS/mm^2 , load acting on the bearing 3 kN, length of the bearing is 50mm.

Determined Sommer field Number

7. Define Anti-Frictional bearing.
8. Explain Pitch Circle.
9. Define viscosity and viscosity index.
10. Why Pre-load applied on the Semi-elliptical Spring?

PART – B (50 Marks)

11. Design an exhaust Valve for diesel engine for following specification:

Cylinder bore diameter 150 mm, stroke length 300 mm, engine speed 575 rpm, Maximum gas pressure inside the cylinder 4N/mm^2 and seat angle 45° Calculate:
 Diameter of port.

- 2) Diameter of the Valve head.
- 3) Diameter of the Valve stem.
- 4) Thickness of the Valve head and Maximum valve lift.

12. Design the center crank shaft for diesel cylinder vertical engine:

Cylinder bore 150 mm, $(L/r) = 4.75$, Maximum gas pressure 4 N/mm^2 length of the stroke 175 mm. Weight of the fly wheel cum pulley 3.5 kN, total belt Pull = 1.8kN allowable bending stress and allowable compressive stress as 75 N/mm^2 , allowable bearing pressure is 10 N/mm^2 Main bearing are 350mm apart and third bearing is 400mm apart from Main bearing.

Contd..2

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Calculate:

- 1) Diameter and length of the crank pin.
- 2) Width and thickness of flanges.
- 3) Reaction of the bearing.
- 4) dia of shaft under the flywheel

13. Design a full hydro-dynamic journal bearing with following specification:

journal diameter 75mm, Radial load 15kN, journal speed 1200RPM, $\phi = 23$ microns, inlet temperature is 40°C. Assume ($FV=5.79$ and $FV=3.99$) calculate:

- 1) length of the bearing.
- 2) Viscosity (if $S=0.3$).
- 3) Temperature rises. And
- 4) Average temperature of the lubricant.

14. Leather belt transmitting 20kW Power, center to center distance between the pulleys is twice of diameter of big pulley. Belt velocity is 23m/s, stress developed in the belt is 3 N/t^2 , $\rho=0.97$ gm/cc, $f=0.3$, $t=5$ mm, small pulley speed=1440RPM, and big pulley speed 480RPM. Calculate:

- 1) Dia of pulleys.
- 2) Length of belt. (If open belt drive)
- 3) Belt Tensions

15. The following data is given for a pair of gear with 20° full depth Involute teeth. Number of teeth on pinion 24, Number of teeth on Gear 56, speed of pinion

1200 RPM, Module 3mm, Service factor 1.5, face width 30mm, $\sigma_b = \frac{600N}{mm^2}$, same material used for gear and pinion calculate :

- 1) Beam strength.
- 2) Velocity factor.
- 3) Rate of power can transmitted without bending failure.
(If the factor of safety is 5).

16. It is require to design a helical compression spring subjected to a maximum force of 8kN, Mean coil dia 150mm, spring rate 75N/mm, $\tau = 1250 N/mm^2$ permissible shear stress is 30% of τ . Calculate:

- 1) Wire diameter.
- 2) Number of active coils (take $G=81370 N/t^2$).

17. Give short notes on

- a. Torque tube
- b. Torque and speed ration calculation
- c. Internal gear
