RVK/KW/13/3137/3563

Faculty of Engineering & Technology
Seventh Semester B.E. (Mech.)/Seventh Semester B.E.P.T. (Mech.) Examination
MACHINE DESIGN–III
Sections—A & B

Time—Three Hours] [Maximum Marks—80

INSTRUCTIONS TO CANDIDATES

(1) All questions carry marks as indicated.
(2) Answer **TWO** questions from Section A and **TWO** questions from Section B.
(3) Due credit will be given to neatness and adequate dimensions.
(4) Assume suitable data wherever necessary.
(5) Illustrate your answers wherever necessary with the help of neat sketches.
(6) Use of Data book and non-programmable calculator is permitted.

SECTION–A

1. (a) Design a flexible bush pin coupling to connect two shafts to transmit 10 kW at 650 rpm. 8

(b) Design and draw neat sketch of C.I. flywheel for a four stroke I.C. engine developing 45 kW at 600 rpm. Total fluctuation of speed is 5% of the mean speed. The work done during power stroke may be assumed to be 1.4 times average work done during whole cycle. The flywheel diameter shouldn't exceed 1200 mm. 12

2. (a) A journal bearing running at 750 rpm is carrying a uniform load of 3000 N. Bearing is operated under ambient temperature at 27°C. Suggest the diameter of bearing and suitable grade of oil if bearing is to have $l/d = 1$. Does the bearing required artificial cooling ? 12

(b) The Spindle of a wood working machine runs at 1000 rpm. It is mounted on two single row ball bearing, one of which is required to carry a radial load of 2.25 kN and thrust load of 1.9 kN. The machine runs 8 hours per day. Assuming a life of four years and spindle diameter equal to 30 mm, select a suitable bearing. 8

3. (a) A machine requiring 37 kW of about 320 rpm is to be driven by 1440 rpm electric motor by use of flat leather belt. Design cross section of belt.
[Pulley Design is not expected.] 10

(b) A 45 kW engine used, roller chain as a drive for rear axle. The driving sproket runs at 800 rpm and driven sproket runs at 200 rpm. The centre distance is approx. 900 mm. The efficiency of transmission between engine and driving sproket is 85%. Select suitable size of chain. Determine no. of teeth on sproket, their pitch axle diameter and outside diameter and also suggest suitable length of chain. 10

SECTION–B

4. A reciprocating pump compressor running at 600 rpm is driven by 15 kW, 1440 rpm of motor through a pair of spur gear for continues duty and medium shock. Design a gear having good balance, strength and wear. Give all the specification including heat treatment, also design gear blank. 20

5. A pair of bevel gear is required to transmit 8 kW for shaft. Determine required module, gear diameter, face width and Design complete drive for following specification.

Sr. no.	Item	Pinion	Gear
01	No. of Teeth	21	63
02	Material	Steel	C.I.
03	Basic stress (S_o)MPa	80	54
04	Hardness, BHN	200	180
05	Speed, rpm	960	?
06	Teeth Profile	14½° F.D.	14½° F.D.

20

6. (a) Design suitable wire rope for elevator in bending 180 m high for total load of 30 kN. The desired speed is 5 m/s and the full speed must be reach in 8 seconds. Also determine proportion of sheave. 15

(b) Explain in brief with sketch the single and double enveloping worm gears. 5