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 **Reg. No. :** **Question Paper Code: 46071** |
| B.E/B.TECH DEGREE END SEMESTER EXAMINATIONS, NOV 2017 |
| Sixth Semester |
| Mechanical Engineering |
| 14UME601 – DESIGN OF TRANSMISSION SYSTEMS  |
|  (Regulation 2014)(PSG Design Data Book) |
| Duration: 3 Hours | Maximum: 100 Marks |
| Answer ALL QuestionsPART -A (10 x 1 = 10 Marks) |
| 1. | The material suitable for the belts used in agricultural equipments is (a) cotton (b) rubber (c) leather (d) balata gum |
| 2. | Design of power transmission shafting is based on (a) Maximum shear stress theory of failure (b) St. Venant theory (c) Rankine’s theory (d) Heigh’s theory |
| 3. | The gears are termed as medium velocity gears, if their peripheral velocity is (a) 1–3 m/s (b) 3–15 m/s (c) 15–30 m/s (d) 30–50 m/s |
| 4. | A spur gear with pitch circle diameter D has number of teeth T. The module m is defined as (a) m = d /T (b) m = T / D (c) m = π D / T (d) m = D.T |
| 5. | When bevel gears having equal teeth and equal pitch angles connect two shafts whose axes intersect at right angle, then they are known as (a) angular bevel gears (b) crown bevel gears (c) internal bevel gears (d) mitre gears |
| 6. | If b denotes the face width and L denotes the cone distance, then the bevel factor is written as (a) b / L (b) b / 2L (c) 1 – 2 b.L (d) 1 – b / L |
| 7. | The contact ratio for gears is (a) zero (b) less than one (c) greater than one (d) none of these |
| 8. |  If the centre distance of the mating gears having involute teeth is increased, then the pressure angle (a) increases (b) decreases (c) remains unchanged (d) none of these |
| 9. | A jaw clutch is essentially a (a) positive action clutch (b) cone clutch (c) friction clutch (d) disc clutch |
| 10. | The torque developed by a disc clutch is given by (a) T = 0.25 μ.W.R (b) T = 0.5 μ.W.R (c) T = 0.75 μ.W.R (d) T = μ.W.R |
|  | PART- B ( 5 x 2 = 10 Marks) |
| 11. | What are the losses in belt drives? |
| 12. | State the law of gearing. |
| 13. | Under what situation, bevel gears are used? |
| 14. | Write any two requirement of a speed gear box? |
| 15. | Name few commonly used friction material. |
|  PART - C ( 5 x 16 = 80 Marks) |
|  16. | (a) | Design a V – belt drive and calculate the actual belt tensions and average stress for the following data. Driven pulley diameter 500mm, driver pulley diameter, 150 mm, center distance 925 mm, Speeds n1 = 1000 rpm, n2 = 300 rpm and power, P= 7.5 Kw. | (16) |
| Or |
|  | (b) | A flat belt drive is to design to drive a flour mill. The driving power requirement of the mill is 22.5 Kw at 750rpm with a speed reduction of 3.0.The distance between the shaft is 3m.Diameter of the mill pulley is 1.2m.Design and make a neat sketch of the drive.  |  (16) |
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| 17. | (a) | Design a spur gear required to transmit 45KW at a pinion speed of 800 rpm. The velocity ratio id 3.5: 1. The teeth are 20 o full depth involute with 18 teeth on the pinion. Both the pinion and gear are made of steel with a maximum safe static stress of 180 N/mm2. Assume medium shock conditions. |  (16) |
| Or |
|  | (b) | In a spur gear drive for a stone crusher, the gears are made of C40 steel. The pinion is transmitting 30 KW at 1200 rpm. The gear ratio is 3. Gear is to work 8 hrs. per day, six days a week and for 3 years. Design the drive. |  (16) |
| Or |
| 18. | (a) | A pair of straight tooth bevel gears has a velocity ratio of 4/3. The pitch diameter of the pinion is 150 mm. The face width is 50 mm. The pinion rotates at 240 rev/min. The teeth are 5 mm module, 14 and 1/2o involute. If 6 KW is transmitted, determine (i) the tangential force at the mean radius, (ii) the pinion thrust force, (iii) the gear thrust force and Draw the free body diagrams indicating the forces. |  (16) |
| Or |
|  | (b) | Design a pair of bevel gears is to be transmitting 10KW from pinion at a speed 1440rpm. Required transmission ratio is 4. Material for gears is 15Ni 2Cr 1 Mo 15/steel. The tooth profiles of the gear are 20o composite form. |  (16) |
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| 19. | (a) | In a machine tool application, 12 different speeds are required from 125 rpm to 450 rpm in the output shaft. The motor speed is 630rpm.1. Determine the 12 standard speeds in G.P.2. Draw the ray diagram.3. Sketch the kinematic layout.4. Determine the number of teeth on the gears to be used.  | (16) |
| Or |
|  | (b) | In a drilling machine, 12 different speeds in the range of 100 rpm to 355 rpm are required. Design a three stage gear box with a standard step ratio. Sketch the layout of the gear box, indicating the number of teeth on each gear. The gear box receives 5 KW from an electric motor running at 360 rpm. Sketch also the speed diagram.  |  (16) |
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| 20. | (a) | A power of 20 KW is to be transmitted through a cone clutch at 500 rpm. For uniform wear condition, find the main dimensions of clutch and shaft. Also determine the axial force required to engage the clutch. Assume coefficient of friction as 0.25, the maximum normal pressure on the friction surface is not to exceed 0.08 MPa and take the design stress for the shaft material as 40 MPa. | (16) |
| Or |
|  | (b) | A hydraulically operated clutch is to be designed for an automatically operated lathe. Determine number of plates and the operating force required for a clutch which is to transmit a torsional moment of 35 Nm under normal operating conditions. The clutch is to be designed to slip under 300 percent of rated torsional moment to protect the gears and other parts of the drive. The limits for the diameters of the friction surface due to space limitations are 100 mm and 62.5 mm. This clutch is used to operate in an oily atmosphere.  | (16) |