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SUBJECT CODE NO: H-1611
FACULTY OF SCIENCE AND TECHNOLOGY
M.E. (Mechanical)
Advanced Machine Design
(REVISED)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
- i) Q. No. 1 from section A and Q. No.6 from section B are compulsory
 - ii) Solve any two questions from the remaining in each section
 - iii) Figure to right indicates full marks
 - iv) Assume suitable data if required and state it clearly

Section A

- Q.1 Attempt any two from the following 16
- a) Explain Mohr's circle for tri-axial state of stresses
 - b) Explain the volumetric strains and bulk modulus
 - c) What are the features, merits, demerits and application for square section helical spring?
- Q.2 How principle stresses are computed from principal stains? 12
- Q.3 Derive the expression for maximum pressure angle for combination of radial cam and translating roller follower 12
- Q.4 A steel Belleville spring has the ratio $h/t = 1.5$ and the ratio of maximum diameter to minimum diameter is 2. The thickness of the disc is 6.5mm. The stress induced in spring material is 1200 Mpa when it is compressed flat. Find the load P and minimum and maximum radii. Find the possible stress the spring can sustain and corresponding load P.
- Q.5 What are the advantages and disadvantages of square section helical compression spring, ring spring Belleville spring and Torsion bar spring over round bar spring? 12

Section B

- Q.6 Attempt any two from the following 16
- a) Explain creep mechanism
 - b) Explain the philosophy of computer aided machine design
 - c) Explain design of spur gear through interactive programming
- Q.7 If the equation for polynomial cam is $y = C_a + C_1 + C_2x^2 + C_3x^3 + C_4x^4 + C_5x^5$. 12
 Find the values of constants for the boundary conditions
 When $x = 0, y = h, y' = 0$
 When $x = 1, y = y' = y'' = y''' = 0$
 compute and plot values of $y/h, y'/h, y''/h, y'''/h$ at intervals of $x = 0.2$

- Q.8 A cam rotates at 300 rpm and has total lift of 50mm with D-R-D type motion. Find the displacement, velocity and acceleration after 30° of cam rotation. If the motion of follower is SHM 12
- Q.9 Derive an expression for maximum pressure angle for a combination of radial cam and translating roller follower 12
- Q.10 Write a short note on- 12
- Different methods of obtaining advanced cams
 - Fracture mechanism