PANDIAN SARASWATHI YADAV ENGINEERING COLLEGE

(Approved by AICTE & Affiliated to Anna University, Chennai)

Madurai - Sivagangai Highway, Arasanoor, Thirumansolai Post, Sivagangai Dt. - 630 561, Tamilnadu
Mobile : 9842102628, 7373002628 Email: info@psyec.edu.in Website : www.psyec.edu.in

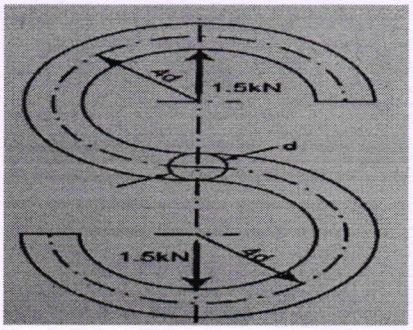
City Office : 10, Pandian Saraswathi St, Sivagami Nagar, Narayanapuram, Madurai - 625 014. Telefax- 0452 2682338, Mobile : 98423-02628

Department of Mechanical Engineering

ASSIGNMENTS

Year/SEM : III/V

Subject Code and Name : ME8593 & Design of Machine Elements

Q. No	Assignment Questions	CO	BTL
1	A link of S shape made of a round steel bar shown in figure. Material for the link is steel with a yield stress of 380 Maps in tension. for a factor of safety of4, find the diameter of steel bar 	1	3
2	A simply supported beam has a concentrated load at the Centre which fluctuations from a value of P to 4P.the span of the beam is 500 mm and its cross section is circular with a diameter of 60 mm. taking for the beam material an ultimate stress of 700 Mpa, a yield stress of 500Mpa , endurance limit of 330 Mpa for the reversed bending and factor of safety of 1.3,calculate the maximum value of P. take a size factor of 0.85 and surface finish factor of 0.9	1	3
3	A transmission shaft is supported on two bearings 450 mm apart. Two pulleys C and D are located on the shaft at distances of 100 mm and 300 mm respectively to the right of the left hand bearing. Power transmitted form pulley C to D .The diameter and weight of pulley C are 200 mm and 600N and those of pulley D are 300 mm and 750N respectively. Ratio of belt transmission is 2 for the pulleys. Power to be transmitted by the shaft is 25 kW at 300 rpm. The drive from C is vertically downwards while from D the drive is upward at an angle of 45° to the horizontal. The shaft is made of C45 steel. using K_b=1.5 and K_t=1.23, design the shaft.	2	3

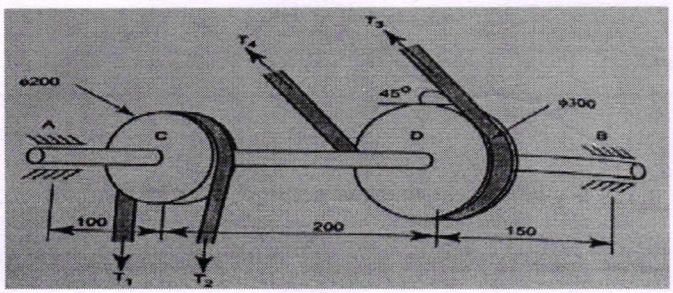
R RAJA Digitally signed by R RAJA Date: 2024.06.25 20:51:40 +05'30'

PANDIAN SARASWATHI YADAV ENGINEERING COLLEGE

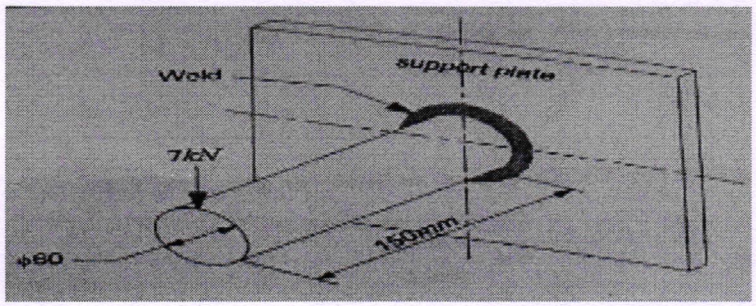
(Approved by AICTE & Affiliated to Anna University, Chennai)

Madurai - Sivagangai Highway, Arasanoor, Thirumansolai Post, Sivagangai Dt. - 630 561, Tamilnadu
Mobile : 9842102628, 7373002628 Email: info@psyec.edu.in Website : www.psyec.edu.in

City Office : 10, Pandian Saraswathi St, Sivagami Nagar, Narayanapuram, Madurai - 625 014. Telefax- 0452 2682338, Mobile : 98423-02628



4	Deign of muff coupling to connect two shafts transmitting 40kW at 150 rpm. The allowable shear and crushing stresses for the shaft and key are 37 N/mm^2 and 96.25 N/mm^2 respectively. The permissible shear stress for the muff is 17.5 N/mm^2. Assume that the maximum torque transmitted is 20% more than the mean torque. Take the width and depth of the parallel key is 22 mm and 14 mm respectively.	2	4
5	A circular shaft 60 mm in diameter is welded to a support plate by means of a fillet weld shown in figure. Determine the size of the weld if the permissible shear stress in the weld. If the permissible shear stress in the weld is limited to 85 Mpa.	3	3



6	A double riveted weld joint is to be made between 6 mm plates. The safe working stresses for plates and rivet materials are σ_t=60N/mm^2, σ_c=80N/mm^2, τ=50 N/mm^2. Design the joint	3	3

R RAJA Digitally signed by R RAJA Date: 2024.06.25 20:51:55 +05'30'

PANDIAN SARASWATHI YADAV ENGINEERING COLLEGE

(Approved by AICTE & Affiliated to Anna University, Chennai)

Madurai - Sivagangai Highway, Arasanoor, Thirumansolai Post, Sivagangai Dt. - 630 561, Tamilnadu
Mobile : 9842102628, 7373002628 Email: info@psyec.edu.in Website : www.psyec.edu.in

City Office : 10, Pandian Saraswathi St, Sivagami Nagar, Narayanapuram, Madurai - 625 014. Telefax- 0452 2682338, Mobile : 98423-02628

7	A safety valve of 60 mm diameter is to blow off at pressure of 1.2 N/mm^2. It is placed on its seat by a close coiled helical spring. The maximum lift of the valve is 10mm.Design a suitable compression spring of spring index 5 and providing an initial compression of 35 mm. The maximum shear stress in the material in the wire is limited to 500 N/mm^2.the modules of rigidity for the spring material is 0.80×10^5 N/mm^2. Calculate (i) diameter of spring wire (ii) Mean coil diameter (iii) Number of active turns (iv) Pitch of the Coil	4	4
8	A single Cylinder Double acting steam steam engine deliver 185 kW at 100rpm. The maximum fluctuation of energy per revolution is 15% of energy developed per revolution. the speed variation is limited to 1 % either way from the mean. The mean diameter of the rim is 2.4 m. Design a cast iron flywheel for the engine.	4	4
9	A full journal bearing of 100 mm diameter and 150 mm long supports a radial load of 6 kn. The shaft rotates at 560 rpm. The diametral clearance is 0.15 mm. The room temperature is 25°C, and the operating temperature is 70° C. The bearing is well ventilated and so no artificial colling is required. Suggest a suitable oil to meet the requirements	5	3
10	Determine the dynamic load carrying capacity of a deep groove ball bearing with the least bore size and which is required to resist a radial load of 4 kN, and an axial thrust load of 3 kN. The shaft rotates at 14 rpm. The bearing is required to be in ana operation for 12000 hours, with 90% reliability.	5	3

PREPARED BY VERIFIED BY APPROVED BY

R RAJA Digitally signed by R RAJA Date: 2024.06.25 20:52:11 +05'30'

PANDIAN SARASWATHI YADAV ENGINEERING COLLEGE

(Approved by AICTE & Affiliated to Anna University, Chennai)

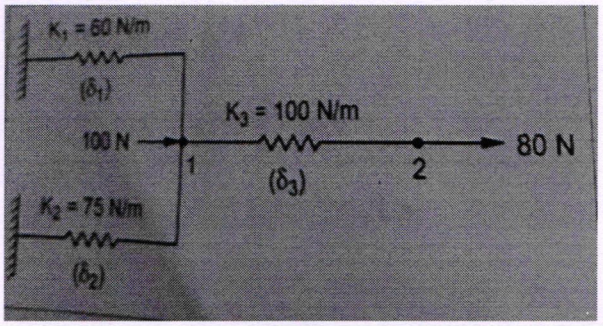
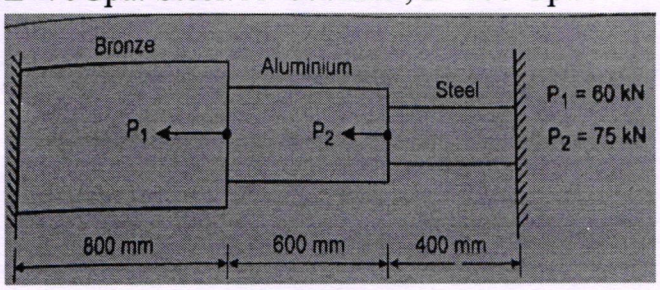
Madurai - Sivagangai Highway, Arasanoor, Thirumansolai Post, Sivagangai Dt. - 630 561, Tamilnadu
Mobile : 9842102628, 7373002628 Email: info@psyec.edu.in Website : www.psyec.edu.in

City Office : 10, Pandian Saraswathi St, Sivagami Nagar, Narayanapuram, Madurai - 625 014. Telefax- 0452 2682338, Mobile : 98423-02628

Department of Mechanical Engineering

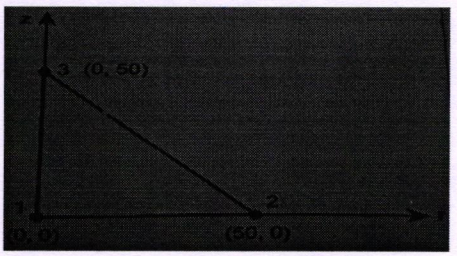
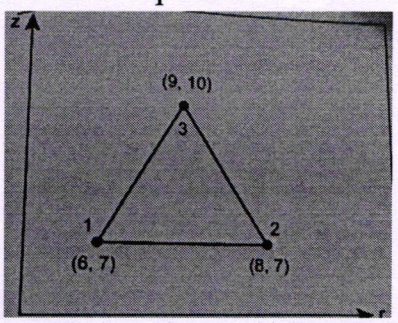
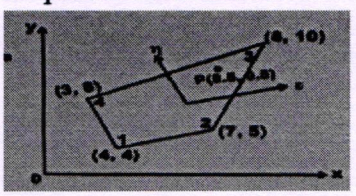
ASSIGNMENTS

Year/SEM : III/VI
Subject Code and Name : ME 8692 & Finite Element Analysis

Q. No	Assignment Questions	CO	BTL
1	General Steps of the Finite Element analysis	1	3
2	Determine the displacements of nodes 1 and 2 in the spring system shown in figure use minimum of potential energy principle to assemble equations of equilibrium 	1	4
3	Derivation of shape function for one dimensional quadratic bar element.	2	3
4	The composite structure shown in fig is subjected to a bar element. Determine the displacements, Stresses and support reactions Bronze: A=2400mm^2, E=83Gpa. Aluminum: A=1200mm^2, E=70Gpa. Steel: A=600mm^2, E=200 Gpa . 	2	5
5	Shape function derivation for the Constant Triangular Element (CST).	3	3
6	Shape function derivation for the Eight noded rectangular Element.	3	3

R RAJA Digitally signed by R RAJA
Date: 2024.06.25 20:52:28 +05'30'

PANDIAN SARASWATHI YADAV ENGINEERING COLLEGE
(Approved by AICTE & Affiliated to Anna University, Chennai)
Madurai - Sivagangai Highway, Arasanoor, Thirumansolai Post, Sivagangai Dt. - 630 561, Tamilnadu
Mobile : 9842102628, 7373002628 Email: info@psyec.edu.in Website : www.psyec.edu.in
City Office : 10, Pandian Saraswathi St, Sivagami Nagar, Narayanapuram, Madurai - 625 014. Telefax- 0452 2682338, Mobile : 98423-02628

7	For the Axis symmetric elements shown in fig determine the stiffness matrix let $E=2.1\times10^5$ N/mm^2 and v=0.25, the coordinates shown in figure are in millimeters 	4	4
8	Calculate the element stiffness matrix and the thermal force vector for the axisymmetric triangular element in figure. the element experiences a 15°C increase in temperature 	4	5
9	Shape function for 4 noded rectangular parent element by using natural coordinate system and coordinate transformation (Two dimensional.	5	3
10	Evaluate the Jacobian matrix at the local coordinates ε=η= 0.5 for the isoparametric quadrilateral element with its global coordinates as shown in fig. Also evaluate the strain-displacement matrix. 	4	5

PREPARED BY **VERIFIED BY** **APPROVED BY**

R RAJA Digitally signed by R RAJA
Date: 2024.06.25 20:52:43 +05'30'