Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – Nov/Dec – 2016**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **Semester :** | **2016-17 ODD** |
| **Code :** | **14ME3008** | **Duration :** | **3hrs** |
| **Sub. Name :** | **Advanced Strength of Materials** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. |  | A point is undergoing plane stress and relative to the xyz and x’y’z’ systems σx = 40, σy =-30, τxy = -20 MPa. Determine σx’, σy’ and τxy.  C:\Users\Lijin\AppData\Local\Microsoft\Windows\INetCacheContent.Word\2016-11-12.png | CO1 | **20** |
| **(OR)** | | | | |
| 2. |  | The stress at a point relative to an xyz coordinate system is  [σ] =MPa  Determine the normal and shear stresses on a surface whose outer normal has the directional cosines nx = ny = 6/11 and nz = 7/11 | CO1 | **20** |
| 3. | a. | Determine the stress fields that arise from the following stress functions   1. Ф = Ax + Cy3 2. Ф = Axy2 + By + Cxy3 + D 3. Ф = Ax2 + Bx2y3 + Cxy3 + Dxy3 | CO2 | **12** |
|  | b. | A solid circular shaft of radius ro is transmitting a torque T. Determine the corresponding shear-stress distribution. | CO2 | **8** |
| **(OR)** | | | | |
| 4. |  | Consider the equilateral cross section with sides of length 2 cm. Determine the shear stress distribution if the section is transmitting a torque T of 30 kN.m. | CO2 | **20** |
| 5. | a. | A thin walled steel tube, 1 m long, with the cross section as shown is transmitting a torque of 2 kN.m. The 50 mm dimension is between wall centers. For the material let young’s modulus be 210 GPa and Poisson’s ratio is 0.29. Determine the average shear stress in the wall and the total angle of twist of the tube.  C:\Users\Lijin\AppData\Local\Microsoft\Windows\INetCacheContent.Word\2016-11-12 (1).png  All dimensions in mm | CO3 | **14** |
|  | b. | The cross section of a shaft is a thin walled rectangle with dimension 6 cm X 2 cm with uniform wall thickness of 2 mm. Estimate the shear stress in each wall. | CO3 | **6** |
| **(OR)** | | | | |
| 6. |  | A thin walled, two cell aluminium tube, symmetric with the y and z axes is transmitting a torsional moment of 2.5 kN.m. The thickness of each wall is 5 mm. For aluminium let young’s modulus be 70 GPa and Poisson’s ratio be 0.33. Determine the average shear stress in each wall and angle of twist per unit length.  C:\Users\Lijin\AppData\Local\Microsoft\Windows\INetCacheContent.Word\2016-11-12 (2).png  All dimensions in mm | CO3 | **20** |
| 7. |  | Determine the vertical deflection of a point B of the structure shown in figure below. Members BC and BD have equal length L = 10 mm, area A = 20 mm2and modulus E = 210 GPa.  C:\Users\Lijin\AppData\Local\Microsoft\Windows\INetCacheContent.Word\2016-11-11 (1).png | CO4 | **20** |
| **(OR)** | | | | |
| 8. |  | At a point the state of stress is given by stress matrix  [σ] =MPa  Determine the strain energy per unit volume if young’s modulus is 70 GPa and Poisson’s ratio 0.33. | CO4 | **20** |
|  | | **Compulsory:** |  |  |
| 9. | a. | Write short notes on stress concentration factor. | CO4 | **10** |
|  | b. | Estimate the life of a steel fatigue specimen of diameter 1/3rd of the length with a force 100 N. The material has an ultimate strength twice of endurance limit. The length of specimen is 60 cm and endurance limit is 50 MPa. | CO4 | **10** |

ALL THE BEST