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

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**End Semester Examination – Nov/Dec – 2018**

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| **Code :** | **17ME3007** | **Duration :** | **3hrs** |
| **Sub. Name :** | **EXPERIMENTAL STRESS ANALYSIS** | **Max. marks :** | **100** |

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

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | What is the condition for a material under plane stress? | CO1 | 2 |
| b. | For the state of stress shown in figure  30MPa  60MPa  40MPa  (i) construct Mohr’s circle,  (ii) determine the principal stresses  and its directions  (iii) determine the maximum shearing  stress and the corresponding normal stress | CO1 | 18 |
| (OR) | | | | |
| 2. |  | In a material under plane strain condition, it is known that the horizontal side of a 10×10 mm square elongates by 4 μm, while its vertical side remains unchanged, and that the angle at the lower left corner increases by 0.5×10-3 rad. Determine (a) the principal axes and principal strains, (b) the maximum shearing strain and the corresponding normal strain.  x  y  y  x  10mm  10mm  π/2 +0.5×10-3 rad | CO1 | 20 |
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| 3. | a. | What are the primary advantages of constantan material used in strain gages? | CO2 | 4 |
| b. | Using a 60° rosette, the following strains have been determined at point Q on the surface of a steel machine base: ε1=50μ , ε2=850μ and ε3=360μ using the coordinates axes shown, determine the following at point Q  (i) the strain components εx , εy and γxy  (ii) the principal strains  60°  60°  1  2  3  Q  x  y  (iii) the maximum shearing strain  Use Poisson ratio ν=0.29. | CO2 | 16 |
| (OR) | | | | |
| 4. | a. | Derive the sensitivity of strain gage in terms of Poisson’s ratio , resistivity and strain. | CO2 | 8 |
| b. | Discuss any four fundamental measurment characteristics which influence the output of strain gage. | CO2 | 12 |
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| 5. | a. | Derive phase shift relation of light wave in a medium of depth d; Δ=(nr -1)d where Δ = phase shift. | CO3 | 4 |
| b. | Explain isoclinic fringe analysis of disk loaded in compression. | CO3 | 16 |
| (OR) | | | | |
| 6. | a. | Derive the basic stress optic photo-elastic equation. | CO3 | 4 |
| b. | Explain circularly polarized light in detail with suitable sketches | CO3 | 16 |
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| 7. | a. | Derive the relation between the state of stress in coating and that in the model of brittle-coating method. | CO4 | 14 |
| b. | Explain brittle-coating crack patterns to the state of stress. | CO4 | 6 |
| (OR) | | | | |
| 8. | a. | Explain Moire fringe formation phenomena briefly. | CO4 | 5 |
| b. | Explain geometrical approach in Moire fringe analysis in detail. | CO4 | 15 |
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|  | | **Compulsory**: |  |  |
| 9. |  | Describe digital image processing used in digital photoelasticity. | CO5 | 20 |