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



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **18AE3029** | **Duration :** | **3hrs** |
| **Sub. Name :** | **COMPOSITE STRUCTURES AND ACOUSTICS** | **Max. Marks :** | **100** |

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| **Q. No.** | **Sub Div.** | **Questions** | **Course Outcome** | **Marks** |
| **ANSWER ANY FIVE QUESTIONS (5 x 16 = 80 Marks)** | | | | |
| 1. | a. | Derive expressions for  i) the elastic modulus in the fibre direction and in the transverse  direction of composites.  ii) load shared by the fibre relative to the total load. | CO1 | 12 |
| b. | State the limitations of conventional engineering material. | CO1 | 4 |
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| 2. | a. | Describe the failure criteria for composite material. | CO2 | 12 |
| b. | Write the matrix relations for a change of axis in a composite. | CO2 | 4 |
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| 3. | a. | Derive the global stiffness matrix of a symmetrical composite. | CO3 | 12 |
| b. | State the Kirchhoff-Love hypothesis for thin plates. | CO3 | 4 |
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| 4. | a. | Describe, in detail and with figures, the reflection of sound from  i) flat surfaces  ii) convex surfaces  iii) concave surfaces  iv) parabolic surfaces. | CO4 | 8 |
| b. | The sound pressure levels at a location from two sources that are in phase are 160 dB and 163 dB respectively. Estimate the combined sound pressure location at that location. | CO4 | 4 |
| c. | The low frequency limit of a band is 25 Hz. Determine the high frequency limit of a band that is eight octave wide. | CO4 | 4 |
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| 5. | a. | Describe with figures, diffraction of sound  i) by large and small apertures  ii) by a slit  iii) around a human head | CO5 | 6 |
| b. | Illustrate with neat diagram, the refraction of sound  i) in solid  ii) in atmosphere  iii) in ocean  iv) in enclosed space | CO5 | 10 |
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| 6. | a. | Write an essay on  i) growth of sound in a room  ii) decay of sound in a room and  iii) reverberation time | CO5 | 10 |
| b. | Compare composite with traditional material. | CO1 | 3 |
| c. | Compare harmonics with octave. | CO4 | 3 |
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| 7. | a. | Write the expressions for predicting density, electrical and thermal conductivity of fibre reinforced composites. | CO1 | 6 |
| b. | A cable contains 30 vol% Al fibres in epoxy matrix. Calculate the electrical conductivity of the cable. The electrical conductivity of Al and epoxy are 3.8\*105 and 10-13/Ohm/cm respectively. | CO1 | 5 |
| c. | Describe the advantages of Hybrid Composites. | CO1 | 5 |
| **COMPULSORY QUESTION (1 x 20 = 20 Marks)** | | | | |
| 8. | a. | Write in detail the description of evaluation of sound absorption by  i) Reverberation chamber method  ii) Impedence tube method | CO6 | 8 |
| b. | Describe the following sound absorbers  i) Polycylindrical absorber  ii) Membrane absorber  iii) Helmholtz resonator | CO6 | 9 |
| c. | Explain the low frequency absorption by resonance. | CO6 | 3 |