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**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
(AUTONOMOUS)**B. Tech I Year I Semester Supplementary Examinations November 2020****PHYSICS**

(Common to CE &amp; AGE)

Time: 3 hours

Max. Marks: 60

**PART-A**

(Answer all the Questions 5 x 2 = 10 Marks)

- 1 a Define Newton's first law of motion. 2M  
 b What is hungry operator? 2M  
 c State the phenomenon of resonance. 2M  
 d One end of a wire 2 m long and 0.2 cm<sup>2</sup> in cross-section is fixed in a ceiling and a load of 4.8 kg is attached to the free end. Find the extension of the wire Young's modulus of steel =  $2.0 \times 10^{11}$  N/m<sup>2</sup>. Take  $g = 10$  m/s<sup>2</sup>. 2M  
 e What is nanoscience and nanotechnology? 2M

**PART-B**

(Answer all Five Units 5 x 10 = 50 Marks)

**UNIT-I**

- 2 a Define scalar product of vectors and give its properties. 6M  
 b Vectors are given by  $A = 2\hat{i} + 3\hat{j} - 4\hat{k}$ , by  $B = 6\hat{i} - 8\hat{j} - 3\hat{k}$  find out the angle between them. 4M

**OR**

- 3 a Define Newton's second law of motion. 2M  
 b Derive the relation for masses to its acceleration of bodies by Newton's second law. 8M

**UNIT-II**

- 4 Explain the effect of coriolis force due to rotation of earth 10M  
**OR**  
 5 a Write the properties of inertial forces. 5M  
 b A body is dropped from a height of 490 m above the earth. Assuming  $g$  is constant, find the deflection of the body from the vertical due to coriolis force when it reaches to the ground? (where latitude is zero) 5M

**UNIT-III**

- 6 a Establish the equation of motion of simple harmonic oscillator. 5M  
 b Derive the solution for equation of simple harmonic oscillator. 5M

**OR**

- 7 a What is forced vibration? 6M  
 b Derive the differential equation of motion of particle under forced vibrations. 4M

**UNIT-IV**

- 8 a Explain the classification of beams. 7M  
 b Find the work done in stretching a wire of cross-section 1.25 mm<sup>2</sup> and length 0.14 m. The Young's modulus of wire is  $45 \text{ GN/m}^2$ . 3M

**OR**

- 9 a Explain the terms rigidity modulus ( $\eta$ ) and poisson's ratio of elastic materials and write its importance in elastic materials. 7M  
 b The Young's modulus for steel is  $Y = 2 \times 10^{11}$  N/m<sup>2</sup> and its rigidity modulus  $\eta = 8 \times 10^{10}$  N/m<sup>2</sup>. Find the Poisson's ratio and its bulk modulus. 3M

**UNIT-V**

- 10 a** What are the techniques available for synthesizing nanomaterials? **3M**  
**b** Explain Sol-Gel technique for synthesis of nanomaterial. **7M**
- OR**
- 11 a** What are carbon nanotubes? Mention its structures. **5M**  
**b** Write brief note on applications of carbon nanotubes. **5M**

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