*Basavarajeswari Group of Institutions*

**2022 SCHEME**

# BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

| USN | | | | | | | | | | |
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| Course Code | 2 | 2 | P | H | Y | C | 12 | / | 22 |
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First/Second Semester B.E. Degree Summer Semester Examinations, September/October 2025

## PHYSICS FOR CIVIL ENGINEERING STREAM

**Duration: 3 hrs** **Max. Marks: 100**

***Note:*** ***1. Answer any* FIVE *full questions, choosing* ONE *full question from each module.***
***2. Handbook is permitted.***
***3. Missing data, if any, may be suitably assumed.***

| *Q. No* | | *Question* | *Marks* | *(RBTL:CO:PI)* |
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| | | **MODULE – 1** | | |
| **1.** | **a.** | Derive an expression for equivalent spring constant in series and parallel combination. | **08** | **(2:1:1.1.1)** |
| | **b.** | Explain the theory of damped oscillation and explain its engineering applications. | **08** | **(2:1:1.1.1)** |
| | **c.** | A mass of 4.3 kg is attached to a spring of force constant 17 N/m. The mass spring system is executing SHM. Find the frequency of the external force which excites resonance in the system. Ignore the mass of the spring. | **04** | **(3:1:1.2.1)** |
| | | **(OR)** | | |
| **2.** | **a.** | What are the types of spring? Explain with applications. | **08** | **(2:1:1.1.1)** |
| | **b.** | Describe the construction and working of Reddy's shock tube with neat diagram. | **08** | **(2:1:1.1.1)** |
| | **c.** | A plain is moving with a speed of 380 km/hour, determine the Mach number and justify the type of flow. | **04** | **(3:1:1.2.1)** |
| | | **MODULE – 2** | | |
| **3.** | **a.** | Explain the failures of engineering materials. | **08** | **(2:2:1.1.1)** |
| | **b.** | Derive the relation between Y, η and σ. | **08** | **(2:2:1.1.1)** |
| | **c.** | Calculate extension produced in a wire of length 2 m and radius $0.013\times10^{-2}$ m due to a force of 14.7 N applied along its length, Given Young's modulus of the material of the wire Y = $2.1\times10^{11}$ N/m$^2$. | **04** | **(3:2:1.2.1)** |
| | | **(OR)** | | |
| **4.** | **a.** | Define bending moment and hence derive the expression for bending moment in terms of moment of inertia. | **08** | **(2:2:1.1.1)** |
| | **b.** | Explain 'I' section girder and its engineering applications. | **08** | **(2:2:1.1.1)** |
| | **c.** | Calculate the Poisson's ratio of steel given its young's modulus = $2\times10^{11}$ N/m$^2$ and rigidity modulus = $7.3\times10^{11}$ N/m$^2$ | **04** | **(3:2:1.2.1)** |
| | | **MODULE – 3** | | |
| **5.** | **a.** | Derive an expression for energy density in terms of Einstein coefficient. | **08** | **(2:3:1.1.1)** |

Note: (**RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)**

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|---|---|---|---|---|
| | **b.** | Derive an expression for numerical aperture and acceptance angle. | **08** | **(2:3:1.1.1)** |
| | **c.** | The average output power of laser source emitting a laser beam of wavelength 632.5 nm is 5 mW. Find the number of photons emitted per second by the laser source. | **04** | **(3:3:1.2.1)** |
| | | **(OR)** | | |
| **6.** | **a.** | Describe the construction and working of semiconductor laser with energy band diagram. | **08** | **(2:3:1.1.1)** |
| | **b.** | Explain fibre optic displacement sensor with near diagram. | **08** | **(2:3:1.1.1)** |
| | **c.** | The refractive index of the core and clad are 1.50 and 1.48 respectively in an optical fibre. Find the numerical aperture and angle of acceptance. | **04** | **(3:3:1.2.1)** |
| | | **MODULE – 4** | | |
| **7.** | **a.** | Define land slide. Mention the engineering solution for land slide. | **05** | **(2:4:1.1.1)** |
| | **b.** | Explain the causes and characteristics of Tsunami. | **05** | **(2:4:1.1.1)** |
| | **c.** | Define Fermi energy and explain the determination of Fermi energy of copper using an experiment. | **10** | **(2:5:1.2.1)** |
| | | **(OR)** | | |
| **8.** | **a.** | Explain Richter scale of measurement. | **05** | **(1:4:1.1.1)** |
| | **b.** | What are forest fires? Explain the detection by using remote sensing. | **05** | **(2:4:1.1.1)** |
| | **c.** | Define resonant frequency. Explain the determination of resonant frequency and quality factor using LCR series and parallel circuits. | **10** | **(2:5:1.2.1)** |
| | | **MODULE – 5** | | |
| **9.** | **a.** | Derive the relation between luminescence and radiant quantities. | **05** | **(2:4:1.1.1)** |
| | **b.** | Derive Sabine's formula. | **05** | **(2:4:1.1.1)** |
| | **c.** | Define Young's modulus. Explain the determination of Young's modulus by single cantilever. | **10** | **(2:5:1.2.1)** |
| | | **(OR)** | | |
| **10.** | **a.** | Define acoustics. Mention the requisites for acoustics in auditorium. | **05** | **(2:4:1.1.1)** |
| | **b.** | What are the requisites for acoustics in auditorium? | **05** | **(2:4:1.1.1)** |
| | **c.** | Define optical fibre. Explain the determination of acceptance angle and numerical aperture of optical fibre. | **10** | **(2:5:1.2.1)** |

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