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Reg. No.:				

## Question Paper Code: 75728

5 Year M.Sc. DEGREE EXAMINATION, JANUARY 2014.

First Semester

Software Engineering

ESE 011 — APPLIED PHYSICS

(Regulation 2010)

Time: Three hours

Maximum: 100 marks

Answer ALL questions.

PART A —  $(10 \times 2 = 20 \text{ marks})$ 

- 1. What is called the elastic limit of a material?
- 2. Define the coefficient of viscosity of a fluid, What is its unit?
- 3. Define loudness of sound. Mention its unit.
- 4. List the applications of ultrasonics in medical field.
- 5. In cold regions where the atmospheric temperature is below ice-point, ponds and lakes have ice bed on their surface floating on water. Why not the entire water becomes ice?
- 6. What is called the reversibility of Carnot engine?
- 7. Upon a polished transparent surface, an anti-reflection coating with a material of refractive index 1.8 needs to be coated to avoid reflection of light of wavelength 550 nm. Calculate the minimum thickness of coating needed.
- 8. What is known as photoelasticity?
- 9. What is the relation between coherence time and coherence length of a laser?
- 10. What is the principle of optical fiber communication?

## PART B — $(5 \times 16 = 80 \text{ marks})$

11.	(a)	Derive an expression for the twisting couple of a wire. Discuss the use of it in the theory of a torsion pendulum and hence deduce an expression for the time period of oscillation. (16)						
$\operatorname{Or}$								
	(b)	(i)	Discuss the principle and working of a rotary pump.	(8)				
		(ii)	Explain the experimental procedure of comparison of vusing Ostwald viscometer.	iscosities (8)				
12.	(a)	grov	Define reverberation time. Deduce expressions for the sound energy growth and decay in an auditorium and hence obtain an expression for the reverberation time. $(2 + 14)$					
			Or					
	(b)	(i)	Explain the principle and working of the piezoelectric m producing ultrasonic waves. List the merits and demeri- method.					
		(ii)	Discuss the industrial applications of ultrasonics.	(8)				
13.	(a)	(i)	i) Discuss the theory and experimental procedure of determining thermal conductivity of a good conductor using Forbe's method. (12)					
		(ii)	Explain the method of providing thermal insulation in build	dings. (4)				
Or								
	(b)	(i)	Explain the principle, theory and working of a Diesel en obtain its efficiency.	gine and (12)				
		(ii)	Draw and discuss the entropy-temperature diagram of cycle.	a Carnot (4)				
14.	(a)	Witl	h necessary diagrams, discuss the theory and working of					
		(i)	Lummer-Brodhum photometer and					
		(ii)	Air-wedge.	(8 + 8)				
			Or					
	(b)	Witl	h necessary diagrams, discuss the theory and working of					
		(i)	Michelson's interferometer and its fringe patterns and					
		(ii)	Sextant.	(8 + 8)				
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- 15. (a) (i) Explain the working of a Nd:YAG laser and discuss the energy level transition scheme. (8)
  - (ii) Discuss the energy band scheme and working of a homo-junction semiconductor laser. (8)

Or

- (b) (i) For an optical fiber, derive expressions for the numerical aperture and acceptance angle. (8)
  - (ii) Discuss the application of optical fibers as temperature and displacement sensors. (8)

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