

(Eng)

SARDAR PATEL UNIVERSITY

F.Y. B. Sc, 1st Semester

Friday, 18th November 2016

Session: Morning, Time: 10:00 AM to 12:00 NOON

Subject Code: (PHYSICS) US01CPHY02

Course Title: Network Analysis, Optics and Laser

Max Marks: 70

NB: iAll symbols have their usual meaning.

iiFigure at the right side of the question indicates full marks.

Que: 1 Write correct answer for each of the following MCQs. [10]

- 1 The point in the network where two or more components are connected, is known as ____ .
 - a) Branch
 - b) Node
 - c) Junction
 - d) loop
- 2 In a network, all the meshes must be ____ .
 - a) loops
 - b) nodes
 - c) branches
 - d) trees
- 3 Conductance is the reciprocal of ____ .
 - a) reluctance
 - b) resistance
 - c) impedance
 - d) reactance
- 4 Hay bridge is used to find unknown ____ .
 - a) inductance
 - b) reactance
 - c) capacitance
 - d) frequency
- 5 In a DC bridge, generally ____ is used as the null detector.
 - a) microphone
 - b) galvanometer
 - c) headphone
 - d) spherometer
- 6 The equation for resolving power of a grating is ____ .
 - a) nN
 - b) $t \frac{d\mu}{d\lambda}$
 - c) $\frac{\alpha}{1.22 \lambda}$
 - d) $\frac{1.22 \lambda}{2 \sin \alpha}$
- 7 Rayleigh's interferometer works on the principle of division of ____ .
 - a) Wavefront
 - b) amplitude
 - c) frequency
 - d) time
- 8 The resolving power (R.P.) of a prism depends on ____ .
 - a) angle of prism
 - b) base length of prism
 - c) minimum deviation angle
 - d) width of emergent beam
- 9 From the followings, ____ is the application of LASER in the field of Medical science.
 - a) hole drilling
 - b) cutting
 - c) treating glaucoma
 - d) welding
- 10 Nd: YAG LASER is a ____ level LASER.
 - a) two
 - b) three
 - c) five
 - d) four

- Que 2 Write answers of any ten questions in brief. [20]**
- 1 State Voltage divider theorem with its advantage.
 - 2 Differentiate between terms branch and tree.
 - 3 Draw the labeled diagram of the network having three meshes.
 - 4 Differentiate between the AC bridge and DC bridge.
 - 5 What are the limitations of Wheatstone bridge circuits?
 - 6 State the advantage of Hay bridge over the Maxwell's bridge.
 - 7 State Rayleigh's criterion for resolution.
 - 8 Draw the labelled diagram of Jamin's interferometer.
 - 9 How could circular fringes be obtained with Michelson's interferometer?
 - 10 Enlist the properties of LASER.
 - 11 Draw the labelled diagram of Nd:YAG LASER.
 - 12 State any four applications of LASER.
- Que 3 [A] Explain network analysis by onenode pair voltage method with proper circuit diagram. [05]**
- [B] Enlist various methods used to find the branch current in the network analysis. Discuss Norton's theorem with suitable diagrams. [05]**
- OR**
- Que 3 [C] Explain network analysis by two mesh current method with proper circuit diagram. [05]**
- [D] State Thevenin's theorem and explain it considering suitable example. [05]**
- Que 4 [A] Explain Scherring bridge with suitable diagram. [05]**
- [B] Discuss the Thevenin's equivalent circuit of Wheatstone bridge circuit. [05]**
- OR**
- Que 4 [C] Explain Kelvin bridge circuit with necessary diagram. [05]**
- [D] Discuss Maxwell's bridge circuit with necessary diagram. Also state its limitation. [05]**
- Que 5 [A] Define resolution and resolving power of an optical instrument. With necessary ray diagram, obtain the equation for resolving power (R.P.) of a telescope. [10]**
- OR**
- Que 5 [B] Discuss the principle, construction and working of Michelson interferometer. Explain how it can be used to determine [10]**
- (1) the wavelength of monochromatic light source and
- (2) the refractive index of thin plate.
- Que 6 [A] With necessary diagram, explain CO₂ LASER. [06]**
- [B] Explain in brief about the main components of a LASER device. [04]**
- OR**
- Que 6 [C] Derive relationship between Einstein's coefficients A and B. [06]**
- [D] Explain in brief about the optical and the electric discharge pumping methods of LASER. [04]**

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