Faculty of Science

B.Sc (Physics) II-Year, CBCS –IV Semester

Regular Examinations June/July –2022

PAPER: Waves and Optics

Time: 3 Hours

Max Marks: 80

Section-A

I. Answer any *eight* of the following   (8x4=32 Marks)

1. Derive an expression for velocity of Transverse wave along a stretched string.
2. Write a short note on Tuning fork.
3. The transverse wave velocity on a stretched string is 500m/s. Find the linear density of the string if the tension in the string is 2500N?
4. Define i) temporal coherence ii) Spatial coherence.
5. What is Cosine law?
6. In a Newton's rings experiment the diameter of the 15th ring was found to be 0.59cm and that of 5th ring was 0.336 cm. If the radius of curvature of the lens is 100cm find the wavelength of light.
7. What is Rayleigh's criterion for resolution?
8. Write the differences between interference and diffraction.
9. If a light of wavelength 5000°A falling normally on a plane transmission grating of 3 cm wide consisting of 15000 lines , then find the angle of diffraction in first order spectrum.
10. Explain the terms i) Polarization of light ii) Plane of Polarization iii) Plane of Vibration.
11. State and explain Brewster's law.
12. Two Nicols are crossed to each other. Now one of them is rotated through 60°. What is the percentage of incident polarized light will pass through the system?

Section-B

II. Answer the following questions   (4x12=48 Marks)

13. (a) Discuss Transverse waves along a stretched string and determine the frequencies of harmonics of stretched string clamped at both ends.

(OR)

    (b) Derive expression for the frequencies of transverse vibrations in a (i) clamped free bar (ii) free –free bar.

14. (a) Describe the construction and working of Fresnel's biprism. Explain how it can be used to find the thickness of a transparent material?

(OR)

    (b) Describe the working of Michelson interferometer. How it can be used to measure the wavelength of a monochromatic light.

15. (a) Discuss Fraunhofer diffraction due to single slit. Explain the distribution of intensity in the diffraction pattern.

(OR)

    (b) Define diffraction of light. Explain Fresnel's half period zones. Show that the resultant amplitude at a point due to whole wave front is equal to half of the amplitude due to first half zone only at that point.

16. (a) What are negative and positive crystals? Describe the construction and working of Babinets compensator.

(OR)

    (b) Describe the construction and working of Laurent's half shade polarimeter. Explain how it is used to determine the specific rotation of a substance like glucose.

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Code:4310/BL/19

Faculty of Science

B.Sc. (Physics) II-Year, CBCS –IV Semester Backlog Examinations –Jan,2023

PAPER: Waves and Optics

Time: 3 Hours   Max Marks: 80

Section-A

I. Answer any *eight* of the following questions   (8x4=32 Marks)

1. Explain the difference between progressive and stationary waves.
2. Explain about tuning fork.
3. In steel sound velocity is 5050m/sec. If steel density is 7700kg/m^3 then determine Young modulus of a steel.
4. State and explain principle of superposition of waves.
5. What is meant by phase change on reflection.
6. Explain the formation of colours in thin films.
7. A grating has 15cm of the surface ruled with 6000 lines per cm. What is the resolving power of grating in the first order?
8. Distinguish between resolving power and dispersive power of a grating.
9. Explain the nature of diffraction at a straight edge.
10. What is polarization? Mention the applications of polarized light.
11. A tube 20cm long containing sugar solution rotates the plane of polarization through an angle of 13.5°. If the specific rotation is 66°,find the amount of sugar present in a liter of the solution.
12. What is meant by plane and circularly polarized light.

Section-B

II. Answer the following questions   (4x12=48 Marks)

13.(a) Obtain transverse wave equation in a string and discuss about the general solution.

(OR)

(b) Derive transverse wave equation in a bar and explain about transverse wave solution.

14.(a) Describe the working of a Michelson Interferometer and mention its applications.

(OR)

(b) Explain Newton's rings experiment and determine the wavelength of monochromatic light?

15.(a) Discuss Fraunhoffer diffraction due to single slit. Explain intensity distribution.

(OR)

(b) Explain the construction and working of a zone plate. Determine the formula for its focal length.

16.(a) Explain the construction ,working of Babinet's compensator and write the analysis of elliptically-polarized light.

(OR)

(b) State the laws of rotator polarization. Give Fresnel's hypothesis for rotatory polarization and derive a formula for the rotation of quartz.

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Faculty of Science
B.Sc (Physics) II-Year, CBCS –IV Semester Regular Examinations –June,2023
PAPER: Waves and Optics

Time: 3 Hours   Max Marks: 80

Section-A

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2. Write a short note on Tuning fork.
3. The transverse wave velocity on a stretched string is 500m/s. Find the linear density of the string if the tension in the string is 2500N?
4. Define i) temporal coherence ii) Spatial coherence.
5. What is Cosine law?
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11. State and explain Brewster's law.
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16.(a) What are negative and positive crystals? Describe the construction and working of Babinets compensator.

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(b) Describe the construction and working of Laurent's half shade polarimeter. Explain how it is used to determine the specific rotation of a substance like glucose.

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Faculty of Science

B.Sc (Physics) II-Year, CBCS –IV Semester Regular Examinations –June, 2023

PAPER: Waves and Optics

Time: 3 Hours

Max Marks: 80

విభాగం - ఎ

I. ఈ క్రింది ఏవైనా ఐదు ప్రశ్నలకు సమాధానములు వ్రాయండి.   (5x4=20 Marks)

1. సాగదీసిన తీగ వెంబడి తిర్యక్ తరంగ వేగానికి సమాసాన్ని ఉత్పాదించండి.

2. శృతిదండం గురించి లఘుటీక రాయండి.

3. సాగదీసిన తీగ వెంబడి తిర్యక్ తరంగ వేగం 500 m/s. తీగలో తన్యత 2500N అయితే తీగ రేఖీయ సాంద్రత కనుగొనండి.

4. (i) కాల సంబద్ధత (ii) అంతరాళ సంబద్ధతలను నిర్వచించండి.

5. కొసైన్ నియమము అనగానేమి?

6. న్యూటన్ వలయాల ప్రయోగంలో 15వ వలయం వ్యాసముల విలువ 0.59 cm మరియు 5వ వలయం వ్యాసము 0.336 cm, కటక వక్రతా వ్యాసార్ధం 100 cm అయితే కాంతి తరంగ దైర్ఘ్యం కనుగొనుము.

7. పృథక్కరణకు రేలీ నిబంధనను తెలపండి.

8. కాంతి వ్యతికరణము మరియు వివర్తనాల మధ్య బేధాలను తెలుపుము.

9. 3cm వెడల్పు కలిగి 15000 గీతలు గల సమతల పరావర్తన గ్రేటింగ్ పై 5000 ^{0}A తరంగదైర్ఘ్యం గల కాంతి లంబంగా పతనమయ్యింది. మొదటి కోటి వర్ణపటానికి వివర్తన కోణాన్ని కనుగొనుము.

10. (i) కాంతి ధ్రువణము (ii) ధ్రువణ తలం (iii) కంపన తలం పదాలను వివరించండి.

11. బ్రూస్టర్ నియమాన్ని తెలిపి వివరించండి.

12. రెండు నికల్ లు వ్యతస్త స్థితిలో ఉన్నాయి. అప్పుడు ఒక నికల్ ను 60^0 కోణంలో తిప్పాము, పతన ద్వితల కాంతిలో ఎంత శాతం ప్రసాంతం అవుతుంది.

విభాగం - బి

II. ఈ క్రింది ప్రశ్నలకు సమాధానములు వ్రాయండి.   (4x15=60 Marks)

13. (a) సాగదీసిన తీగ వెంబడి తిర్యక్ తరంగాల గురించి చర్చించండి. రెండు వైపులా బిగించి ఉన్న సాగదీసిన తీగలో అనుస్వరాల పౌన:పున్యాలను కనుగొనండి.

(లేదా)

(b) (i) ఒక కొన బిగించి మరొక కొన స్వేచ్చగా ఉన్నప్పుడు

(ii) రెండు కొనలు స్వేచ్చగా ఉన్నప్పుడు (దండము) కడ్డీలలో తిర్యక్ తరంగాల కంపనాల పౌన:పున్యాలకు సమాసాలు ఉత్పాదించండి.

14. (a) ఫ్రెసెల్ ద్విపట్టక నిర్మాణము మరియు పనిచేసే విధానాన్ని వర్తింపుము. పారదర్శక పదార్ధపు మందాన్ని లెక్కించుటలో దానిని ఏ విధంగా ఉపయోగిస్తారు?

(లేదా)