SLR-TX – 11

Seat No.	

Set P

F.E. (Part – I) (CGPA) (Old) Examination, 2018
ENGINEERING PHYSICS

Day and Date : Wednesday, 12-12-2018 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Make suitable assumptions,* ***if necessary****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
4) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

Constants : *1) Avogadro's no., N= 6.02 × 10^{26} / k.mol.*
2) Velocity of light, c = 3 × 10^{8}m/sec.
3) Charge of electron, e = 1.6 x 10^{-19} C.

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

SECTION – I

1. Choose the correct answer : **(14×1=14)**

1) Acceptor type semiconductor is formed by adding impurity of valency
a) 3 b) 4 c) 5 d) 2

2) The number of died axes symmetry elements that are present in a cubic crystal are
a) 4 b) 6 c) 8 d) 10

3) The Miller indices of the plane parallel to y and z axes are
a) (0 0 1) b) (0 1 0) c) (1 0 0) d) (1 1 1)

4) The audible range of frequency is
a) 20 KHz to 20 MHz b) 200 KHz to 200 MHz
c) 200 Hz to 200 MHz d) 20 Hz to 20 KHz

5) Reverberation time is _____ to/of volume of the hall.
a) directly proportional b) inversely proportional
c) independent d) none of these

6) The inertial frame of reference is _____ frame of reference
a) An accelerated b) Non-accelerated
c) A rotating d) None of these

P.T.O.

7) The Lorentz transformation equation for x′ co-ordinate from s to s′
   a) $x' = (x + vt) / \sqrt{1 - v^2/c^2}$ b) $x' = (x - ct) / 1 - v^2/c^2$
   c) $x' = (x - vt) / \sqrt{1 - v^2/c^2}$ d) $x' = x - vt (\sqrt{1 - v^2/c^2})$

SECTION – II

8) The resolving power of a grating having N slits in n^{th} order will be
   a) (n+N) b) (n – N) c) n/N d) n.N

9) The substances that rotate the plane of polarization are said to be
   a) opaque b) optically inactive
   c) optically active d) polaroid

10) Stimulated emission process is represented by equation
   a) $A^* + h\gamma \rightarrow A + 2h\gamma$ b) $A + h\gamma \rightarrow A^*$
   c) $A^* \rightarrow A + h\gamma$ d) $A^* + h\gamma \rightarrow A + h\gamma$

11) The hologram records _____ of the object.
   a) Only intensity variation
   b) Only phase distribution
   c) Both intensity variation and phase distribution
   d) None of these

12) In total internal reflection phenomenon the light ray incident from
   a) Rarer to denser b) Rarer to rarer
   c) Denser to denser d) Denser to rarer

13) Energy released per fission of a $_{92}U^{235}$ nucleus is nearly
   a) 200 eV b) 20 eV
   c) 200 MeV d) 20 MeV

14) The chirality of armchair CNT is
   a) (a, b) b) (a, 0) c) (a, a) d) (0, b)

_____

SLR-TX – 11

Seat No.	

F.E. (Part – I) (CGPA) (Old) Examination, 2018
ENGINEERING PHYSICS

Day and Date : Wednesday, 12-12-2018 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Make suitable assumptions,* ***if necessary****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. Attempt **any five** of the following : **15**
   a) Describe in brief the formation of energy bands in solids.
   b) Calculate no. of atoms per unit cell for SC, BCC and FCC crystal.
   c) Explain the various requirements of a good auditorium.
   d) Deduce an expression for length contraction.
   e) Obtain the relativistic formula for the addition of velocities.
   f) A hall with volume of 1000 m^3 has a sound-absorbing surface of area of 400 m^2. If the average absorption coefficient of the hall is 0.2 sabines, what is the reverberation time of the hall ?
   g) A rocket ship is 100 meter long on the ground. When it is in flight, its length is 99 meters to an observer on the ground. What is its speed ?

3. a) What is Hall effect ? Obtain an expression for Hall voltage and Hall coefficient. **5**

   OR

   b) Discuss the various types of symmetry elements and symmetry operations present in a cubic crystal.

4. Attempt **any two** of the following : **8**
   a) Explain effect of impurity on Fermi level in p-type and n-type semiconductor.
   b) Define atomic radius and obtain its values for SC, BCC and FCC crystals.
   c) Explain acoustic diffraction method for determination of wavelength of ultrasonic waves.
   d) Deduce the expression for relativistic mass variation, to show $m = m_0/(1 – v^2/c^2)^{1/2}$.

Set P

SECTION – II

5. Attempt **any five** of the following : **15**
   a) Distinguish between Fresnel and Fraunhoffer class of diffraction.
   b) Define :
      i) Spontaneous emission
      ii) Stimulated emission
      iii) Stimulated absorption
   c) Explain with neat diagram basic concept and structure of optical fiber.
   d) Explain with diagram types of carbon nano tubes.
   e) Explain Proton - Proton cycle.
   f) A fiber cable has an acceptance angle of 30° and core index of refraction 1.4. Calculate the cladding index of refraction.
   g) Calculate power output of a nuclear reactor. Which consumes 20.4 Kg of U 235 in 1000 hours of operations. Assume that energy released per fission of U 235 is 200 MeV.

6. a) Define optical activity. Explain construction and working of Laurent's half shade polarimeter. **5**

   OR

   b) Describe He-Ne laser with its construction and working.

7. Attempt **any two** of the following : **8**
   a) Derive an expression for the resolving power of a plane diffraction grating.
   b) Explain the construction and reconstruction of hologram with neat diagram.
   c) Explain the fiber optics communication system with block diagram.
   d) Write a note on: Classification of nuclear reactor.

Set P

SLR-TX – 11

Seat No.	

Set Q

F.E. (Part – I) (CGPA) (Old) Examination, 2018
ENGINEERING PHYSICS

Day and Date : Wednesday, 12-12-2018 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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Constants : *1) Avogadro's no., N= 6.02 × 10^{26} / k.mol.*
2) Velocity of light, c = 3 × 10^{8}m/sec.
3) Charge of electron, e = 1.6 x 10^{-19} C.

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

SECTION – I

1. Choose the correct answer : **(14×1=14)**

1) The Miller indices of the plane parallel to y and z axes are
a) (0 0 1) b) (0 1 0) c) (1 0 0) d) (1 1 1)

2) The audible range of frequency is
a) 20 KHz to 20 MHz b) 200 KHz to 200 MHz
c) 200 Hz to 200 MHz d) 20 Hz to 20 KHz

3) Reverberation time is _____ to/of volume of the hall.
a) directly proportional b) inversely proportional
c) independent d) none of these

4) The inertial frame of reference is _____ frame of reference
a) An accelerated b) Non-accelerated
c) A rotating d) None of these

5) The Lorentz transformation equation for x′ co-ordinate from s to s′
a) $x' = (x + vt) / \sqrt{1 - v^2/c^2}$ b) $x' = (x - ct) / 1 - v^2/c^2$
c) $x' = (x - vt) / \sqrt{1 - v^2/c^2}$ d) $x' = x - vt (\sqrt{1 - v^2/c^2})$

6) Acceptor type semiconductor is formed by adding impurity of valency
a) 3 b) 4 c) 5 d) 2

P.T.O.

7) The number of died axes symmetry elements that are present in a cubic crystal are
   a) 4 b) 6 c) 8 d) 10

SECTION – II

8) Stimulated emission process is represented by equation
   a) $A^* + h\gamma \rightarrow A + 2h\gamma$ b) $A + h\gamma \rightarrow A^*$
   c) $A^* \rightarrow A + h\gamma$ d) $A^* + h\gamma \rightarrow A + h\gamma$

9) The hologram records _____ of the object.
   a) Only intensity variation
   b) Only phase distribution
   c) Both intensity variation and phase distribution
   d) None of these

10) In total internal reflection phenomenon the light ray incident from
   a) Rarer to denser b) Rarer to rarer
   c) Denser to denser d) Denser to rarer

11) Energy released per fission of a $_{92}U^{235}$ nucleus is nearly
   a) 200 eV b) 20 eV
   c) 200 MeV d) 20 MeV

12) The chirality of armchair CNT is
   a) (a, b) b) (a, 0) c) (a, a) d) (0, b)

13) The resolving power of a grating having N slits in n^{th} order will be
   a) (n+N) b) (n – N) c) n/N d) n.N

14) The substances that rotate the plane of polarization are said to be
   a) opaque b) optically inactive
   c) optically active d) polaroid

_____

SLR-TX – 11

Seat No.	

F.E. (Part – I) (CGPA) (Old) Examination, 2018
ENGINEERING PHYSICS

Day and Date : Wednesday, 12-12-2018 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Make suitable assumptions, **if necessary**.*
*2) Figures to the **right** indicate **full** marks.*

SECTION – I

2. Attempt **any five** of the following : **15**
   a) Describe in brief the formation of energy bands in solids.
   b) Calculate no. of atoms per unit cell for SC, BCC and FCC crystal.
   c) Explain the various requirements of a good auditorium.
   d) Deduce an expression for length contraction.
   e) Obtain the relativistic formula for the addition of velocities.
   f) A hall with volume of 1000 m^3 has a sound-absorbing surface of area of 400 m^2. If the average absorption coefficient of the hall is 0.2 sabines, what is the reverberation time of the hall ?
   g) A rocket ship is 100 meter long on the ground. When it is in flight, its length is 99 meters to an observer on the ground. What is its speed ?

3. a) What is Hall effect ? Obtain an expression for Hall voltage and Hall coefficient. **5**

   OR

   b) Discuss the various types of symmetry elements and symmetry operations present in a cubic crystal.

4. Attempt **any two** of the following : **8**
   a) Explain effect of impurity on Fermi level in p-type and n-type semiconductor.
   b) Define atomic radius and obtain its values for SC, BCC and FCC crystals.
   c) Explain acoustic diffraction method for determination of wavelength of ultrasonic waves.
   d) Deduce the expression for relativistic mass variation, to show $m = m_0/(1 – v^2/c^2)^{1/2}$.

Set Q

SECTION – II

5. Attempt **any five** of the following : **15**
   a) Distinguish between Fresnel and Fraunhoffer class of diffraction.
   b) Define :
      i) Spontaneous emission
      ii) Stimulated emission
      iii) Stimulated absorption
   c) Explain with neat diagram basic concept and structure of optical fiber.
   d) Explain with diagram types of carbon nano tubes.
   e) Explain Proton - Proton cycle.
   f) A fiber cable has an acceptance angle of 30° and core index of refraction 1.4. Calculate the cladding index of refraction.
   g) Calculate power output of a nuclear reactor. Which consumes 20.4 Kg of U 235 in 1000 hours of operations. Assume that energy released per fission of U 235 is 200 MeV.

6. a) Define optical activity. Explain construction and working of Laurent's half shade polarimeter. **5**

   OR

   b) Describe He-Ne laser with its construction and working.

7. Attempt **any two** of the following : **8**
   a) Derive an expression for the resolving power of a plane diffraction grating.
   b) Explain the construction and reconstruction of hologram with neat diagram.
   c) Explain the fiber optics communication system with block diagram.
   d) Write a note on: Classification of nuclear reactor.

Set Q

SLR-TX – 11

Seat No.	

Set R

F.E. (Part – I) (CGPA) (Old) Examination, 2018
ENGINEERING PHYSICS

Day and Date : Wednesday, 12-12-2018 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Make suitable assumptions,* ***if necessary****.*
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2) Velocity of light, c = 3 × 10^{8}m/sec.
3) Charge of electron, e = 1.6 x 10^{-19} C.

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

SECTION – I

1. Choose the correct answer : **(14×1=14)**

1) Reverberation time is _____ to/of volume of the hall.
a) directly proportional b) inversely proportional
c) independent d) none of these

2) The inertial frame of reference is _____ frame of reference
a) An accelerated b) Non-accelerated
c) A rotating d) None of these

3) The Lorentz transformation equation for x′ co-ordinate from s to s′
a) $x' = (x + vt) / \sqrt{1 - v^2/c^2}$ b) $x' = (x - ct) / 1 - v^2/c^2$
c) $x' = (x - vt) / \sqrt{1 - v^2/c^2}$ d) $x' = x - vt (\sqrt{1 - v^2/c^2})$

4) Acceptor type semiconductor is formed by adding impurity of valency
a) 3 b) 4 c) 5 d) 2

5) The number of died axes symmetry elements that are present in a cubic crystal are
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6) The Miller indices of the plane parallel to y and z axes are
a) (0 0 1) b) (0 1 0) c) (1 0 0) d) (1 1 1)

P.T.O.

7) The audible range of frequency is
   a) 20 KHz to 20 MHz
   b) 200 KHz to 200 MHz
   c) 200 Hz to 200 MHz
   d) 20 Hz to 20 KHz

SECTION – II

8) In total internal reflection phenomenon the light ray incident from
   a) Rarer to denser
   b) Rarer to rarer
   c) Denser to denser
   d) Denser to rarer

9) Energy released per fission of a $_{92}U^{235}$ nucleus is nearly
   a) 200 eV
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11) The chirality of armchair CNT is
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14) The hologram records _____ of the object.
   a) Only intensity variation
   b) Only phase distribution
   c) Both intensity variation and phase distribution
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_____

Set R

SLR-TX – 11

Seat No.	

F.E. (Part – I) (CGPA) (Old) Examination, 2018
ENGINEERING PHYSICS

Day and Date : Wednesday, 12-12-2018 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Make suitable assumptions,* ***if necessary****.*
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SECTION – I

2. Attempt **any five** of the following : **15**
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   f) A hall with volume of 1000 m^3 has a sound-absorbing surface of area of 400 m^2. If the average absorption coefficient of the hall is 0.2 sabines, what is the reverberation time of the hall ?
   g) A rocket ship is 100 meter long on the ground. When it is in flight, its length is 99 meters to an observer on the ground. What is its speed ?

3. a) What is Hall effect ? Obtain an expression for Hall voltage and Hall coefficient. **5**

   OR

   b) Discuss the various types of symmetry elements and symmetry operations present in a cubic crystal.

4. Attempt **any two** of the following : **8**
   a) Explain effect of impurity on Fermi level in p-type and n-type semiconductor.
   b) Define atomic radius and obtain its values for SC, BCC and FCC crystals.
   c) Explain acoustic diffraction method for determination of wavelength of ultrasonic waves.
   d) Deduce the expression for relativistic mass variation, to show $m = m_0/(1 – v^2/c^2)^{1/2}$.

Set R

SECTION – II

5. Attempt **any five** of the following : **15**
   a) Distinguish between Fresnel and Fraunhoffer class of diffraction.
   b) Define :
      i) Spontaneous emission
      ii) Stimulated emission
      iii) Stimulated absorption
   c) Explain with neat diagram basic concept and structure of optical fiber.
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SLR-TX – 11

Seat No.	

Set S

F.E. (Part – I) (CGPA) (Old) Examination, 2018
ENGINEERING PHYSICS

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

SECTION – I

1. Choose the correct answer : **(14×1=14)**

1) The audible range of frequency is
a) 20 KHz to 20 MHz b) 200 KHz to 200 MHz
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P.T.O.

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SECTION – II

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Set S

SLR-TX – 11

Seat No.	

F.E. (Part – I) (CGPA) (Old) Examination, 2018
ENGINEERING PHYSICS

Day and Date : Wednesday, 12-12-2018 Marks : 56
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Set S

SECTION – II

5. Attempt **any five** of the following : **15**
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Set S