

# KADI SARVA VISHWAVIDYALAYA

BE Semester-I

## Engineering Physics

Date: 02/01/2013

Max. Marks: 70

Time: 2.00 pm – 5.00 pm

- Instruction:
- (1) Answer each section in separate Answersheet.
  - (2) Use of Scientific calculator is permitted
  - (3) Indicate clearly, the options along with respective question number
  - (4) Use the last page of main supplementary for rough work.

### Section - I

**Q.1** Each carries equal marks [5]

- [A] (a) The intensity level of threshold of hearing is  
i. 0 dB      ii. 1 dB      iii. 60 dB      iv. 0.1 dB  
(b) Ultrasonic waves can travel long distance in seawater due to its  
i. high intensity      ii. larger wavelength  
iii. High frequency      iv. None of above  
(c) The effective number of atoms per unit cell in FCC crystal is  
i. 1      ii. 2      iii. 4      iv. 6  
(d) The refractive index of the core is  
i. lower than that of cladding      ii. higher than that of cladding  
iii. equal to that of cladding      iv. same as that of buffer  
(e) If an atom jumps from a lower energy level to higher energy level, the process is known as  
i. induced emission      ii. induced absorption  
iii. spontaneous emission      iv. none of above

[B] Explain the method of construction and reconstruction of Hologram. [5]

[C] Describe the principle, construction and working Photovoltaic Cell. [5]

**OR**

[C] Sketch the planes for the Miller Indices (110), (221), (111), ( $\bar{1}\bar{1}\bar{1}$ ), (001)

**Q.2**

- [A] Describe Powder method in X-ray diffraction to study a crystal structure. [5]  
[B] A classroom has size 15m x 10m x 10m. Its total absorption is equivalent to  $480\text{ m}^2$  of open window. What will be the effect on the reverberation time if audience fill the hall and thereby increase the absorption by another  $480\text{ m}^2$  of open window? [5]

**OR**

**Q.2**

- [A] What is absorption coefficient of a material? How one can measure the absorption coefficient of additional material. [5]  
[B] Find the fractional refractive index and numerical aperture for an optical fiber with refractive indices of core and cladding as 1.5 and 1.49 respectively. [5]

**Q.3**

- [A] Describe method to determine the coefficient of rigidity of a wire using Torsional Pendulum. [5]  
[B] Describe Geiger-Muller counter. [5]

**OR**

**Q.3**

- [A] Write a note on multimeters. [5]  
[B] An ultrasonic source of 0.07 MHz sends down a pulse towards the seabed which returns after 0.65 sec. The velocity of sound in seawater is 1700 m/s. Calculate the depth of sea and wavelength of pulse. [5]

## Section - II

Q.4

Each carries equal marks

[5]

- [A] (a) In an optical fiber light propagates in the  
 i. core      ii. Cladding      iii. Buffer      iv. air  
 (b) LED is operated  
 i. without bias      ii. with forward bias  
 iii. with reverse bias      iv. none of above  
 (c) The conductivity of a superconductor is  
 i. zero      ii. Finite      iii. Infinite      iv. none of above  
 (d) X-ray fluoroscopy is an  
 i. off time radiography      ii. real time radiography  
 iii. mean time radiography      iv. none of above  
 (e) The reverberation time is  
 i. inversely proportional to volume  
 ii. directly proportional to volume  
 iii. not related to volume  
 iv. directly proportional to total area
- [B] Explain the Meissner effect in superconductors. Prove that superconductor exhibits perfect diamagnetism.
- [C] Define NDT. State the Objectives of NDT. Compare NDT & DT.

**OR**

- [C] What is Acoustical grating? Describe the method of determining the wavelength & velocity of ultrasonic waves in liquids.

Q.5

- [A] Explain Hall Effect & derive the expression for Hall coefficient  $R_H$  in semiconductors.
- [B] The Hall coefficient and the conductivity of n-type silicon are  $1.25 \times 10^{-4} \text{ m}^3/\text{C}$  and  $112 \Omega^{-1}\text{m}^{-1}$ , respectively. Calculate the charge carrier density and electron mobility.

**OR**

Q.5

- [A] Define acceptance angle & numerical aperture of an optical fiber. Derive the expression for them.
- [B] Explain how solids are classified into conductors, semiconductors and insulators with the help of energy band diagrams.

Q.6

- [A] Mention the properties and applications of nanomaterials.
- [B] A wire of length 50 cm and radius 2 mm is twisted through  $30^\circ$ . Calculate the angle of shear on its surface.

**OR**

Q.6

- [A] Describe Liquid Penetrant method of NDT with suitable diagrams.
- [B] Write a note on Artificial radioactivity with examples.

# KADI SARVA VISHWAVIDYALAYA

BE Semester-II

Subject code: CC107

Date: 25/5/13

Time: 10.30 to 1.30

## **Subject Name: Engineering Physics**

**Total Marks : 70**

**Instruction:** (1) Answer each section in separate Answer sheet.

- (2) Use of Scientific calculator is permitted  
(3) All questions are compulsory.  
(4) Indicate clearly, the options along with respective question number.  
(5) Use the last page of main supplementary for rough work.

## **SECTION - I**

**Q. 1 (a) (1)** Which of the following is not a characteristic of a musical sound?



(2) If the intensity of a source of sound is  $10^{-10} \text{ W/m}^2$ , calculate the intensity level in dB.

- (i) 10dB (ii) 20dB  
 (iii) 30dB (iv) 40dB

(3) Which of the following is not a mechanical wave?



(4) The speed of sound in medium depends upon:



(5) To form stimulated emission, atom should make collision with an atom initially present in:

- (i) Ground state      (ii) Excited state  
 (iii) Both (i) & (ii)      (iv) None

(b) What is reverberation and reverberation time? A hall has a volume of  $120000\text{m}^3$  and has reverberation time of 1.55 s. What is the average absorbing power of the surface if the total absorbing surface is  $26500\text{ m}^2$ ?

(c) Describe any five applications of laser light. 05

**OR**

OR

(c) What is the physical significance of numerical aperture and acceptance angle? An optical fiber core and its cladding have refractive indices of 1.545 and 1.495 respectively. Calculate the relative refractive index, critical angle, acceptance angle and numerical aperture.

**Q. 2** (a) State the applications of ultrasonic waves and explain SONAR technique to determine the depth of sea.

(b) Mention any five factors affecting acoustics of building along with their remedies.

**OR**

(a) What is an optical fiber? Explain the principle of an optical fiber as a waveguide for light. Hence give the advantages of fiber optic cable.

(b) Which method is suitable for the production of ultrasonic waves of frequency of the order of 3MHz? Describe it with a suitable diagram.

- Q. 3** (a) Distinguish between musical sound & noise. Explain the terms: (i) threshold of hearing and (ii) dead effect 05  
 (b) What is LDR? List any four major applications of LDR. 05

**OR**

**Q. 3** (a) Describe the principle, construction and working Photovoltaic Cell. 05  
 (b) Describe an experimental method in determining the Young's modulus of a cantilever. 05

## **SECTION – II**

- Q. 4**

  - (a) (1) A superconductor is a perfect \_\_\_\_\_ material.
    - (i) diamagnetic
    - (ii) dielectric
    - (iii) insulator
    - (iv) conductor
  - (2) Maglev trains are constructed based on \_\_\_\_\_ effect.
    - (i) gravitational
    - (ii) electrical
    - (iii) meissner
    - (iv) magnetic
  - (3) Cubic crystal system is represented by;
    - (i)  $a = b = c, \alpha = \beta = \gamma = 90^\circ$
    - (ii)  $a \neq b \neq c, \alpha = \beta = \gamma = 90^\circ$
    - (iii)  $a = b \neq c, \alpha = \beta = \gamma = 90^\circ$
    - (iv)  $a = b = c, \alpha = \beta = \gamma \neq 90^\circ$
  - (4) What is the frequency of the electromagnetic waves radiated from a Josephson junction, if the voltage drop at the junction is  $6.3\mu\text{V}$ ? (Use  $\hbar = 6.62 \times 10^{-34} \text{ Js}$ )?
    - (i) 3 GHz
    - (ii) 4 GHz
    - (iii) 5 GHz
    - (iv) 6 GHz
  - (5) The surface area to volume ratio is \_\_\_\_\_ for nanomaterials.
    - (i) very large
    - (ii) very less
    - (iii) moderate
    - (iv) none of the above

(b) What is Hall effect? Derive an expression for Hall voltage, Hall coefficient, and Hall mobility.

(c) Write a short note on Industrial application of X-rays.

**OR**

(c) Give the detail about radiation detector and its importance.

**Q. 5**

(a) What are superconductors? Give examples. What is the significance of critical temperature, critical magnetic field and critical current density for super conductors?

(b) Derive the expression for the interplanar spacing between two parallel planes with Miller indices  $(hkl)$  for a cubic lattice of lattice constant  $a$ .

**OR**

(a) Give the classification of solids into conductors, insulators and semiconductors on the basis of Band theory.

(b) Describe Liquid Penetrant method of NDT with suitable diagrams.

**Q. 6**

(a) Write any five applications of nanomaterials in the field of engineering and industry?

(b) Write a short note on Soft and Hard superconductors.

OR

- (a) What are Miller indices? Sketch the following Miller index planes: (111), (200), (202) and (101). 05

(b) Give the difference between Destructive and Non-Destructive Tests. 05

# KADI SARVA VISHWAVIDYALAYA

BE Semester-I

## Engineering Physics

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### Section - I

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[B] Explain the method of construction and reconstruction of Hologram. [5]

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[B] Explain the Meissner effect in superconductors. Prove that [5]  
superconductor exhibits perfect diamagnetism.

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# KADI SARVA VISHWAVIDYALAYA

BE Semester-II

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Date: 25/5/13

Time: 10.30 to 1.30

## **Subject Name: Engineering Physics**

**Total Marks : 70**

**Instruction:** (1) Answer each section in separate Answer sheet.

- (2) Use of Scientific calculator is permitted
  - (3) All questions are compulsory.
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## **SECTION - I**

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## **SECTION – II**

- Q. 4**

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    - (iii) 5 GHz
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**Q. 5**

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(b) Derive the expression for the interplanar spacing between two parallel planes with Miller indices  $(hkl)$  for a cubic lattice of lattice constant  $a$ .

**OR**

(a) Give the classification of solids into conductors, insulators and semiconductors on the basis of Band theory.

(b) Describe Liquid Penetrant method of NDT with suitable diagrams.

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(a) Write any five applications of nanomaterials in the field of engineering and industry?

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OR

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(b) Give the difference between Destructive and Non-Destructive Tests. 05

# KADI SARVA VISHWAVIDYALAYA

B.E SEMESTER I/II EXAMINATION (Dec-2014)

Subject Code: CC107  
Date: 26/12/2014

Subject Name: ENGINEERING PHYSICS  
Time: 10.30am to 1.30pm Total Marks: 70

- Instruction:
- (1) Answer each section in separate Answersheet.
  - (2) Use of Scientific calculator is permitted.
  - (3) All questions are **Compulsory**.
  - (3) Indicate **clearly**, the options along with respective question number
  - (4) Use the last page of main supplementary for **rough work**.

## Section - I

**Q.1** Each carries equal marks [5]

- [A] (a) In an optical fibre light propagates in the  
i. core      ii. buffer  
iii. cladding      iv. air.
- (b) The resistivity of a superconductors is  
i. zero      ii. finite  
iii. infinite      iv. unchanged
- (c) Nanomaterial are those which have structured components with at least one dimension  
i. less than 100 nm      ii. Between 100 nm to 200 nm  
iii. Above 200 nm      iv. None of these
- (d) Dye penetrant method is  
i. Destructive method      ii. Non-destructive method  
iii. Calculative method      iv. None of these
- (e) Type-I superconductor is also called  
i. soft superconductor      ii. hard superconductor  
iii. Amorphous superconductor      iv. None of these

[B] Describe CO<sub>2</sub> laser with necessary energy level diagrams. [5]

[C] Write a note on Photovoltaic cell. [5]

**OR**

[C] Explain the characteristics of musical sound as loudness, pitch, timbre.

**Q.2**

- [A] Explain the phenomenon of acoustical grating. [5]  
[B] Calculate natural frequency of ultrasonic waves by using iron rod of length 40 mm. [5]  
Given for pure iron; Young's modulus  $115 \times 10^9 \text{ N/m}^2$  and density  $7.25 \times 10^3 \text{ Kg/m}^3$ .

**OR**

**Q.2**

- [A] Derive the expression for the Interplanar distance ( $d_{hkl}$ ) for a cubic lattice. [5]  
[B] Determine the lattice constant for FCC lead crystal of radius 1.746 Å. Also find the spacing of (220) plane. [5]

**Q.3**

- [A] Write a note on Shape Memory alloys with applications. [5]  
[B] Compare spontaneous and stimulation emission of radiation. [5]

**OR**

**Q.3**

- [A] Explain Powder diffraction method to study crystal structure. [5]  
[B] What is resultant sound level when 55 dB sound is added with 50 dB sound. [5]

## Section - II

**Q.4**

**Each carries equal marks**

**[5]**

[A]

**(a) Frequency of audible sound is**

- i. 0 Hz to 100 kHz
- ii. 20 Hz to 20 kHz
- iii. 20 Hz to 200 kHz
- iv. 0 Hz to 200 kHz

**(b) The piezoelectric effect is observed in**

- i. Nickel
- ii. Copper
- iii. Iron
- iv. Quartz

**(c) Which of the following cells has closed packing structure?**

- i. SC
- ii. BCC
- iii. FCC
- iv. All the three

**(d) Light amplification is possible because of**

- i. spontaneous emission
- ii. absorption
- iii. stimulated emission
- iv. All of these

**(e) LDR is used as**

- i. voltage regulator
- ii. numerical display
- iii. light generator
- iv. Counting device.

[B]

Explain basic principle & conditions of optical fibre communication.

**[5]**

[C]

Give any five differences between Step index fibre and Graded index fibre.

**[5]**

**OR**

[C]

A Step Index fibre with a core refractive index of 1.49 and fractional index difference of 0.0005 has radius of 12.5  $\mu\text{m}$ . The operative wavelength is 1.3  $\mu\text{m}$ . Find the numbers of modes, this fibre will support.

**Q.5**

[A]

State any five properties of superconducting material. Explain any one of them.

**[5]**

[B]

Superconducting Tin has a critical temperature of 3.7 K at zero magnetic field and a critical field of 0.0306 T at 0K. Find the critical field at 2 K.

**[5]**

**OR**

**Q.5**

[A]

Explains the classification of solids.

**[5]**

[B]

What is Hall-effect? State any four applications of Hall-effect.

**[5]**

**Q.6**

[A]

List any five applications of artificial radioactivity.

**[5]**

[B]

Write a note on SEM.

**[5]**

**OR**

**Q.6**

[A]

Explain Ultrasonic inspection method to detect flaws in material.

**[5]**

[B]

Explain Magnetic levitation.

**[5]**

\*\*\*\*\*All The Best\*\*\*\*\*

# KADI SARVA VISHWAVIDYALAYA

B.E SEMESTER I/II EXAMINATION

Subject Code: CC107  
Date: 28.12.15

Subject Name: ENGINEERING PHYSICS  
Time: 10:30 to 1:30

Total Marks: 70

- Instruction:
- (1) Answer each section in separate Answersheet.
  - (2) Use of Scientific calculator is permitted.
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## Section - I

**Q.1** Each carries equal marks [5]

- [A] (a) The intensity level of 0 dB corresponds to intensity of \_\_\_\_\_.  
i.  $10^0 \text{ W/m}^2$       ii.  $10^{-1} \text{ W/m}^2$   
iii.  $10^{-10} \text{ W/m}^2$       iv.  $10^{-12} \text{ W/m}^2$
- (b) Which of the following cells has closest packing structure?  
i. SC      ii. FCC  
iii. BCC      iv. All of these
- (c) Condition for fibre optical communication system having  $n_1$  and  $n_2$  refractive indices of core and cladding respectively is  
i.  $n_1 > n_2$       ii.  $n_1 < n_2$   
iii.  $n_1 = n_2$       iv. None of these
- (d) Scanning electron microscopy provides \_\_\_\_\_ image.  
i. zero dimensional      ii. one dimensional  
iii. two dimensional      iv. three dimensional
- (e) The conductivity of superconductor is \_\_\_\_\_.  
i. zero      ii. finite  
iii. infinite      iv. None of these

- [B] Explain the construction & working of CO<sub>2</sub> LASER along with energy level diagram. [5]  
[C] Describe the principle, construction and working of Light Emitting Diode. [5]

### **OR**

- [C] An x-ray beam of wavelength  $0.842 \text{ \AA}$  is incident on a crystal at a diffraction angle of  $8^{\circ}55'$  when the first order Bragg's diffraction occurs. Calculate the interplanar spacing d.

**Q.2**

- [A] Explain the method to determine Miller Indices by giving suitable example in SC structure. [5]  
[B] Calculate natural frequency of ultrasonic waves by using quartz plate of thickness  $5 \times 10^{-3}$  m, Young's modulus  $7.99 \times 10^{10} \text{ N/m}^2$  and density  $2.65 \times 10^3 \text{ Kg/m}^3$ . [5]

### **OR**

**Q.2**

- [A] Deduce the relation to find out the bending moment of rectangular beam. [5]  
[B] Sketch the planes for the Miller Indices (011), (202), (00 $\bar{1}$ ), (0 $\bar{1}\bar{1}$ ), (2 $\bar{2}\bar{2}$ ). [5]

**Q.3**

- [A] Explain sol-gel method to synthesize nanomaterial with necessary figures. [5]  
[B] Explain Eddy current current NDT method with suitable diagrams [5]

### **OR**

**Q.3**

- [A] List any five industrial application of x-ray. [5]  
[B] Describe Laue method in x-ray diffraction to study a crystal structure. [5]

## **Section - II**

0.4

**Each carries equal marks**

[5]

- [A] (a) Type-I superconductors are known as  
 i. semiconductors                      ii. soft superconductors  
 iii. hard superconductors            iv. None of these

(b) x-ray fluoroscopy provides \_\_\_\_\_ images  
 i. off-time                              ii. real-time  
 iii. dead-time                         iv. All of these

(c) Austenite phase of shape memory alloys are \_\_\_\_\_ temperature phase.  
 i. high                                  ii. low  
 iii. zero                                iv. None of these

(d) Energy band gap of conductors is of the order of  
 i. upto 0.01 eV                        ii. upto 1.1 eV  
 iii. greater than 5 eV                iv. None of these

(e) The coordination number of FCC crystal is  
 i. 6                                      ii. 8  
 iii. 12                                 iv. 14

[B] Explain Maglev with suitable diagram.

[5]

[C] Give any five differences between step index fibre and graded index fibres.

[5]

OR

[C] The Hall coefficient and the conductivity of n-type semiconductor are  $4.16 \times 10^{-4} \text{ m}^3/\text{C}$  and  $108 \Omega^{-1}\text{m}^{-1}$ , respectively. Calculate the charge carrier density and electron mobility at room temperature.

Q.5

- [A] Derive relation between acceptance angle and numerical aperture of optical fibre. [5]  
 [B] A step index fibre made with the core refractive index of 1.63 and the cladding refractive index of 1.48. Calculate the fractional index difference numerical aperture of the fibre. [5]

OR

0.5

- [A] Compare artificial radioactivity and artificial transmutation. [5]  
[B] Give any five application of artificial radioactivity. [5]

Q.6

- [A] Give any five differences between Hard and soft superconductors with suitable figure. [5]  
 [B] Superconducting Nb has a critical temperature of 9.15K at zero magnetic field and a critical field of 0.1960 T at 0 K. Find the critical field at 5 K. [5]

OR

Q.6

- |  |                       |
|--|-----------------------|
| <p>[A] State the objectives of NDT. Compare NDT with DT</p> <p>[B] Explain pseudo-elastic effect in shape memory alloys.</p> | <p>[5]</p> <p>[5]</p> |
|--|-----------------------|