University of Mumbai

Examination 2020 under cluster 3 (Lead College: FCRIT)

Examinations Commencing from 7th January 2021 to 20th January 2021

Program: **FE**

Curriculum Scheme: Rev 2019

Examination: FE Semester II

Course Code: **202** and Course Name: **Engineering Physics-II**

Time: 2 hour Max. Marks: 60

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Pumping is done in order to achieve
Option A:	Steady state
Option B:	Population inversion
Option C:	Equilibrium
Option D:	Photon emission
2.	The Maxwell's equation, $\nabla \cdot B = 0$ is due to
Option A:	B = Mh
Option B:	Non-existence of a mono pole
Option C:	$B = H/\mu$
Option D:	No magnetic field
3.	Nanomaterials are the materials with at least one dimension measuring less than
Option A:	1nm
Option B:	10nm
Option C:	100nm
Option D:	1000nm
4.	What is the meaning of grating element for a diffraction grating
Option A:	It is the width of a single slit
Option B:	It is the width of the opaque space
Option C:	It is the distance between the source and slit
Option D:	It is the sum of width of slit and width of opaque space
5.	Which of the following is an example of top-down approach for the preparation of nanomaterials?
Option A:	Gas phase agglomeration
Option B:	Molecular self-assembly
Option C:	Mechanical grinding
Option D:	Molecular beam epitaxy
6.	The numerical aperture of a fiber if the angle of acceptance is 15 degrees, is
Option A:	0.17
Option B:	0.26
Option C:	0.50
Option D:	0.75

7.	According to Einstein's Special Theory of Relativity, laws of physics can be formulated based on
Option A:	Inertial Frame of Reference
Option B:	Non-Inertial Frame of Reference
Option C:	Both Inertial and Non-Inertial Frame of Reference
Option D:	Quantum State
8.	Where is ND: YAG most commonly used
Option A:	Optical Communication
Option B:	Cosmetic Surgery
Option C:	Welding
Option D:	Photography
9.	Photodiode can be used as sensor
Option A:	Electric Field
Option B:	Temperature
Option C:	Pressure
Option D:	Optical
10.	Which of the following is Einstein's mass energy relation
Option A:	$E_k = (m - m_0)c^2$
Option B:	$E = mc^2$
Option C:	$E^2 - p^2c^2 = m_0^2c^4$
Option D:	$E_k = mv^2/c^2$
11.	Maxwell's equation derived from Faraday's law is
Option A:	Div(H) = J
Option B:	Div(D) = I
Option C:	Curl(E) = −dB/dt
Option D:	Curl(B) = −dH/dt
12.	What is the region enclosed by the optical cavity called
Option A:	Optical Region
Option B:	Optical System
Option C:	Optical box
Option D:	Optical Resonator
13.	Piezoelectric transducer consists of _____
Option A:	Quartz crystal
Option B:	Aluminum wire
Option C:	Copper Rod
Option D:	Gold Crystal
14.	Which of the following Einstein's coefficient represents spontaneous emission
Option A:	A_{12}
Option B:	A_{21}
Option C:	B_{12}
Option D:	B_{21}

15.	Relation between temperature and resistance of a conductor is
Option A:	$R_t = R_{ref}[1+\alpha\Delta t]$
Option B:	$R_t = R_{ref}[1+t]$
Option C:	$R_t = R_{ref}[1-\alpha t]$
Option D:	$R_t = R_{ref}[1-t]$

Q2 (15 Marks Each)	**Solve any Four out of Six** **5 marks each**
A	Draw the schematic diagram of SEM and explain its construction and working.
B	What is time dilation and length contraction?
C	What is Optical Sensor? Explain construction and working of Photodiode with a neat diagram.
D	State Maxwell's all four equations and give the significance of each.
E	Calculate the number of modes of a step index optical fibre of diameter 40 $\boldsymbol{\mu m}$ and its core and cladding refractive indices are 1.5 and 1.46, respectively. Wavelength of light used is 1.5 $\boldsymbol{\mu}$m

Q.3 (15 Marks Each)	**Solve any Four out of Six** **5 marks each**
A	What is holography? Give its construction and advantages over photographic technique.
B	If $\boldsymbol{A} = \boldsymbol{x}\,\boldsymbol{2z}\,\boldsymbol{i} - \boldsymbol{2y}\,\boldsymbol{2z}\,\boldsymbol{2}\,\boldsymbol{j} + \boldsymbol{xy}\,\boldsymbol{2zk}$. Find $\nabla.\boldsymbol{A}$ at point (1,-1,1).
C	What is Sensor? Explain the use of resistance sensor for temperature measurement (Pt-100 Sensor with diagram and types).
D	Describe the fiber optics communication system with block diagram
E	Draw and explain energy level diagram of He-Ne Laser.

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Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 2021

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Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	B
Q2.	B
Q3.	C
Q4	D
Q5	C
Q6	B
Q7	A
Q8.	B
Q9.	D
Q10.	B
Q11.	C
Q12.	D
Q13.	A
Q14.	B
Q15.	A