KARPAGAM ACADEMY OF HIGHER EDUCATION

Coimbatore-641021.

(For the candidates admitted from 2016 onwards)

DEPARTMENT OF PHYSICS

UNIT I (Objective Type/Multiple choice Questions each Questions carry one Mark)

NANOMATERIALS AND APPLICATIONS

PART –A(Online Examination)

S.No.	QUESTIONS	opt1	opt2	opt3	opt4	ANSWER
1	Nanotechnology was brought into day light by delivering lectures by:	Feymann	Einstein	Newton	Max Planck	Feymann
2	The prefix "nano" comes from a	French word meaning billion	Greek word meaning dwarf	Spanish word meaning particle	Latin word meaning invisible	Greek word meaning dwarf
3	Who first used the term nanotechnology and when?	Richard Feynman, 1959	Norio Taniguchi, 1974	Eric Drexler, 1986	Sumio Iijima, 1991	Norio Taniguchi, 1974
4	What is a buckyball?	A carbon molecule (C60)	Nickname for Mercedes-Benz's futuristic concept car (C111)	Plastic explosives nanoparticle (C4)	Concrete nanoparticle with a compressive strength of 20 nanonewtons (C20)	A carbon molecule (C60)
5	Richard Feynman is often credited with predicting the potential of nanotechnology. What was the title of his famous speech given on December 29, 1959?	There is a tiny room at the bottom	Things get nanoscopic at the bottom	Bottom? What bottom?	There is plenty of room at the bottom	There is plenty of room at the bottom
6	Which of these consumer products is already being made using nanotechnology methods?	Fishing lure	Golf ball	Sunscreen lotion	All of the above	All of the above

7	What is graphene?	A new material made from carbon nanotubes	A one-atom thick sheet of carbon	Thin film made from fullerenes	A software tool to measure and graphically represent nanoparticles	A one-atom thick sheet of carbon
8	What is the 2017 budget for the U.S. National Nanotechnology Initiative?	$587 million	$917 million	$1.4 billion	$2.1 billion	$1.4 billion
9	In which of the following the atoms do not move from each other?	Shape memory alloys	Nano materials	Dielectrics	Static materials	Nano materials
10	10 nm = _____ m	10^{-8}	10^{-7}	10-9	10-10	10^{-8}
11	The diameter of hydrogen atom is...	1	10	0.1	0.01	0.1
12	Carbon atoms make ____ type of bond with other carbon atoms.	covalent	ionic	metallic	hydrogen	covalent
13	Fullerene or bucky ball is made up of ____ carbon atoms.	100	20	75	60	60
14	1 m = _____ nm.	10^{-9}	10-8	109	108	109
15	"There is plenty of room at the bottom." This was stated by _____.	Eric Drexler	Richard Feynmann	Sumio Tijima	Richard Smalley	Richard Feynmann
16	Who coined the word 'nanotechnology'?	Eric Drexler	Richard Feynmann	Sumio Tijima	Richard Smalley	Eric Drexler
17	According to the definition by CRN, nanotechnology is...	mechanical engineering	atomic engineering	Newtonian mechanics	micro-electronics	atomic engineering
18	Nanoscience can be studied with the help of…	quantum mechanics	Newtonian mechanics	macro-dynamics	geophysics	quantum mechanics
19	Greeks and Romans had used nanoparticles in the manufacture of...	cosmetics for eyes	medicines	metal articles	hair-dye	hair-dye
20	Egyptians were using ____ to prepare make-up for eyes.	nanoaluminium	nanocopper	nanosteel	nanolead	nanolead
21	The sword of Tipu Sultan was made of...	nanolead	nanoaluminium	Damascus steel	Pure iron	Damascus steel
22	_____ contains nanoparticles prepared by using biologically processed metal ores.	Homeopathic medicines	Modern antibiotics	Ayurvedic 'Bhasmas'	Modern cosmetics	Ayurvedic 'Bhasmas'
23	The diameter of human hair is ____ nm.	50,000	75,000	90,000	1,00,000	50,000

24	The diameter of human hair is ____ m.	5 x 10^{-8}	5 x 10-7	5 x 10-6	5 x 10-5	5 x 10-5
25	The cut-off limit of human eye is ____ nm.	2,000	5,000	10,000	50,000	10,000
26	The size of E.Coli bacteria is ____ nm.	2,000	5,000	50	90	2,000
27	The size of RBC is ____ nm.	50	90	2,000	5,000	5,000
28	The thickness of a transistor is ____ nm.	50	90	2,000	5,000	90
29	The size of a virus is ____ nm.	2	20	50	2000	50
30	The diameter of a bucky ball is ____ nm.	1,000	100	10	1	1
31	The width of a typical DNA molecule is ____ nm.	1	2	5	10	2
32	1 micrometer (micron) = _____ m.	10-9	10-8	10-7	10-6	10-6
33	1 micrometer (micron) = _____ nm.	1,000	100	10	0.01	1,000
34	The surface area to volume ratio of a sphere with radius 1 cm is R_1 and that of a sphere with radius 5 cm is R_2. Then R_1 = ____ R_2.	3	0.3	5	1/5	5
35	The surface area to volume ratio of a cube with side 1 unit is R_1 and that of a cube with side 10 units is R_2. Then R_2 = ____ R_1.	0.1	10	1/100	100	0.1
36	The two important properties of nanosubstances are...	pressure and friction	sticking and friction	sticking and temperature	temperature and friction	sticking and friction
37	With the help of _____, Robert F. Curl and others discovered fullerene.	electron microscope	magnetic resonance	condensation technique	mass spectrograph	mass spectrograph
38	In the structure of fullerene each carbon atom forms covalent bonds with ____ other carbon atoms.	one	two	three	four	three
39	Who had invented the famous 'Geodesic' dome structure?	Eric Drexler	Buckminster Fuller	Richard Smalley	Faraday	Buckminster Fuller
40	The largest cluster of carbon atoms in Bucky balls known till today consists of ____ carbon atoms.	60	75	180	540	540
41	The smallest cluster of carbon atoms in	75	60	20	15	20

	Bucky balls known till today consists of ____ carbon atoms.					
42	The tensile strength of an MWNT is ____ Pa.	63 x 10^6	63 x 107	63 x 108	63 x 109	63 x 109
43	The compressive strength of a nanotube _____ its tensile strength.	is less than	is greater than	is equal to	may be greater than	is less than
44	The hardness of a standard SWNT is ____ Pa.	63 x 10^6	25 x 106	25 x 109	25 x 10-9	25 x 109
45	The bulk modulus of a standard SWNT is _____ that of diamond.	less than	greater than	equal to	less than or equal to	greater than
46	How much current can be passed through 1 cm^2 cross-section of a metal nanotube?	10^{-9} A	109 A	1000 A	0.001 A	109 A
47	The size of a quantum dot is _____ nm.	5	10	50	100	5
48	The capacity of a normal human eye to see the smallest object is _____ μm.	10000	1000	100	10	10
49	Nanoparticles of which substance were found on the surface of the sword of Tipu Sultan?	Gold	Lead	Carbon	Silicon	Carbon
50	Quantum dots are _____particles	semiconductor	conductor	insulator	optical	semiconductor
51	Larger QDs emit longer wavelengths resulting in emission colors such as _____	yellow	orange or red	brown	black	orange or red
52	Smaller QDs emit shorter wavelengths resulting in colors like	brown	red and orange	blue and green	green and yellow	blue and green
53	Nanotechnology, in other words, is	Carbon engineering	Atomic engineering	Small technology	Microphysics	Atomic engineering
54	The diameter of the nano wire is about _____	10-6m	10-3m	10-8m	10-9m	10-9m
55	A suspended nano wire is a wire that is produced in the_____	Air medium	Vaccum	Low vaccum chamber	High vaccum chamber	High vaccum chamber
56	Nano wires are used in_____	Transistors	Resistors	Capacitors	Transducers	Transistors
57	Nano cones are the predominant structures made with_____	Carbon	Nitrogen	Hydrogen	Silicon	Carbon

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DEPARTMENT OF PHYSICS

UNIT II (Objective Type/Multiple choice Questions each Questions carry one Mark)

NANOMATERIALS AND APPLICATIONS

PART –A(Online Examination)

S.No.	QUESTIONS	opt1	opt2	opt3	opt4	ANSWER
1	Which of the following uses radio frequency to produce nano-particles?	Plasma arching	Chemical vapour deposition	Sol-gel technique	Electro deposition	Plasma arching
2	Which of the following methods can be used to produce nano-powders of oxides?	Plasma arching	Sol-gel technique	Chemical vapour deposition	Mechanical crushing	Chemical vapour deposition
3	Which of the following is used to make both nano-particles and nano-powders?	Chemical vapour deposition	Sol-gel technique	Plasma arching	Electro deposition	Sol-gel technique
4	Which method can be used to prepare iron nitriles nano-crystals using ammonia gas?	Pulsed laser deposition	Sol-gel technique	Electro-deposition	Mechanical crushing	Mechanical crushing
5	Which of the following is used to modify the optical properties of a material system?	Electricity	Magnetic field	Pressure	Light	Light
6	Which of the following is used in electro optic modulators?	Lithium tantalite	Barium sodium niobate	Lithium niobate	Lithium sodium niobate	Lithium niobate
7	Sol-gel method is _____ approach	Bottom up	Up bottom	Top down	Down top	Bottom up
8	Sol-gel method is known since _____	1970	1960	1980	1990	1980
9	Which ratio decides the efficiency of nanosubstances?	Weight/volume	Surface area/volume	Volume/weight	Pressure/volume	Surface area/volume

10	While synthesizing the nano cones the plasma temperature is above_____	1000oC	1500oC	2000oC	2500oC	2000oC
11	The sol-gel is a _____ of solid particle.	Sublimation	Melting	Colloidal suspension	Cool down	Colloidal suspension
12	The gel is a _____ mass.	Heavy molecular	Semi regid	Regid	Light molecular	Semi regid
13	Sol-gel method is _____ chemical process.	Dry	Wet	Semi liquid	Semi solid	Wet
14	_____ undergo hydrolysis and poly condensation reactions.	Metal ions	Metal carbonates	Metal nitrates	Metal oxides	Metal oxides
15	The solvent evolves towards the formation of an inorganic continuous network containing a	Gaseous phase	Gel	Solid phase	Semi solid phase	Gel
16	Formation of an inorganic continuous network containing the metal centres with _____	Azo	Oxo	Nitro	Hydro	Oxo
17	After drying process the liquid phase is removed from the gel and _____ is performed.	Calcination	De-oxygenation	Oxygenation	Hydrogenation	Calcination
18	One of the advantages of sol-gel method is able to get uniform and _____ powder.	Micro size	Large size	Nano size	Small size	Small size
19	Sol-gel method can produce _____ systems.	Uniform multi component	Non uniform multi component	Multi component	Non uniform multi component	Uniform multi component
20	Metal nano particles particularly _____ nano particles are prepared by the chemical reduction method.	Silver	Gold	Platinum	Tungsten	Silver
21	The _____ and citrate solution are used as reducing agents in chemical reduction method.	Hydrazine hydrate	Hydrazine	Hydrazone	Semi carbazene	Hydrazine hydrate
22	What is range of temperature at Hydro thermal reservoirs?	350oC	210oC	50oC	1900oC	350oC
23	When do hydrothermal resources arise?	When the movement of tectonic plates	When the area is prone to volcanic eruptions	When water has access to high	When temperature on earth surface is	When water has access to high temperature

		occurs		temperature	very high	
24	Fabrics are extensively made out of nano materials like _____	Carbon nano tubes	Fullerenes	Mega tubes	Polymers	Fullerenes
25	The power required for electro-deposition is	DC and very low voltage	DC and high voltage	AC and very low voltage	AC and high voltage	C and very low voltage
26	The energy required for refining of gold in kWh / tone is about	100 to 150	250 to 350	300 to 350	350 to 400	300 to 350
27	On industrial scale sodium metal is prepared by electrolysis of fused	NaOH	NaCl	NaO	NH_3	NaCl
28	Electrolyte used for tin plating is	sulphide ore	stannous sulphate	hydrogen sulphate	sodium chloride	stannous sulphate
29	When zinc is plated on steel, anode is made up of	steel	oxygen	zinc	carbon	zinc
30	If the containerof ball mill is more than half filled, the efficiency of milling is	increased	reduced	same	zero	reduced
31	_____ mass ratio of balls to material is advisable	3:01	4:01	2:01	1:01	2:01
32	If surface area of liquid is large then evaporation will be	small	large	moderate	none of above	large
33	Changing of a liquid into vapours from surface of liquid without heating it is called	expansion	contraction	evaporation	fusion	evaporation
34	Evaporation from surface of any liquid depends on	temperature	wind	nature of liquid	all of above	all of above
35	Evaporation causes	cooling	heating effect	increase in weight	increase in density	cooling

36	Evaporation takes place at	freezing point	boiling point	In between freezing point and boiling point	at all temperatures	at all temperatures
37	Lithography was invented by _____ in 1798.	Alois Senefelder	John Denver	Manuel Neuer	Billy Armstrong	Alois Senefelder
38	The surface is treated with a _____ that is soaked into the image area, but avoided the H2O treated, non-image area.	Polar ink	Non-polar ink	Silk screen	Pressure screen	Non-polar ink
39	Lithography is:	Process used to transfer a pattern to a layer on the chip	Process used to develop an oxidation layer on the chip	Process used to develop a metal layer on the chip	Process used to produce the chip	Process used to transfer a pattern to a layer on the chip
40	The system utilised to apply the H2O solution to the plate surface is called the _____	Dissociating system	Dampening system	H2O hating system	Littering	H2O hating system
41	Dot gain in the mid tones is said to be about _____ lower than with conventional lithography.	10%	20%	30%	40%	10%
42	Silicon oxide is patterned on a substrate using:	Physical lithography	Photolithography	Chemical lithography	Mechanical lithography	Photolithography
43	The chemical used for shielding the active areas to achieve selective oxide growth is:	Silver Nitride	Silicon Nitride	Hydrofluoric acid	Polysilicon	Silicon Nitride
44	An _____ is a sol with the continuous phase a gas. Fog is an _____ of water droplets.	Aerosol	Emulsion	Agglomerate	Electrophoresis	Aerosol
45	An _____ is a sol in which the suspended particles are liquid droplets and the continuous phase is also a liquid. The 2 phases are	Aerosol	Emulsion	Agglomerate	Electrophoresis	Emulsion

	immiscible, otherwise a solution would form.					
46	A _____ is a sol of solid particles scattered in a liquid. Foam is a colloidal system in which gas bubbles dispersed in a liquid or solid.	Colloidal suspension	Streaming potential	Sedimentation potential	Electrophoresis	Colloidal suspension
47	The _____ of colloids are of maximum importance since the interaction of the particles with each other and the principal phase is of primary concern.	Magnitude	Shape	Surface	Size	Surface
48	As the concentration increases to the critical micelle concentration(C.M.C.) soap particles abruptly collected into spherical structures called _____	Ball	Sphere of ions	Micelles	Dirt particle	Micelles
49	_____ is the charged field generated by charged particles moving in a stationary liquid.	Colloidal suspension	Emulsion	Sedimentation potential	Electrophoresis	Sedimentation potential
50	When tiny particles of a substance are dispersed through medium then mixture is called	alloys	amalgams	suspension	colloid	colloid
51	Particle size in suspension is	less than 10^3 nm	10^2 nm	greater than 10^3	10 nm	less than 10^3 nm
52	What is the best description of blood?	sol	foam	solution	aerosol	sol
53	Which of the following is a characteristic of a horizontal tube evaporator?	Agitation is provided only by bubbles leaving the evaporator as vapor	The tube bundle is arranged vertically, with the solution inside the tubes condensing outside	To handle viscous solution a pump is used to force liquid upwards	Also called short vertical tube evaporator	Agitation is provided only by bubbles leaving the evaporator as vapor
54	Which of the following is not an assumption in the evaporator model?	The feed has only one volatile	Only the latent heat of vaporization is	Boiling action in heat exchanger	Overall temperature driving force is	Overall temperature driving force is the temperature that of

		components	available for heating the solution	ensures perfect mixing	the temperature that of saturated steam	saturated steam

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DEPARTMENT OF PHYSICS

UNIT III (Objective Type/Multiple choice Questions each Questions carry one Mark)

NANOMATERIALS AND APPLICATIONS

PART –A(Online Examination)

S.No.	QUESTIONS	opt1	opt2	opt3	opt4	ANSWER
1	The full form of STM is...	Scanning Tunneling Microscope	Scientific Technical Microscope	Systematic Technical Microscope	Super Tensile Microscope	Scanning Tunneling Microscope
2	What does 'F' stand for in AFM?	Fine	Front	Force	Flux	Force
3	X-rays have larger wavelengths than which of the following?	Gamma rays	Beta rays	Microwave	Visible light	Gamma rays
4	X-ray diffraction patterns are used for studying crystal structure of solids because	They have very high energy, hence they can penetrate through solids	They are electromagnetic radiation, and hence do not interact with matter (crystals)	Their wavelengths are comparable to inter-atomic distances	Their high frequency enables rapid analysis	Their wavelengths are comparable to inter-atomic distances
5	For destructive interference to take place, the path difference between the two waves should be:	$n\lambda$	$2n\lambda$	$(n + 1/2)\lambda$	$(2n + 1)\lambda$	$n\lambda$
6	Minimum interplanar spacing required for Bragg's diffraction is:	$\lambda/4$	$\lambda/2$	λ	2λ	$\lambda/2$
7	In Bragg's equation [$n\lambda = 2.d.\sin\theta$], θ is the angle between:	specimen surface and incident rays	normal to specimen surface and incident rays	parallel lattice surfaces d distance apart	normal to parallel lattice surfaces d	parallel lattice surfaces d distance apart

				and incident rays	distance apart and incident rays	and incident rays
8	In the powder method of XRD, the intensities of various bright lines are compared to determine the crystal structure. For simple cubic lattice the ratio of intensities at first two maxima are:	1⁄2	3⁄4	1⁄4	1	1⁄2
9	X-ray diffractometers are not used to identify the physical properties of which of the following?	Metals	Liquids	Polymeric materials	Solids	Liquids
10	X-ray diffractometers provide _____ information about the compounds present in a solid sample.	Quantitative	Qualitative	Quantitative and qualitative	Either quantitative or qualitative	Quantitative and qualitative
11	Using powder method of diffractometers, which of the following can be determined?	Percentage of K+	Percentage of Na+ and Cl-	Percentage of KBr and NaCl	Percentage of Br-	Percentage of KBr and NaCl
12	In powder method, the powder sample is contained in which of the following?	Thin walled glass capillary tubes	Thin walled test tube	Thin walled curvettes	Thin walled flask	Thin walled glass capillary tubes
13	Which of the following is the most common instrument for photographic recording of diffraction patterns?	Debye-Scherrer powder camera	Gamma camera	Geiger tube	Scintillation counter	Debye-Scherrer powder camera
14	With the help of which of the following equations is the distance calculated from known wavelength of the source and measured angle?	Coolidge equation	Bragg's equation	Debye equation	Scherrer equation	Bragg's equation
15	In Diffractometer, the identification of a component of the sample from its powder diffraction pattern is based upon the _____ of lines and their relative _____.	Number, length	Number, intensity	Position, length	Position, intensity	Position, intensity
16	Diffractometers are similar to which of the following?	Optical grating spectrometer	Prism spectrometer	Photo multiplier	Photovoltaic cell	Optical grating spectrometer
17	In Diffractometers, line intensities depend on _____ and kind of atomic reflection centres in each set of plates.	Number	Position	Length	Distance between lines	Number
18	In powder diffractometer, the sharpness of the lines is greatly determined by which of the	Quality of the sample, size of the	Quality of the slit, size of the sample	Thickness of the slit, amount of	Number of slits,	Quality of the slit, size of the

	following?	slit		the sample	composition of the sample	sample
19	X-Rays are	magnetic radiation	electric radiation	electromagnetic radiations	chemical radiations	electromagnetic radiations
20	Kind of electron microscope which is used to study internal structure of cells is	scanning electron microscope	transmission electron microscope	light microscope	compound microscope	transmission electron microscope
21	Electrons of Scanning Electron Microscope are reflected through	glass funnel	specimen	metal-coated surfaces	vacuum chamber	metal-coated surfaces
22	Magnification of light microscope is	1500X	2000X	1000X	2500X	1500X
23	Photograph which is taken from microscope is known as	macrograph	monograph	micrograph	pictograph	micrograph
24	Object can be magnified under electron microscope about	350, 000 times	250, 000 times	300, 000 times	450, 000 times	300, 000 times
25	Which of the following is used in electron microscope?	electron beams	magnetic fields	light waves	electron beams and magnetic fields	electron beams and magnetic fields
26	Electron Microscope can give a magnification up to _____	400,000X	100,000X	15000X	100X	400,000X
27	Which of the following are true for electron microscopy?	specimen should be thin and dry	image is obtained on a phosphorescent screen	electron beam must pass through evacuated chamber	specimen should be thin and dry, image is obtained on a phosphorescent screen and electron beam must pass through evacuated chamber	specimen should be thin and dry, image is obtained on a phosphorescent screen and electron beam must pass through evacuated chamber
28	Degree of scattering in transmission electron microscope is a function of _____	wavelength of electron beam used	number of atoms that lie in the	number and mass of atoms	mass of atoms that lie in the	number and mass of atoms

			electron path	that lie in the electron path	electron path	that lie in the electron path
29	Which among the following helps us in getting a three-dimensional picture of the specimen?	Transmission Electron Microscope	Scanning Electron Microscope	Compound Microscope	Simple Microscope	Scanning Electron Microscope
30	The secondary electrons radiated back in scanning microscope is collected by?	specimen	anode	vacuum chamber	cathode	anode
31	On what factors do the intensity of secondary electrons depends upon?	shape of the irradiated object	chemical composition of the irradiated object	number of electrons ejected	size and chemical composition of the irradiated object, number of electrons ejected and on the number of electrons reabsorbed by surrounding	size and chemical composition of the irradiated object, number of electrons ejected and on the number of electrons reabsorbed by surrounding
32	Where do we obtain the magnified image of the specimen in SEM?	cathode ray tube	phosphorescent screen	anode	scanning generator	cathode ray tube
33	Which of the following techniques are used in Transmission Electron Microscopy (TEM) for examining cellular structure?	Negative-Staining	Shadow Casting	Ultrathin Sectioning	Negative-Staining, Shadow Casting, Ultrathin Sectioning, Freeze-Etching	Negative-Staining, Shadow Casting, Ultrathin Sectioning, Freeze-Etching
34	In Electron microscope, light source is replaced by a beam of very fast moving	electron	neutron	proton	photon	electron
35	Electrons are sub-atomic particles that rule outer part of the	photon	particle	atom	molecule	atom
36	When maintaining the microscope what is used to clean the lenses?	Oil	Water	Alcohol	Detergent	Alcohol
37	What device is used to test the optics of the high	Stage magnometer	Stage micrometer		Glass slide	Stage

	power lens			Haemocytometer		micrometer
38	When maintaining the microscope, which is NOT an essential step?	Clean off grease and spills	Blow away dust	Oil the mechanics and moving parts	Wash the base and arm	Wash the base and arm
39	Which of the following components on a light microscope should be focused first?	The two eye pieces	Objective lenses	Condenser	Revolving nosepiece	The two eye pieces
40	Which of these objectives should be used to first view the specimen?	X10	X40	X4	X100	X4
41	What is the correct name for the main microscope lens that focuses the image?	Ocular	Binocular	Objective	Condenser	Objective
42	What is the correct name for the microscope lens located in the eyepiece?	Ocular	Binocular	Objective	Condenser	Ocular
43	If the eyepiece magnification on light microscope is x10 and the objective is x40, what is the overall magnification?	x10	x40	x400	x4	x400
44	Kind of electron microscope which is used to study internal structure of cells is	scanning electron microscope	transmission electron microscope	light microscope	compound microscope	transmission electron microscope
45	Electrons of Scanning Electron Microscope are reflected through	glass funnel	specimen	metal-coated surfaces	vacuum chamber	metal-coated surfaces
46	Object can be magnified under electron microscope about	350, 000 times	250, 000 times	300, 000 times	450, 000 times	300, 000 times
47	How is the wavelength controlled in an FTIR spectrometer?	By a Michelson Interferometer	By a computer	By a laser	By calibration with a standard sample	By a laser
48	What type of technique is FTIR spectroscopy?	A dispersive technique?	An emission technique	An absorbance technique	A UV-Vis technique	An absorbance technique
49	What does the spectrum of Nitrogen(N2) look like?	The same as that of air	It has only p- and r-branches	The same as that of carbon monoxide	It doesn't have one!	It doesn't have one!
50	What occurs when the moving mirror in an FTIR spectrometer is the same distance from the beamsplitter as the static mirror?	Constructive interference	Destructive interference	Radio interference	The spectrum is measured	Constructive interference

51	In what region of the spectrum does infrared radiation occur?	At the low-energy end	Between the visible and ultraviolet regions	Between the visible and microwave regions	Between the visible and x-ray regions	Between the visible and microwave regions
52	What occurs when a molecule absorbs infrared radiation?	It warms up	It flies around	It spins faster	It vibrates faster	It vibrates faster
53	Which of the following is not true about Fourier Transform Infrared (FTIR) spectrometer?	It is of non-dispersive type	It is useful where repetitive analysis is required	Size has been reduced over the years	Size has increased over the years	Size has increased over the years
54	Which of the following is not the advantage of Fourier Transform Spectrometers?	Signal to noise ratio is high	Information could be obtained on all frequencies	Retrieval of data is possible	Easy to maintain	Easy to maintain
55	In which region of the electromagnetic spectrum does an absorption at 600 nm come?	Vacuum-UV	Visible	near UV	infrared	Visible
56	What is a red shift?	The shifting of an absorption towards the blue end of the spectrum	The shifting of an absorption to higher energy.	The shifting of an absorption to lower energy	The shifting of an absorption to shorter wavelength	The shifting of an absorption to lower energy
57	Why is the computer necessary in Fourier Transform Spectrometer?	To display the detector output	To process the detector output	To determine the amplitude	To determine the frequency	To process the detector output
58	What is the wavelength range for UV spectrum of light?	400 nm – 700 nm	700 nm to 1 mm	0.01 nm to 10 nm	10 nm to 400 nm	10 nm to 400 nm
59	Which of the following has to be computed to determine transmittance and absorbance at various frequencies?	Ratio of signal and noise	Ratio of sample and reference spectra	Sample spectra	Reference spectra	Ratio of sample and reference spectra

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DEPARTMENT OF PHYSICS

UNIT IV (Objective Type/Multiple choice Questions each Questions carry one Mark)

NANOMATERIALS AND APPLICATIONS

PART –A(Online Examination)

S.No.	QUESTIONS	opt1	opt2	opt3	opt4	ANSWER
1	When the size of the material decreases , the band gap energy _____	increases	decreases	remains constant	zero	increases
2	The Fermi energy of the metal are in the order of _____	5 MeV	5 eV	5 KeV	5 meV	5 eV
3	Quantum effects mainly occurs at _____	conductor	metal	Metal or Semiconductors Nanocrystal	insulator	Metal or Semiconductors Nanocrystal
4	This Coulomb blockade behaviour is also called as _____	maxwell staircase	quantized	ballistic	Coulombic staircase	Coulombic staircase
5	The dimension of the nanomaterials reduced to de-Broglie wavelength, the semiconductor nanomaterials changes to _____	conductor	metal	Metal or Semiconductors Nanocrystal	insulator	insulator
6	The size of the nanocrystal _____ than the de-Broglie wavelength, _____ energy levels formed	Smaller, Discrete	Larger, Discrete	Smaller, continuous	Larger, continuous	Smaller, Discrete
7	How does a semiconductor behave at absolute zero?	conductor	protection device	Semiconductors	insulator	insulator
8	How is the resistance of semiconductor classified?	High resistance	Positive temperature co-efficient	Negative temperature co-efficient	Low resistance	Negative temperature co-efficient

9	The threshold for indirect absorption occurs at wavelength _____	3.01 μm	2.09 μm	0.92 μm	1.09 μm	1.09 μm
10	The semiconductor material for which the lowest energy absorption takes place is :	GaAs	Silicon	GaSb	Germanium	Germanium
11	_____ materials are potentially superior to germanium.	GaAs	Silicon	GaSb	III – V alloys	III – V alloys
12	If the absorption of electromagnetic radiation by matter results in the emission of radiation of same or longer wavelengths for a long or a short time, the phenomenon is termed as which of the following?	Luminescence	Fluorescence	Phosphorescence	Spontaneous emission	Luminescence
13	Prompt emission of X-ray by an atom ionised by a higher energy X-ray is a type of which of the following phenomena?	Luminescence	Fluorescence	Phosphorescence	Spontaneous emission	Fluorescence
14	In X-ray fluorescence spectrometer, the relationship between the excitation intensity and the intensity of fluorescence does not depend on which of the following?	Spectrum of the incident radiation	Angle of radiance	Molecular weight	Incident angle	Incident angle
15	Fluorescence occurs within _____.	10-5 s	10-5 ms	10-5 μs	10-5ns.	10-5 ms
16	_____ alloys can be fabricated in hetero-junction structures.	InGaSb	III – V alloys	InGaAsP	GaAsSb	III – V alloys
17	The alloys lattice matched to InP responds to wavelengths up to 1.7μm.	InAsSb	III – V alloys	InGaSb	InGaAs	InGaAs
18	Which phenomenon is related to the term radiation?	magnetic phenomenon	gravity	electromagnetic phenomenon	none of the above	
19	Thermal radiation takes place from a body by electromagnetic waves as a result of	the weight of the body	the magnetic power of the body	the temperature of the body	none of the above	electromagnetic phenomenon
20	Rate of transfer of energy by radiation can be increased by	increasing the surface temperature	decreasing the surface area	using shiny white surfaces instead of dull and black surfaces	decreasing the atmospheric pressure	the temperature of the body
21	Thermal energy that reaches surface of earth	Conduction	Convection	Radiation	Conduction and	increasing the

	from sun, is transferred through process of				convection	surface temperature
22	Which of the following is not an example of nanoscience in nature?	Hydrophobic surface of a lotus plant	Hydrophylic surface of a pitcher plant	Sticky pads on the bottom of an ant's foot	Gold that can stretch to form flexibile electronics	Gold that can stretch to form flexibile electronics
23	Which of the following is used to observe the unseen?	Hydrophobocity Microscopes	Magnetos	Atomic Force Tunnelers	Scanning Tunneling Microscopes	Scanning Tunneling Microscopes
24	Nano wires are used in_____	Transistors	Resistors	Capacitors	Transducers	Transistors
25	Nano cones are the predominant structures made with _____	Carbon	Nitrogen	Hydrogen	Silicon	Carbon
26	As per Coulomb's law, force of attraction or repulsion between two point charges is directly proportional to	sum of the magnitude of charges	square of the distance between them	product of the magnitude of charges	cube of the distance	product of the magnitude of charges
27	Electric charges under action of electric forces is called	electrostatic	electric flux	electric field	electric field lines	electrostatic
28	The absorption of photons in a photodiode is dependent on:	Absorption Coefficient α0	Properties of material	Charge carrier at junction	Amount of light	Absorption Coefficient α0
29	The absorption coefficient of semiconductor materials is strongly dependent on	Properties of material	Wavelength	Amount of light	Amplitude	Wavelength
30	In optical fiber communication, the only weakly absorbing material over wavelength band required is:	GaAs	Silicon	GaSb	Germanium	GaSb
31	The threshold for indirect absorption occurs at wavelength _____	3.01 μm	2.09 μm	0.92 μm	1.09 μm	1.09 μm
32	The semiconductor material for which the lowest energy absorption takes place is :	GaAs	Silicon	GaSb	Germanium	Germanium
33	_____ photodiodes have large dark currents.	GaAs	Silicon	GaSb	Germanium	GaSb
34	A photodiode should be chosen with a _____ less than photon energy.	Direct absorption	Band gap energy	Wavelength range	Absorption coefficient	Absorption coefficient
35	_____ materials are potentially superior to germanium.	GaAs	Silicon	GaSb	III – V alloys	III – V alloys

36	_____ alloys can be fabricated in hetero-junction structures.	InGaSb	III – V alloys	InGaAsP	GaAsSb	III – V alloys
37	_____ alloys such as InGaAsP and GaAsSb deposited on InP and GaSb substrate.	Ternary	Quaternary	Gain-guided	III – V alloys	Ternary
38	The alloys lattice matched to InP responds to wavelengths up to 1.7μm.	InAsSb	III – V alloys	InGaSb	InGaAs	InGaAs

KARPAGAM ACADEMY OF HIGHER EDUCATION

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(For the candidates admitted from 2016 onwards)

DEPARTMENT OF PHYSICS

UNIT V (Objective Type/Multiple choice Questions each Questions carry one Mark)

NANOMATERIALS AND APPLICATIONS

PART –A(Online Examination)

S.No.	QUESTIONS	opt1	opt2	opt3	opt4	ANSWER
1	Process of emission of electrons from hot metal surfaces is called	plastic emission	thermionic emission	static emission	current emission	thermionic emission
2	At room temperature, electron cannot escape metal surface due to	attractive forces of nucleus	repulsive forces of electrons	repulsive forces of nucleus	pulling force of protons	attractive forces of nucleus
3	One of the applications of Bulk micromachining is :	SAW sensor	Resonant sensor	Temperature sensor	Pressure sensor	Resonant sensor
4	.....method removes material through erosive action:	Diamond milling	Soft lithography	Micro-electro discharge machining	Powder blasting	Micro-electro discharge machining
5	Which of the following are the three most widely used micromachining processes	Bulk, surface, PMMA	Surface, bulk, LIGA	PMMA, LIGA, surface	LIGA, CMP, surface	Surface, bulk, LIGA
6	Which of the following MEMS components would LEAST likely be fabricated using bulk micromachining processes?	Cantilevers	Microfluidic channels	Probes	Gear trains	Gear trains
7	Photoresist is to surface micromachining as _____ is to LIGA.	Beryllium	Gold	KOH	Plexiglas or PMMA	Plexiglas or PMMA
8	Which choice below best describes the goal for nanotechnology advances in medicine?	To improve technology for finding cures	Aid the FBI for investigative methods	Improve the application of cosmetics	Increase food production	To improve technology for finding cures

9	What can nanotechnology best help with for consumer products?	Produce floating devices	Reduce the size of devices	Make stuff light up	Larger and stronger materials	Reduce the size of devices
10	Why are nanoelectronic devices a less expensive alternative to the design of current electronic devices?	They are slower operating	They require less parts and materials	They are less reliable	They are more vulnerable to viral software	They require less parts and materials
11	The components fabricated using surface micromachining are _____ aspect ratio components relative to other micromachining processes.	Low	medium	high	ultra high	Low
12	Particles emitted from hot cathode surface are	negative ions	positive ions	protons	electrons	electrons
13	One of the most used kinds of lasers in microfabrication is:	Excimer	Diamond milling	Bulk micromachining	Pressure sensor	Excimer
14	Which of then following is example of direct access?	magnetic disc	floppy disc	program tape	plain disc	magnetic disc
15	Interest of increasing wafer diameter from 200 mm to 300 mm	The price of a 300 mm wafer is lower	It is easier to fabricate	To produce more silicon devices from a single wafer	To increase the size of a die	To produce more silicon devices from a single wafer
16	If a single walled CNT is semiconducting, the bandgap scales with ----------	the value of diameter, d	the square value of diameter, d2	the reciprocal value of diameter, 1/d	the reciprocal square value of diameter, 1/d2	the reciprocal value of diameter, 1/d
17	The term photo voltaic comes from _____	spanish	greek	german	english	greek
18	The term photo voltaic is in use since _____	1840	1844	1849	1850	1849
19	When the source of light is not sun light then the photo voltaic cell is used as _____	Photo diode	Photo voltaic cell	Photo detector	Photo transmitter	Photo detector
20	Solar cells are made from bulk materials that are cut into wafer of _____ thickness	120-180μm	120-220μm	180-220μm	180-240μm	180-240μm
21	_____ photo voltaic devices in the form of thin films.	Cadmium Telluroide	Cadmium oxide	Cadmium sulphide	Cadmium sulphate	Cadmium Telluroide
22	_____ is a direct band gap material	Copper Indium Gallium Selenide	Copper Selenide	Copper Gallium Telluride	Copper Indium Gallium Diselenide	Copper Indium Gallium Selenide

23	Dye-sensitized solar cells are made from _____ organic dye.	Ruthium melallo	Aniline	Safranine	Induline	Ruthium melallo
24	Quantum dot solar cells are based on _____	Gratzel cell	Solar cell	Voltaic cell	Galvanic cell	Gratzel cell
25	The quantum dot used are	CdS	CdTe	PbO	GaAs	CdTe
26	the cathode and the anode of the diode are referred to as	emitter and collector	electrode	terminals	connections	emitter and collector
27	_____ entering the structure from the emitter is described by the wavefunction	proton	electron	neutron	photon	electron
28	the lifetime of an electron in the well equals	5 x 10-12s	5 x 10-12μs	5 x 10-12ms	5 x 10-12ns	5 x 10-12s
29	The widths of the quantum wells are equal to	36 Å	46 Å	56 Å	66 Å	46 Å
30	The heights of the barriers vary from _____	0.3 eV to 1.2 V	0.3 eV to 1.2 eV	0.3 eV to 1.2 mV	0.3 eV to 1.2 MeV	0.3 eV to 1.2 eV
31	For asymmetric barriers, the maximum transmission at $E_\perp = \varepsilon_n$ is _____	positive	unity	less than unity	negative	less than unity
32	The process responsible for the resonant-tunneling effect is the so-called	sequential tunneling process	quantum tunneling process	tunneling process	differential process	sequential tunneling process
33	For the lower temperature, there is _____ current at finite voltage biases	positive	negative	unit	almost zero	almost zero
34	As of public record at the end of 2002, which country was making the greatest annual investment in molecular nanotechnology research?	Russia	Japan	China	India	Japan
35	What is the term used in the field of nanotechnology to describe an as-yet theoretical device that "will be able to bond atoms together in virtually any stable pattern?"	Stacker	Replicator	Assembler	Constructor	Assembler
36	What is the general name for the class of structures made of rolled up carbon lattices?	Nanorods	Nanotubes	Nanosheets	Fullerrods	Nanotubes
37	The efficiency of the solar cell is about	25%	15%	40%	60%	15%
38	The output of the solar cell is of the order	0.1W	1W	10W	100W	1W
39	What is the maximum possible output of a solar array?	300 W/m2	100 W/m2	250 W/m2	500 W/m2	250 W/m2

40	The current density of a photo voltaic cell ranges from	10 – 20 mA/cm2	40 – 50 mA/cm2	20 – 40 mA/cm2	60 – 100 mA/cm2	40 – 50 mA/cm2
41	Optical switching can be classified into _____ categories.	Two	Three	Four	One	Two
42	_____ are the array of switches which forms circuit switching fabrics.	Packet arrays	Optical cross connects	Circuit arrays	Optical networks	Optical cross connects
43	What is the main disadvantage of OCS?	Regenerating mechanism	Optical session	Time permit	Disability to handle burst traffic	Disability to handle burst traffic
44	How many functions are performed by an optical packet switch?	4	3	2	1	4
45	_____ provides data storage for packets to resolve contention problems.	Switching	Routing	Buffering	Reversing	Buffering
46	_____ provides efficient designation, routing, forwarding, switching of traffic through an optical packet-switched network.	Label correlation	Multiprotocol label switching	Optical correlation	Routing	Multiprotocol label switching
47	_____ mode is temporary, selective and continuous.	Cell switching	Buffer switching	Cache	Circuit switching	Circuit switching
48	_____ refers to the process whereby a node finds one or more paths to possible destinations in a network.	Routing	Framing	Lightning	Cloning	Routing