JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATIONS-2022

B.Tech-VI Semester (BT)

COURSE CODE (CREDITS): L-18B1WBT633 MAX. MARKS: 35

COURSE NAME: Nano-Biotechnology

COURSE INSTRUCTORS: Dr. Abhishek MAX. TIME: 2 Hours

Note: *All questions are compulsory. Marks are indicated against each question in square brackets.*

Q 1.Various drug delivery approaches can be used to maximize therapeutic efficacy and minimize side effects. To achieve desired targeted therapy, detail out the various requirements of (a) drug candidate, (b) drug carrier and (c) targeted moieties to be selected for formulation into targeted drug delivery system and also write the concept of active targeting of drug. [6] [CO4]

Q 2.In a road accident, Patient –X suffered a full thickness wound with an area of about 7.5cm x 3.5 cm to the skin of their forearm. Describe an experimental strategy to engineer a 3D tissue, to heal this deep wound considering (a) cell type and isolation (b) biomaterial and scaffold (c) signalling molecule or growth factor. Also mention the advantages of natural scaffold over synthetic scaffold [7] [CO4]

Q 3.Mercury (Hg) has been widely recognized as the major environmental pollutant (water pollutant) in all of its physical and chemical forms which causes toxic effects and leads to serious and permanent damage of the central nervous system. Describe a experimental strategy to develop a colorimetric sensor for the detection of mercury considering the sensitivity and selectivity of the sensor [5] [CO5]

Q 4.For NMR analysis, it is recommended to use D_2O instead of H_2O why?, give some more name of the solvent which can be used in NMR spectroscopy.

After NMR spectral analysis a students would like to calculate the chemical shift of a compound using TMS as an internal standard. He observed a peak at 765.5 Hz downfield of TMS on a spectrum recorded using a 120 MHz NMR spectrometer. Calculate the value of chemical shift to help the student. Also explain the significance of Zeeman Effect in NMR spectroscopy [5] [CO3]

Q 5.A research scholar purified two compound $CH_2ClCOCH_2Cl$ and CH_3CH_2Cl respectively. Find out the splitting pattern of both these compound [2] [CO3]

Q 6.The quantum yield for the decomposition of a compound X is 0.3. In an experiment 0.01 moles of the compound X are decomposed. Calculate the number of photons absorbed by the compound. [3] [CO3]

Q 7.Scanning electron microscope is one of the important techniques in nanomaterial characterization and produces images of a sample by scanning the surface with a focused beam of electrons. Write the concept and design of SEM and list out its similarity with confocal microscope.[3] [CO3]

Q 8.A student has 7.2 ml of paint and he would like to paint an area with 1 nm thickness, how much area he will paint. [2] [CO1]

Q 9.Nanomaterial can be synthesized by physical methods, Chemical methods and Biologicals methods. All these methods have their own advantages and disadvantages, which methods you will prefer to synthesize metallic nanoparticles for targeted drug delivery system and why? [2] [CO2]

B Examinations Only