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VI SEMESTER B.TECH. BIOTECHNOLOGY

END SEMESTER EXAMINATIONS, APRIL/MAY 2017

SUBJECT: GENOMICS & PROTEOMICS [BIO 4005]

REVISED CREDIT SYSTEM
(29/04/2017)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitable assumed.

1A.	In Pyrosequencing, mention the role of apyrase enzyme and also why deoxyadenosine alpha-thio triphosphate (dATPαS) is used as a substitute for the natural deoxyadenosine triphosphate (dATP)?	**4**
1B.	Explain and illustrate Strand Displacement Amplification (SDA)	**4**
1C.	What is the effect of having repeats of CAG related to human genome & personalized medicine.	**2**
2A.	Detail the functional consequences of RNA editing mechanism with examples	**5**
2B.	In what way nanopore and ion-torrent sequencing are different from other NGS techniques?	**2**
2C.	High specificity binding as between antibody and antigens or transcription factor and DNA are often in the nanomolar (10^{-9} M) range. However, the affinity could be even higher, as some antibodies-antigen complexes have K_d values as low as 10^{-11} M. The strongest biomolecular complex is that between avidin and biotin that is frequently used as a connecting adaptor in biotechnological and nanotechnological applications. What is K_d value? To which interaction, we can compare avidin-biotin binding?	**3**
3A.	Detail the different target enrichment techniques in WES.	**5**

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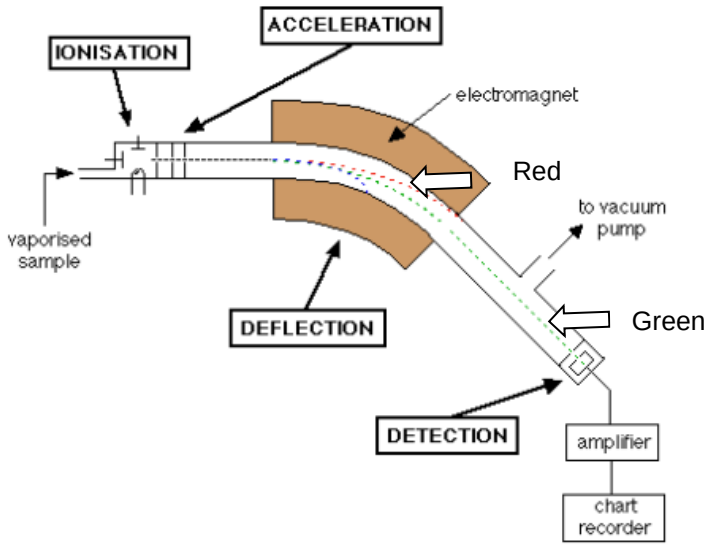
3B.	What is the common phenomenon occurring in DNA methylation and restriction digestion. Explain it.	**2**
3C.	Using WES, detail the somatic mutation detection between normal and cancer pairs with a neat sketch.	**3**
4A.	Protein post-translational modification (PTM) increases the diversity of proteome functions by covalent addition of functional groups, proteolytic cleavage of regulatory subunits or degradation of entire proteins. Among these PTM's, methylation and proteolytic cleavage possess major role, detail the roles of these modifications and the difference between the two.	**4**
4B.	Our cells contain essential information to make a complete human being. However not all genes are expressed in all the cells. Explain with an example about the enzymes or proteins that are expressed in all cells and the enzymes or proteins that are not expressed in all cells.	**2**
4C.	What two properties of the ions determine how much they are deflected by the magnetic field? What effect does each of these properties have on the amount of deflection? Of the three different ion streams in the diagram above, why is the red one least deflected? What would you have to do to focus the red stream on the detector?  	**4**
5A.	Why is it important that there is a vacuum in the M/S instrument?	**2**

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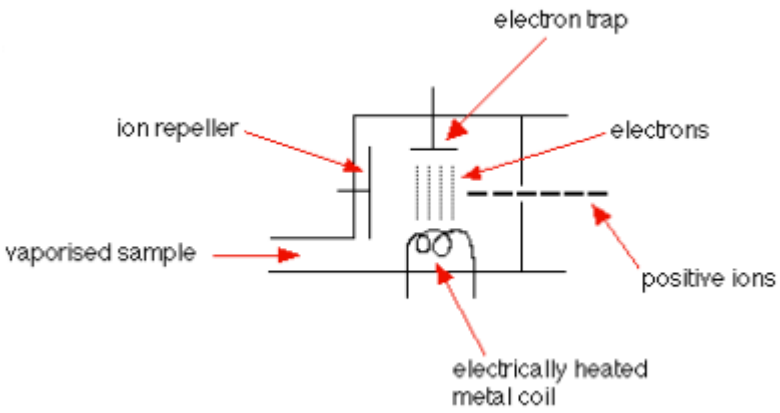
5B.	Explain what is happening in the ionisation part of the spectrometer which looks like this in close-up.  	**4**
5C.	What is the role of cyanogen bromide in protein cleavage?	**4**