DPP
DAILY PRACTICE PROBLEMS

CLASS : XIth
DATE :

Solutions

SUBJECT : BIOLOGY
DPP No. : 9

Topic :- MOLECULAR BASIS OF INHERITANCE

1. (A) Total DNA = 3.2 Kbp = 3200 bp
Adenine = 820
According to Chargaff's rule
[A] = [T], [G] = [C]
So, Thymine = 820
Therefore, total A + T content = 820 + 820 = 1640
Also, A + T = 3200 – (G + C)
So, G + C content = 3200 – 1640 = 1560
So,

2. (B) The technique of DNA fingerprinting involves following steps :
(i) Isolation of DNA from sample cell.
(ii) Amplification of DNA using polymerase chain reaction (PCR), (if DNA is less in amount).
(iii) Digestion of this DNA by restriction endonucleases (C).
(iv) These DNA fragments are electrophoresed in agarose gel. These fragments can be visualised using EtBr-UV system (A).
(v) Separated DNA fragments are transferred to nitrocellulose membrne using. Solution Blotting (E).
(vi) Probing for VNTRs is done using labelled DNA probes (B).
(vii) The hybridised fragment can be detected by autoradiography (D).

3. (C) During transcription, one of the two DNA strand functions as template strand and the other functions as coding strand. Template strand serves as template for transcription whereas coding strand does not take part in transcription. Hence, the *m*RNA produced has base sequence complementary to template strand while similar to coding strand except that thymine (T) is replaced by uracil (U).
Here,
Coding strand → 5′ GTTCGAGTC 3′
Template strand → 5′ CAAGCTCAG 3′
Transcript → 5′ GUUCGAGUC 3′

4. (A) Nucleosome is a structural unit of a eukaryotic chromosome which consists of a length of DNA coiled around a core of histones and are thought to be present only during interphase of cell cycle. In the given figure of nucleosome structure, the parts
marked asA, Band C are respectivelyDNA, H1 histones and histone octamer.

5. (A) A-III, B-IV, C-I, D-V, E-II
UUU – Phenylalanine
GGG – Glycine
UCU – Serine
CCC – Proline
AUG – Methionine

6. (A)

7. (A)

8. (A)

9. (A) DNA replication is the process of forming carbon copy of DNA whereas transcription is the formation of RNA from DNA template.
DNA replication and transcription takes place in nucleus as the required material DNA and RNA are present in the nucleus. During transcription *m*RNA take the coded information from DNA to the cytoplasm where translation takes place. Translation is the process of protein synthesis. It is separated from transcription in both space and time. It prevents the intermixing of raw materials, protect DNA from respiratory enxymes and ribosomal machinery from nuclease.

10. (A)

11. (A) : Microsatellite DNA is form of highly repetitive DNA consisting of large number of very short base sequences scattered throughout the eukaryote genome. Each consists of short base sequence, generally 2-6 bp long. that is repeated 5-30 times in a tandem array at any given locus.

12. (B) A DNA molecule has two unbranched complementary strands which are spirally coiled. The two chains are antiparallel. i.e., they run parallel but in oposite direction , One chain has the polarity 5`→ 3` whereas, other has 3`→ 5`. Both are held together by hydrogen bonds between their bases i.e A = T and G =C and the amount of adenine is equal to thymine and guanine equals to cytosine. The base ratio A + T / G + C may vary from one species to another but is constant for a give species. The purine and pyrimidiners are always in equal amount (A+G=T+C) but A + T is not necessarily equal to G+C.

13. (A) The diagram given in the question shows central dogma in molecular biology. It was proposed by Francis Crick. It states that the genetic information flows from DNA → RNA → Protein . In some viruses the flow of information is in the reverse direction, that is , from RNA to DNA. DNA is formed from RNA with the help of enzme reverse transcriptase.

14. (D)

15. (C) : Two nucleosides are linked through 1-4 glycosidic linkage where the bond is normally formed betwewn the carbon 1 of one sugar and carbon 4 of other sugar. Chromatin is a substance of which eukaryotic chromosomes are composed. It consists of proteins (principally histones) DNA, and small amounts of RNA. The DNA molecule is wrapped around the histones to form a series of linked globular nucleosomes, resematin called heterochromatin, which stains densely with basic stains. The genes in the solenoid can only be transcribed if the solenoid unfolds to some extent, an expanded chromatin (Euchromatin) which is lighter staining.

16. (B) R- strian is rough and harmless, while S-strain is smooth and virulent form of streptococcus pneumoniae, In their experiment, Avery et al., Found out that only when DNA from S-type bacteria is added to a culture of R-type bacteria R-type get converted to S-type strain.This transformation of R into S-type did not occur on addition of carbohydrate or proteinfrom s-type bacteria. Moreover, in the first scenario, if DNase enzyme was added , i.e., 'R' strain + DNA from 'S' strain +DNase, transformation would not have occurred, proving conclusively that DNA, indeed is the genetic material.

17 (E)

18. (A) : RNA polymerase initiates and extends the RNA (chain elongation) and functions always in 5` to 3` direction. The structural component of DNA has 3` to 5` polarity. It is also called template DNA strand or antisense (-) strand.

19. (E)

20. (C)

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	A	B	C	A	A	A	A	A	A	A
Q.	11	12	13	14	15	16	17	18	19	20
A.	A	B	A	D	C	B	E	A	E	C