BLUE PRINT II

BIOLOGY

CLASS XII

S. No	Type of Questions ⟶ ↓ Units	VSA (1 mark)	SA II (2 marks)	SA I (3 marks)	LA (5 marks)	Total -
1.	Reproduction	2(2)	6(3)	6(2)	-	14(7)
2.	Genetic and Evolution	2(2)	2(1)	9(3)	5(1)	18(7)
3.	Biology in Human Welfare	1(1)	4(2)	9(3)	-	14(6)
4.	Biotechnology	2(2)	-	3(1)	5(1)	10(4)
5.	Ecology and Environment	1(1)	8(4)	-	5(1)	14(6)
	Total	**8(8)**	**20(10)**	**27(9)**	**15(3)**	**70(30)**

Sample Question Paper II
XII- Biology

Time : 3 Hours **Max. Marks : 70**

GENERAL INSTRUCTIONS :

1. *All questions are compulsory.*
2. *The question paper consists of four sections A, B, C and D. Section-A contains 8 questions of 1 mark each, Section B is of 10 questions of 2 marks each, Section C has 9 questions of 3 marks each whereas Section D is of 3 questions of 5 marks each.*
3. *There is no overall choice. However, an internal choice has been provided in one question of 2 marks, one question of 3 marks and all the three questions of 5 marks weightage. A student has to attempt only one of the alternatives in such questions.*
4. *Wherever necessary, the diagrams drawn should be neat and properly labelled.*

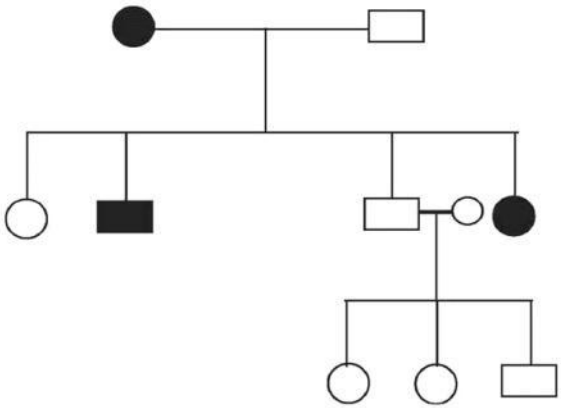
SECTION - A

(1) In the whiptail lizards only females are born generation after generation. There are no males. How is this possible? 1

(2) In the following figure of a fruit, label the part which is protective in function and that which is responsible for producing new plants. 1

(3) Which Mendel's law of inheritance is universally acceptable and without any exception? State the law. 1

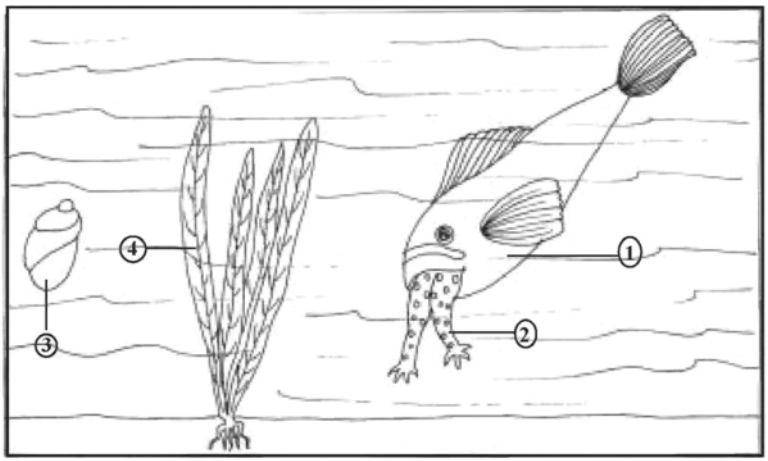
(4) In the following pedigree chart, state if the trait is autosomal dominant, autosomal recessive or sex linked. Give reason for your answer.



(5) Given below are pairs of disease and causative organism. Which out of these is not a matching pair and why?

Filariasis	:	*Wuchereria*
Ringworm	:	*Ascaris*
AIDS	:	Human immuno virus
Malaria	:	*Plasmodium*

(6) In the picture provided, what is the relationship between (1) and (2) with respect to population interaction and between (3) and (4) with respect to trophic levels.

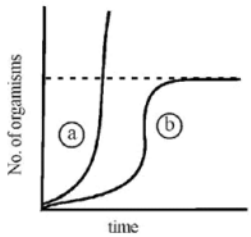


(7) Provide one word or one sentence information about 'plasmid' with respect to its (i) chemical nature and (ii) its duplication.

(8) Expand the following (i) PCR (ii) Bt

SECTION -B

(9) In the adjacent population growth curve, (i) What is the status of food and space in the curves (a) and (b)? (ii) In the absence of the predators, which curve (a) or (b) would appropriately depict the prey population?



(10) Given below is a sequence of steps of transcription in a eukaryotic cell.

Fill up the blanks (1, 2, 3, 4) left in the sequence.

OR

(10) Certain molecular processes are given in column (A). Provide the terms given to these processes in column (B), after selecting them from the terms: Recombination, gene regulation, prokaryotic, transcription, eukaryotic transcription, translation, replication, gene transfer, DNA fingerprinting

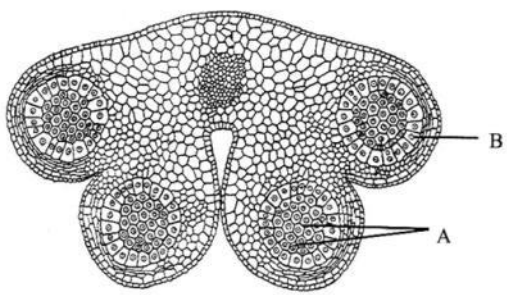
	Column A		Column B
(i)	DNA ⟶	DNA	
(ii)	DNA ⟶	hnRNA	
(iii)	mRNA ⟶	Protein	
(iv)	Repressor Protein + Operator ⟶	No transcription	

$\frac{1}{2} \times 4 = 2$

(11) In the following table the ecological units are mentioned in the first column vertically and their attributes are mentioned horizontally. Match the ecological units and its attribute and put a tick in the blanks within the table: 2

Attribute Ecological → Unit ↓	Age	Flow of Energy	Natality	Predator-prey relationship
Individual organism				
Population				
Community				
Ecosystem				

(12) In the T.S. of a mature anther given below **identify** "A" and "B" and **mention their function.**

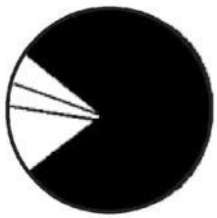


(13) In the table given below, select and enter one correct device out of the following :
Oral pill, condom, Copper T, Saheli, Vasectomy, Diaphragm, Tubectomy, Cervical cap

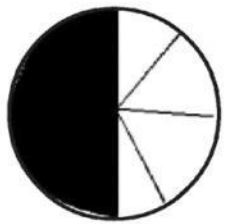
Method of birth control	Device
Barrier	
IUD	
Surgical Technique	
Administering Hormones	

(14) If the chromosome number of a plant species is 16, what would be the chromosome number and the ploidy level of the (i) microspore mother cell and (ii) the endosperm cells? 2

(15) In the pie charts (A) and (B) drawn below to show the global animal diversity, which groups of animals would you name and write on the areas shaded black in (A) and (B). In which kind of habitat would you find these groups of animals? 2



(A) INVERTERBRATES

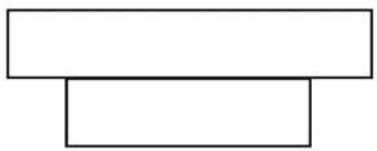


(B) VERTEBRATES

(16) In the pyramid of biomass drawn below,

a) name the two crops : (i) one which is supported and (ii) the one which supports.

b) In which ecosystem is such a pyramid found? (½ + ½ + 1) =2



(17) The steps in a programme are: 2

- Collection of germplasm
- Crossbreeding the selected parents
- Selecting superior recombinant progeny
- Testing, releasing and marketing new cultivars.

(i) What is this programmme related to?

(ii) Name two special qualities as basis of selection of the progeny.

(iii) What was the outcome of the programme?

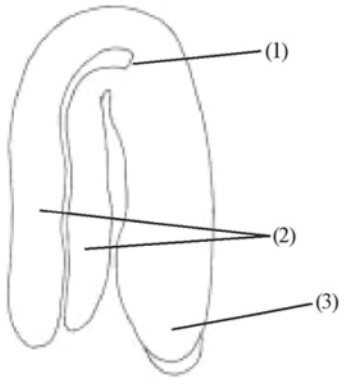
(iv) What is the popular term given to this outcome? Also name the Indian scientist who is credited with chalking out of this programme.

(18) What is measured in BOD test ? BOD level of three samples of water labelled as A, B and C are 30 mg/ *l* , 10 mg / *l* and 500 mg/*l* respectively. Which sample of water is most polluted ?

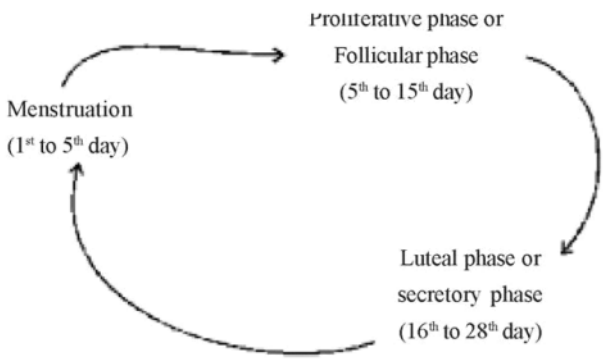
SECTION - C

(19) How are biofertilisers different from fertilisers such as NPK that we buy in the market? Justify the role of *Rhizobium* as a biofertiliser. 3

(20) In the adjacent figure of a typical dicot embryo, label the parts (1), (2) and (3). State the function of each of the labelled part. 3



(21) The events of the menstrual cycle are represented below. Answer the questions following the diagram.



(i) State the levels of FSH, LH and Progesterone simply by mentioning high or low, around 13th and 14th day and 21st to 23 rd day

(ii) In which of the above mentioned phases does the egg travel to the fallopian tube?

(iii) Why is there no menstruation upon fertilisation? 3

(22) Few gaps have been left in the following table showing certain terms and their meanings. Fill up the gaps. 3

	Terms	Meanings
(i)	-	Non coding sequence in eukaryotic DNA
(ii)	-	Technique used in solving paternity disputes
(iii)	Restriction endonuclease	_____
(iv)	Plasmid	_____
(v)	Transgenics	_____
(vi)	-	Nucleotide sequences with single base differences

(23) $A_{3'}$ _____ $_{5'}B$ 3

$C_{5'}$ _____ $_{3'}D$

AB and CD represent two strands of a DNA molecule.

When this molecule undergoes replication, forming a replication fork between A and C in the above.

(i) Name the template strands for replication.

(ii) Using which strand as the template, will there be continuous synthesis of a complementary DNA strand?

(iii) Complementary to which strand will okazaki segments get synthesised discontinuous synthesis will occur.

(iv) What are template strands and Okazaki pieces?

(v) In which direction is a new strand synthesised?

(24) "A population has been exhibithing genetic equilibrium". 3

Answer the following with regard to the above statement.

(i) Explain the above statement.

(ii) Name the underlying principle.

(iii) List any two factors which would upset the genetic equilibruim of the populationn.

(iv) Take up any one such factor and explain how the gene pool will change due to that factor

OR

In the 1950s, there were hardly any mosquitoes in Delhi. The use of the pesticide DDT on standing water killed their larve. It is believed that now there are mosquitoes because they evolved DDT resistance through the interaction of mutation and Natural Selection. Pointwise, state in a sequence how that could have happened. 3

(25) A thallasemic child needed repeated blood transfusions got infected by HIV. 3

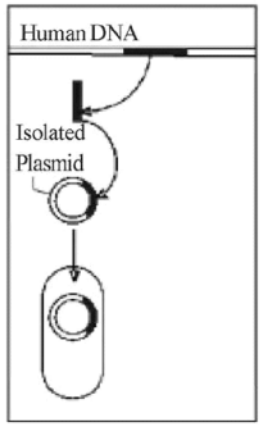
(i) Use a rough diagrammatic sketch and arrows to show how the virus increased in number.

(ii) Why did the increased number of the HIV virus deteriorate the child's immunity?

(iii) Which diagnostic test showed that the infective virus was HIV?

(26) Microbes play a dual role when used for sewage treatment as they not only help to retrieve usable water but also generate fuel. Write in points how this happens? 3

(27) Name the particular technique in Biotechnology whose steps are shown in the figure, Use the figure to summmarise the technique in three steps.



SECTION - D

(28) With an example, explain how biotechnology has been applied in each of the following:

(i) In curing Diabetes mellitus

(ii) In raising pest resistant plants

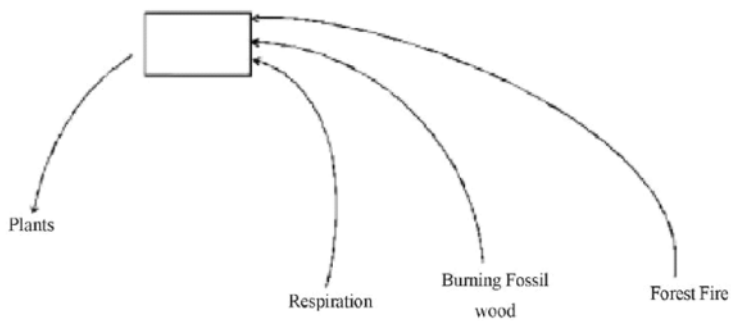
(iii) In producing more nutritionally balanced milk.

Do you think it is ethical to manipulate organisms for human benefits? Justify your answer.

OR

Name any two cloning vectors. Describe the features required to facilitate cloning into a vector.5

(29)



The above diagram shows a simplified biogeochemical cycle

(i) Name the compound whose cycle is depicted.

(ii) In what way do vehicles add this compound to the atmosphere?

(iii) What adverse effect does its excess have on the environment?

(iv) Cite an event which depicts this effect in the modern times.

(v) Suggest two ways of reducing this effect.

OR

Create an aquatic food chain in a water body into which effluents flow from a pesticide factory. Diagrammati-cally represent biomagnification in this food chain.

Explain why a decline in the predator-bird population is expected, when it feeds on the tertiary consumers of this food chain. 5

(30) (a) Study the following carefully and explain why mutation (A) did not cause any sickle cell anemia inspite of change in the molecular structure of the gene which codes for Haemoglobin, when as a similar mutation (B) did. (The question is based on properties of the genetic code. c = codon, a = amino acid, Hb = Hoemoglobin)

Codons for Hb : C_1-C_2-C_3-C_4-C_5-GAG-GAA-C_8 .....

Amino acids in Hb : a_1-a_2-a_3-a_4-a_5-Glutamic acid -Glutamicacid-a_8 .....

(Normal Haemoglobin)

Mutation (A) : C_1-C_2-C_3-C_4-C_5-GAA-GAA-C_8 .....

a_1-a_2-a_3-a_4-a_5-Glutamic acid-Glutamic acid-a_8 .....

(Normal Haemoglobin)

Mutation (B) : C_1-C_2-C_3-C_4-C_5-GUG-GAA-C_8 .....

a_1-a_2-a_3-a_4-a_5-Valine-Glutamic acid -a_8 .....

(Sickle cell Haemoglobin)

(b) Why is tRNA refered as 'the Adapter molecule'

(c) In the first phase of translation amino acids are activated in the presence of ATP and linked to their congnate tRNA.

(i) What is this process called as ?

(ii) Why is it important ? 5

OR

One chromosome contains one molecule of DNA. In eukaryotes the length of the DNA molecule is enormously large. Explain how such a long molecule fits into the tiny chromosomes seen at Metaphase. 5

Marking Scheme

Sample Paper II

XII - Biology

Q. No.	Value Points	Marks
1.	Through asexual reproduction/ parthenogenesis	1
2.	Correctly labelled pericarp and seed.	(½ x 2) = 1
3.	The law of segregation; The factors or alleles present in pairs segregate during gamete formation/ or similary worded.	1
4.	Autosomal dominant; defective trait in both male and female progeny/unaffected child did not pass down trait.	1
5.	Ringworm: *Ascaris* ; Because ringworm is a disease caused by a fungus (or named fungus) Ascaris causes Ascariasis.	1
6.	Predator-prey/Predation between level (1) and (2); Producer-consumer between levels (3) and (4)	(½ x 2) = 1
7.	Plasmid made of DNA/Deoxy ribonucleic acid; Replicates/duplicates along with host bacterial DNA	(½ x 2) = 1
8.	Polymerase chain reaction; *Bacillus thuringiensis* (no mark if specific name written with capital T)	(½ x 2) = 1
9.	(i) a = Unlimited food and space, b = limited food and space	
	(ii) curve a, K/carrying capacity	½ x 4 = 2
10.	(1) RNA polymerase; (2) hn; (3) m; (4) poly A tail	½ x 4 = 2
10.	Replication; Eukaryotic transcription; translation; gene regulation	(½ x 4) = 2
11.	Individual = age; population = Natality; community= predator-prey relation; ecosystem = energy flow	(½ x 4) = 2
12.	A - Sporogenous tissue; form microspores or pollen grains.	
	B - Tapetum; nourishes the developing pollen grains.	(½ x 4) = 2
13.	Barrier = Diaphragm/ condom/cervical cap 1UD = Copper T	
	Surgical technique = Vasectomy / Tubectomy	
	Hormonal administrations = Oral pill/saheli	(½ x 4) = 2
14.	(i) Microspore mother cell = 16; diploid/ 2n	
	(ii) Endosperm cell = Triploid / 3n	(½ x 4) = 2
15.	(A) Insects/arthropods; aerial/air/ground/ soil/ water etc.	
	(B) = fishes/pisces; aquatic/ water/ sea/river etc.	
16.	(a) Phytoplankton; zooplankton;]	
	(b) aquatic/water ecosystem showing pyramid of biomass	(½ + ½ + 1) =2

17. Plant breeding; high yield and pest resistant/drought resistant etc (any two) for increase in food production; green revolution; M.S. Swaminathan (½ x 4) = 2

18. BOD test measures rate of uptake of O_2 by microorganisms in a a sample of water. Greater the BOD of water, more is pollution =1

Sample 'C' is most polluted because it has highest BOD level among the three samples of water = 1

1+ 1 = 2

19. Biofertilisers = organisims enriching nutrient quality of soil; fertilisers = chemical synthesised in factory; Rhizobium has symbiotic association with leguminous roots and fixes nitrogen 1 x3 =3

20. Label 1 : Origin of plumule; plumule grows into shoot

Label 2 : Cotyledons; food storage

Label 3 : Origin of radicle ; radicle grows into root (½ x 6) = 3

21. (i) FSH and LH : high and progesterone low;

FSH and LH : Low and Progesterone high;

(ii) Luteal phase (iii) uterine wall and blood vessels help maintain implanted embryo;

½ + ½ +1+1 = 3

22. Intron; DNA finger printing; cuts specific nucleotide sequence; extrachromosomal DNA in bacteria/ vector; modified organisms/ organisms with foreign gene; SNP (½ x 6) = 3

23. (i) AB, CD (ii) AB (iii) CD; (iv)Template strands : parental DNA strands complementary to which new strands of DNA are synthesised; Okazaki pieces: small pieces of DNA complementany to template. (v) 5 ' - 3 ' (½ x 6) = 3

24. (i) Allelic frequencies in the gene pool of a population remains unchanged for generations;

(ii) Hardy-Weinberg equilibrium

(iii) Any two factors - mutation/Natural selection : gene flow/genetic drift/ migration

(iv) Mutation : changes alleles/ Natural selection : brings about grater reproduction of certain/ alleles gene flow. migration genetic drift : alleles move out of gene pool (½ x 6 = 3)

OR

Certain larvae born with mutation; which conferred resistance to DDT; DDT sensitive larvae died; DDT resistant larvae completed life history and became adult mosquitoes; natural selection caused greater reproduction of DDT resistant mosquitoes; which soon replaced DDT sensitive mosquitoes.

(½ x 6) = 3

25. (i) simplified (virus replicated in host cell, many viruses , infect new cell)

(ii) Viral DNA enters helper T-lymphocyles, which are responsible for immunity; virus replicates and attacks other T- lymphocytes whose - number decreases.

(iii) ELISA test /Enzyme linked immunosorbent assay. (1 + 1 + 1) = 3

26. Heterotrophic microbes naturally present in sewage are used; vigorous growth of aerobic microbes as flocs use up organic matter in effluent and reduce BOD of waste water; other kinds of bacteria grow in it anaerobically; and digest the bacteria and fungi called flocs (masses of bacteria associated

with fungal filaments); As they digest flocs a mixture of CH_4, H_2S, and CO_2 or biogas are evoloved; which can be used as fuel. (½ x 6) = 3

27. Genetic engineering/Recombinant DNA technology; segment of DNA removed from human cell and DNA segmant incorporated into bacterial plasmid ; Plasmid taken up into bacterial cell which makes protein directed by human DNA. (1 + 1 + 1) = 3

28. (i) Page 211 production of insulin to cure Diabetes mellitus or gene therapy for cure of ADA

(ii) Page 209 - using *Agrobacterium* vectors to introduce nematode specific genes or RNAi

(iii) Page 213- generating transgenic cow such as Rosie. (1 x 5) = 5

Ethical standards required as genetically manipulated organisms may harm other organisms/results unpredicatable.

OR

Cloning vectors - (i) plasmids, (ii) bacteriophages (iii) YACS, (iv) BACS (any two) 1

Features required to facilitate cloning into a vector are (1 x 4) = 4

(a) Origin of replication (ori) - Sequence where replication starts and any piece of DNA when linked to this sequence can be made to replicate within host cells.

(b) Selectable marker - Helps in identifying and eliminating non transformants and selectively permitting the growth of the transformants.

(c) Cloning sites : Few or single recognition sites are preferable

(d) Vectors for cloning genes in plants and animals. eg genetically modified *Agrobacterium tumifaciens* and retroviruses.

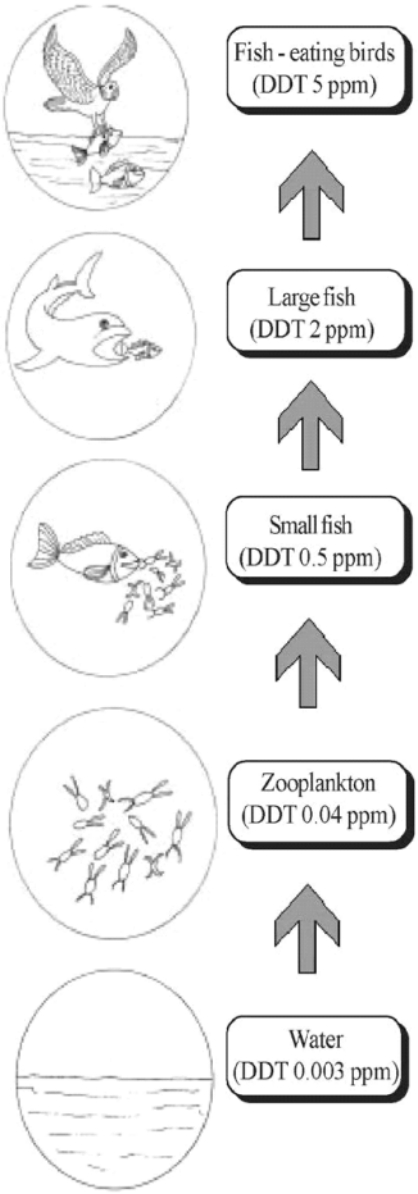
29. (i) CO_2

(ii) Fuels burnt in vehicles emit CO_2 which goes into atmosphere

(iii) Causes global warming

(iv) Long summer/ Himalayan caps melting/floods etc.

(v) Plant more trees/Afforestation/ car pool/ any other (any two) 1 x 4 + ½ x 2 = 5



Correct food chain - 1

correct doses of DDT - 1

High conc. of DDT disturbs
Ca (Calcium) metabolism in birds - 1

Thinning of egg shell - 1

Premature breaking of egg shell eventnaly leads
to decline in bird population - 1

(***Note :*** Food chain may be depicted in writing or through pictures)

OR

30. (a) - Genetic code degenerate i.e more than one code for one amino acid. 1

- Both GAG, GAA code for glutamic acid.

- Mutation of third base/ nucleotide- no change in phenotype in mutation A/Wobble hypothesis 1

- In case of change on 2nd codon of triplet code as in Mutation B, codon stands for a different amino acid valine. 1

- Hb becomes different / normal Hb becomes Hbs/Structure of protein changed.

Ans (b) tRNA has an anticodon loop that has bases complementry to the code it also has an amino acid acceptor end via which it binds to amino acids. (½x2)

(c) (i) charging of rtNA or aminoacylation of tRNA.

(ii) peptide bond formation requires energy (½x2)

OR

DNA is packaged in the cell in the following manner:

(a) As Nucleosomes consists of Histone octamer around which the positively charged DNA is wrapped around to form a nucleosome. A typical nucleosome contains 200bp of DNA helix.

(b) Repeated units of nucleosomes then form chromatin (in a nucleus). The nuceleosomes represent the "Beads on String" structure" as seen in electron microscopic picture.

(c) These are then further coiled and condensed at metaphase stage to form chromosomes.

(d) For packaging of chromatin at higher level, non histone proteins are required. 5