

KATHMANDU UNIVERSITY
End Semester Examination
March/April 2017

Marks scored:

Level : B. Tech.
Year : III

Course : BIOT 302
Semester: I

Exam. Roll No.:

Time: 30 mins.

F.M. : 20

Registration No.:

Date

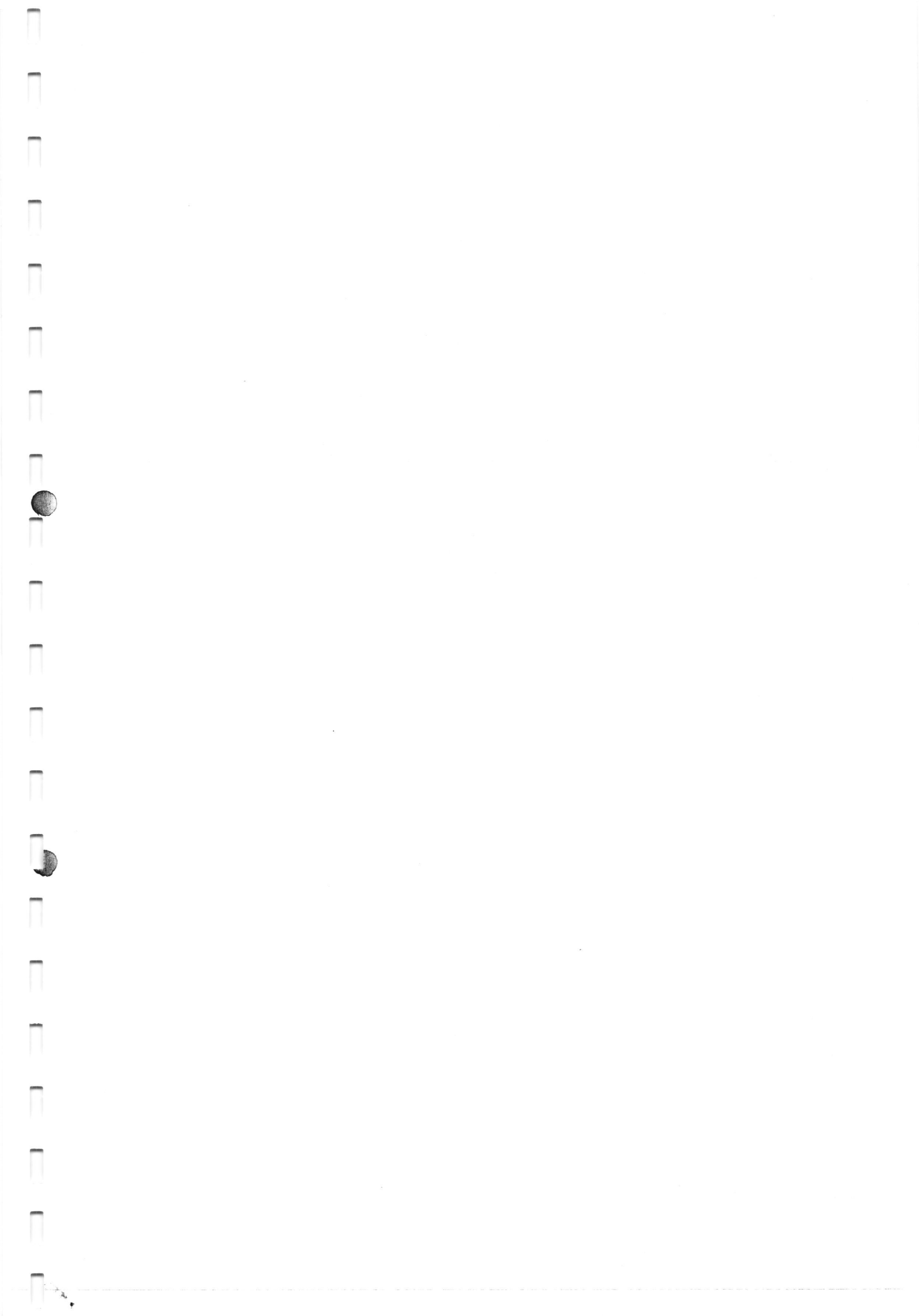
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SECTION "A"
[20 Q.×1=20 marks]

1. Nucleosomes are:
 - a. Compact structure of the chromosome when isolated without breaking the protein DNA-interaction
 - b. Compact chromosomes that emerge out from scaffolds.
 - c. Highly supercoiled DNA attached to proteins
 - d. A fragment of DNA, bound to one H1 and two copies of H2A, H2B, H3 and H4.
2. Pol μ is involved in:
 - a. Translesion synthesis
 - b. Meiosis associated DNA repair
 - c. Somatic hypermutation
 - d. Lagging Strand DNA synthesis.
3. The distinction between rNTPs and dNTPS is that:
 - a. rNTPs are incorporated in RNA with Uracil in place of thymine in DNA.
 - b. In 2' position of rNTP, there is an -OH group.
 - c. In 3' and 2' position of DNA, there is an -OH group
 - d. The elongation occurs via 3'-OH in DNA while 2'-OH in RNA.
4. Mcm2-7 functions as:
 - a. Topoisomerase
 - b. Helicase
 - c. Cyclin dependent kinase
 - d. Gyrase
5. In yeasts, the activity of telomerase is regulated by:
 - a. Binding of Rif1 and Rif2 proteins to Rap1 protein, which binds to the dsDNA
 - b. Binding of Rap1 to TRF2 and Rif2, which then binds to the dsDNA
 - c. TRF2 binds to RAP1, TRF1 then binds to TRF2
 - d. POT1, TPP1, TIN2 binds to RAP1 and RAP1 binds to the dsDNA.
6. The binding of TBP to the TATA box causes:
 - a. Recruitment of TFIIA and TFIIH
 - b. Recruitment of the RNA polymerase to the promoter
 - c. Bending of the DNA and distorting the promoter.
 - d. Recruitment of upstream promoter elements.
7. Serine, are present in _____ positions in the heptapeptide sequence, present in the CTD of RNA polymerase.
 - a. 2 and 7
 - b. 3 and 5
 - c. 2 and 5
 - d. 3 and 7
8. P-TEFb is a kinase that phosphorylates:
 - a. hSPT5
 - b. TAT-SF1
 - c. TFIIIS
 - d. CstF

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18. HO gene is inhibited by:
- a. SWI5 protein
 - b. ASH1 mRNA
 - c. Gli protein
 - d. She3 protein
19. The enhancers in 5'UTR of *rhomboid* is kept in off state in mesodermal tissues by:
- a. Snail protein
 - b. Oskar mRNA
 - c. bicoid mRNA
 - d. hunchback mRNA
20. Kruppel gradient causes distinction of:
- a. 2nd and 3rd segmentation
 - b. 3rd and 4th segmentation
 - c. 1st and 2nd segmentation
 - d. 5th and 7th segmentation



KATHMANDU UNIVERSITY
End Semester Exam
March/April 2017

APR 6 2017

Level : B. Tech.
Year : III
Time : 2 hrs. 30 mins.

Course : BIOT 302
Semester: I
F.M. : 55

SECTION "B"

Attempt *ALL* questions. Support your answer with figures whenever applicable.

1. **On the basis of DNA replication, answer the following questions:**
 - a. How is eukaryotic replication initiated? [2]
 - b. What ensures DNA replication is performed once per cell-cycle? [2]
 - c. What regulates telomerase activity? [2]
 - d. Telomerase are the enzymes that solve the end-repair problem. However, if they are to be acted without any inhibitors, the DNA end will be extended indefinitely. How is this extension regulated? [1]
2. **On the basis of transcription, answer the following questions:**
 - a. How is transcription initiated in eukaryotes? [2]
 - b. What are the modifications that occur in nascent mRNA in eukaryotes? Explain how do those modifications occur. [4]
 - c. What is a core promoter, in context of RNA pol III? [2]
3. **On the basis of splicing, answer the following questions:**
 - a. How is the structure of lariat formed? [2]
 - b. What is the mechanism of spliceosome? [5]
 - c. How splicing occurs in Group II and Group I introns? [3]
4. **Based on transcriptome profiling, answer:**
 - a. What is a microarray? What are spotted/printed arrays and in situ synthesized oligonucleotide arrays? [1+2+2]
 - b. How Sanger sequencing elucidates DNA sequence? [4]
5. **Based on translation, answer the following questions:**
 - a. Describe the translation initiation process in eukaryotes. [5]
 - b. What is the significance of 5' cap and 3' poly A tail during translation? [2]
6. **Based on gene regulation, answer the following questions:**
 - a. How does 5' UTR play its role in regulation? [5]
 - b. With example for each, explain how cells are instructed to express specific genes during development? [3]
 - c. How is mating type in yeast controlled? [2]
 - d. How do Dorsal protein act? What consequences it bring downstream? [2]
 - e. How does localization of mRNA occurs and how does it bring regulation during development? [2]

