St. Philomena's College (Autonomous), Mysore

PG Department of Biochemistry

Question Bank {Revised Curriculum (LOCF) - 2020-22 Batch }

Second Year- Third Semester

Course Title (Paper Title): Genetic Engineering and Gene Expression (HC) QP Code -84322

Sl. No.	Unit	PART A	Marks
1	1	How do you measure the purity of DNA and RNA in a given extract of nucleic acid?	2
2	1	Highlight the importance of EDTA and SDS in in extraction of nucleic acids.	2
3	1	Comment on use of hydroxyapatite column in DNA purification.	2
4	1	Give the principle behind ethanol precipitation of nucleic acids.	2
5	1	Give the principle of behind phenol chloroform extraction.	2
6	1	Why iso-amylalcohol is used in DNA extraction?	2
7	1	Extraction of DNA from plant is more tedious than from animal source. Why?	2
8	1	Give the principle of behind trizol extraction of RNA.	2
9	1	Why poly u coated sepharose column is used in extraction of mRNA?	2
10	1	Give the use of streptavidin beads in mRNA extraction.	2
11	1	Differentiate between cDNA library and genomic library.	2
12	1	Differentiate between sticky ends and blunt ends.	2
13	1	State the application of alkaline phosphatase and polynucleotide kinase in gene cloning.	2
14	1	What are restriction endonucleases? Give two of its application	2
15	1	What are palindrome sequences and mirror repeats?	2
16	1	What are Isoschizomers? Give two examples.	2
17	1	What are Neoschizomers? Give two examples.	2
18	1	What are isocaudomers? Give two examples.	2
19	1	Differentiate between Isoschizomers and Neoschizomers with examples.	2
20	1	Differentiate between isoisomers and isocaudomers with examples.	2
21	1	What are vectors? Give its characteristic features.	2
22	1	Give two advantages of a bacteriophage vector over a plasmid vector.	2
23	1	Differentiate between cosmids and phagemids.	2
24	1	What are shuttle vectors and expression vectors?	2
25	1	Highlight the importance of a selectable marker in a vector.	2
26	1	What is double screening? Give the importance of double screening in gene cloning technology.	2
27	1	What is blue white screening selection?	2
28	1	What is red white screening selection?	2
29	1	What is a catenane?	2

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69 4 What is lipofection? Give its applications. 2	68	4	1 2 1	
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70	4	How is DNA finger printing is different from DNA profiling?	2
71	5	Differentiate between lysogenic and lytic cycle of a bacteriophage.	2
72	5	What is conjugation? Give its application in genetic engineering.	2
73	5	Differentiate between transduction and transformation.	2
74	5	What is horizontal and vertical gene transfer method?	2
75	5	What are plaques? Give its characteristic features.	2
76	5	What are Hfr cells?	2
77	5	Differentiate between F ⁺ and Hfr cell.	2
78	5	Comment on the importance of U shaped tube experiment in horizontal gene transformation study.	2
79	5	Comment on the importance of Tra genes in conjugation.	2
13		Differentiate between generalized transduction and specialised	
80	5	transduction.	2
81	5	What are competent bacterial cells?	
82	6	Give the applications of a terminator gene.	2
83	6	Give two applications of gene knockout.	2
84	6	What are GM foods? Give its positive and negative impact on mankind.	2
85	6	What are transgenic plants? Give its applications	2
86	6	What is gene therapy?	2
87	7	What is catabolic repression?	2
88	7	Differentiate between activators and repressors.	2
89	7	What is an Operon?	2
90	7	What is positive gene regulation?	2
91	7	Differentiate between cis acting units and trans acting units.	2
92	7	What are trans-acting factors? Give its importance in gene regulation.	2
93	7	What are cis acting elements? Give its importance in gene regulation.	2
94	7	Comment on the role of leader peptide in tryptophan operon regulation.	2
95	7	Name the structural genes of an arabinose operon.	2
96	7	Comment on the necessity of two promoters and two operators in regulation of galactose operon.	2
97	7	Give the importance of histone like protein in regulation of galactose operon.	2
98	7	Comment on the regulatory units of an arabinose operon.	2
99	7	Highlight the role of cyclic AMP in prokaryotic gene regulation.	2
100	7	What are riboswitches? Mention its application.	2
101	8	Comment on importance of RISC protein complex in gene silencing.	2
102	8	Why gene regulation is important for life?	2
103	8	Name any four modifications of histone proteins.	2
104	8	Differentiate between miRNA and siRNA.	2
105	8	What are shRNA and siRNA? Give its application in gene regulation.	2
106	8	What is the solenoid structure of chromatin?	2
107	8	Why gene regulation in eukaryotic cell is more complex compared to a	2
107	O	prokaryotic cell?	

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108	8	What is chromatin remodelling?	2
109	8	What are non histone proteins? Give two of its characteristic feature.	2
110	8	What are chromo domains? Give its importance.	2
111	8	What are bromo domains? Give its importance.	2
112	8	How RNA stability plays a crucial role in gene regulation.	2
1	1	Detail the steps involved in extraction of DNA from a bacterial cell.	5
2	1	Detail the steps involved in extraction of DNA from plant cell.	5
3	1	Detail the steps involved in extraction of RNA from a bacterial cell.	5
4	1	Detail the steps involved in differential extraction of DNA highlight the use of this technique in the field of forensic science.	5
5	1	Explain the steps involved in construction of genomic library.	5
6	1	Explain the steps involved in construction of a cDNA library.	5
7	1	Write a note on shotgun cloning.	5
8	1	Write a note on restriction endonucleases and its types.	5
9	1	What are type 2 restriction endonucleases? Explain its mechanism of action.	5
10	1	Explain characteristic feature of a plasmid taking an example.	5
11	1	Describe the construction and applications of λbacteriophage cloning vector.	5
12	1	Discuss the construction and applications of M13 phage cloning vector.	5
13	1	Explain the construction of an expression vector with an example.	5
14	1	Describe a cosmid vector.	5
15	1	Describe a phagemid cloning vector.	5
16	1	Explain the structure and application of a BAC vector	5
17	1	Give a detailed description of YAC vector.	5
18	1	Explain the working principle of lac promoter and λPL Promoter in an expression vector.	5
19	1	Discuss the T7 expression system.	5
20	1	Describe Tac expression system.	5
21	1	Describe the λ PL promoter system.	5
22	1	Write a note on SV 40.	5
23	1	Describe a plant vector system with an example.	5
24	1	Give the brief description on mechanism of DNA ligation.	5
25	1	Explain DNA cloning phage vectors.	5
26	1	Describe the salient features of shuttle vectors and expression vectors.	5
27	1	Write a short note on PBR322.	5
28	1	Describe a shuttle vector with an example	5
29	2	What is transformation technique? Describe any two methods of transformation technique.	5
30	2	Explain any two chemical methods of gene transformation technique.	5
31	2	Briefly explain the method and applications of microinjection.	5
32	2	Briefly explain the method and applications of electroporation.	5

2 Describe gene gun method of transformation. 3 Explain the concept of chromosome walking. Give its applications. 3 Discuss the methodology and applications of Nested PCR 5 Discuss the methodology and applications of RT PCR. 5 Discuss the application of PCR techniques in the field of agriculture and medicine 3 Discuss the application of PCR techniques in the field of agriculture and medicine 3 What is PCR? Explain its principle, methodology and applications. 4 What is Real time PCR? Explain its principle, methodology and applications. 4 Describe the strategies developed to identify recombinant clones in yeast and mammalian culture. 4 Describe the strategies used to identify clones in recombinant bacterial clones. 4 Describe the principle and methodology involved DNA foot printing. Give its application. 5 Cive its application. 5 Cive its application. 5 Explain indirect screening methods used in identifying recombinant clones. 6 Discuss the use of probes in gene clone technology. 5 Discuss the use of probes in gene clone technology. 5 Discuss the use of probes in gene clone technology. 5 Describe hybrid arrest translation method of clone selection 5 Describe hybrid select translation method of clone selection 5 Describe hybrid select translation method of clone selection 5 Describe hybrid select translation method of clone selection 5 Describe the regulation of lytic and lysogenic cycle of bacteriophage. 5 Describe the lytic and lysogenic cycle of a bacteriophage. 5 Describe the lytic and lysogenic cycle of a bacteriophage. 5 Describe the lytic and lysogenic cycle of a bacteriophage. 5 Describe the price and lysogenic cycle of a bacteriophage. 5 Describe the price and lysogenic cycle of a bacteriophage. 5 Describe the price and lysogenic cycle of a bacteriophage. 5 Describe the price and lysogenic cycle of a bacteriophage. 5 Describe the price and lysogenic cycle of a bacteriophage. 5 Describe the price and process of transformation and transduction in gene mapping. 6 Describe the p				
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65 6 What are GM foods? Comment on its positive and negative impact. 5	64	6		5
	65	6		5
,	66	6	Describe any two applications of genetic engineering. Comment on the	5

		negative impact of genetic engineering.	
	_	Write a note on application of genetic engineering in the field of medical	_
67	6	and agricultural science.	5
68	7	Describe the regulation of an Lac Operon.	5
69	7	How tryptophan operon is regulated?	5
70	7	Write a note on CRISPR-Cas gene regulation. Give its applications.	5
71	7	Explain the mechanism of gene regulation by Riboswitches.	5
72	7	Describe the regulation of an arabinose operon.	5
73	7	Describe the regulation of a galactose operon.	5
74	8	Discuss the mechanism of Gcn 4 gene regulation.	5
75	8	Describe NFkB mediated gene regulation.	5
76	8	Discuss the mechanism of gene silencing using RNA interference.	5
77	8	What is the role of SWI/SNF complex in gene regulation?	5
78	8	What is histone code hypothesis? Explain.	5
79	8	Describe the role of HATs and HMTs in eukaryotic gene regulation.	5
80	8	Describe nucleosome structure.	5
81	8	How eukaryotic gene expression is regulated by acetylases and deacetylases?	5
		Discuss the methodology and application of chromatin	
82	8	immunoprecipitation.	5
		The second secon	
1	1	Explain the characteristic features, applications, and limitations of the	10
1	1	vector. Write a note on plant vectors with an example.	10
2	1	Describe the salient features of shuttle vectors and expression vectors.	10
3	1	Describe different types of plant vector systems with suitable example.	10
4	1	Describe cloning vectors with suitable examples	10
5	1	Detail the steps involved in differential extraction of DNA highlight the use of this technique in the field of forensic science.	10
6	1	Explain the characteristic features, applications, and limitations of the vector. Write a note on plant vectors with an example.	10
7	2	What is transformation in genetic engineering? Explain microinjection technique and calcium phosphate method of transformation.	10
8	2	What is transformation technique? Describe any two methods of transformation technique.	10
9	2	What is transformation in genetic engineering? Explain microinjection technique and calcium phosphate method of transformation.	10
10	3	Discuss the methodology and application of Nested & RT PCR.	10
		Discuss on the strategies developed to identify recombinant clones in	
11	4	yeast and mammalian culture.	10
12	4	Describe the strategies used to identify clones in recombinant bacterial clones.	10
13	4	Give a detailed account of the principle and procedure of colony and plaque hybridization techniques with a neat labelled diagram.	10
14	4	Give a detailed account of the principle and procedure of colony and plaque hybridization techniques with a neat labelled diagram	10

16 4 Discuss on principle, procedure and application of DNA finger printing 10 17 4 Write a detailed noted on RFLP. 10 18 4 Explain the principle, procedure and application of RAPD. 10 19 4 Explain the principle, procedure and application of RFLP. 10 20 4 Give an account on clonal selection methods with suitable examples. 10 21 4 Describe any two methods of blot transfer methods in detail. 10 22 4 Give an account on western blotting and DNA Foot printing. 10 23 5 Give detailed description of specialized transduction and its application in bacterial gene mapping. 10 24 5 Describe the process of transformation in Gram positive and Gram negative bacteria. 10 25 6 What is gene therapy? Comment on positive and negative impacts of genetic engineering. 10 26 6 Write a note on application of genetic engineering in the field of medical and agricultural science. 10 27 6 Write a note on gene therapy and genetically modified foods. 10 28 7 Describe the regulation of an Lac Operon. 10 29 7 How Lac Operon is regulated? 10	15	4	Give an account on western blotting and DNA Foot printing.	10
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204Give an account on clonal selection methods with suitable examples.10214Describe any two methods of blot transfer methods in detail.10224Give an account on western blotting and DNA Foot printing.10235Give detailed description of specialized transduction and its application in bacterial gene mapping.10245Describe the process of transformation in Gram positive and Gram negative bacteria.10256What is gene therapy? Comment on positive and negative impacts of genetic engineering.10266Write a note on application of genetic engineering in the field of medical and agricultural science.10276Write a note on gene therapy and genetically modified foods.10287Describe the regulation of an Lac Operon.10297How Lac Operon is regulated?10307How tryptophan operon is regulated?10	18	4	Explain the principle, procedure and application of RAPD.	10
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23 5 Give detailed description of specialized transduction and its application in bacterial gene mapping. 24 5 Describe the process of transformation in Gram positive and Gram negative bacteria. 25 6 What is gene therapy? Comment on positive and negative impacts of genetic engineering. 26 6 Write a note on application of genetic engineering in the field of medical and agricultural science. 27 6 Write a note on gene therapy and genetically modified foods. 28 7 Describe the regulation of an Lac Operon. 29 7 How Lac Operon is regulated? 30 7 How tryptophan operon is regulated? 10	21	4	Describe any two methods of blot transfer methods in detail.	10
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10 24 5 Describe the process of transformation in Gram positive and Gram negative bacteria. 10 25 6 What is gene therapy? Comment on positive and negative impacts of genetic engineering. 10 26 6 Write a note on application of genetic engineering in the field of medical and agricultural science. 27 6 Write a note on gene therapy and genetically modified foods. 10 28 7 Describe the regulation of an Lac Operon. 10 29 7 How Lac Operon is regulated? 10 30 7 How tryptophan operon is regulated? 10	22	5	Give detailed description of specialized transduction and its application	10
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25 6 genetic engineering. 26 6 Write a note on application of genetic engineering in the field of medical and agricultural science. 27 6 Write a note on gene therapy and genetically modified foods. 28 7 Describe the regulation of an Lac Operon. 29 7 How Lac Operon is regulated? 30 7 How tryptophan operon is regulated? 10 10 10 10 10 10 10 10 10 1	24		negative bacteria.	10
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28 7 Describe the regulation of an Lac Operon. 10 29 7 How Lac Operon is regulated? 10 30 7 How tryptophan operon is regulated? 10	20	O	and agricultural science.	10
29 7 How Lac Operon is regulated? 10 30 7 How tryptophan operon is regulated? 10	27	6	Write a note on gene therapy and genetically modified foods.	10
30 7 How tryptophan operon is regulated? 10	28	7	Describe the regulation of an Lac Operon.	10
	29	7	How Lac Operon is regulated?	10
	30	7	How tryptophan operon is regulated?	10
31 7 Describe the regulation of an Tryptophan operon. 10	31	7	Describe the regulation of an Tryptophan operon.	10
32 7 Write a note on CRISPR-Cas gene regulation. Give its applications. 10	32	7		10

	Model Question Paper	
	St. Philomena's College (Autonomous), Mysore	
	III Semester M.Sc-Final Examination	
	Subject: Biochemistry	
	Title: Genetic Engineering and Gene Expression (HC)	
Time		Marks: 70
	PART-A	1
	ver any TEN of the following:	10x2=20
1.	What are Isoschizomers? Give an example.	2
2.	What is an expression vector? Give an example.	2
3.	What is a phagemid?	2
4.	What are Riboswitches?	2
5.	Distinguish between RT-PCR and Real time PCR.	2
6.	What are GM Foods? Give an example.	2
7.	What is Ti Plasmid? Give its application in genetic engineering.	2
8.	Name any four modifications in histone tails.	2
9.	What is mi RNA?	2
10.	Mention the role of Swi/snf complex.	2
11.	What is meant by 'Gene knockout'?	2
12.	Give the application of gene therapy.	2
-	PART-B	
Ansv	ver any SIX questions:	6x5=30
13.	Write a note on restriction endonucleases and its types.	5
14.	Explain cDNA cloning technique.	5
15.	What is PCR technique? Explain its principle and applications.	5
16.	Explain Benzer's work in analysing the fine structure of R2 locus of T4 phage	5
17.	Write a note on Western blotting.	5
18.	Describe the regulation of lytic and lysogenic cycle of bacteriophage.	5
19.	Discuss the negative impact of genetic engineering.	5
20.	Describe the regulation of a galactose operon.	5
	agyon ony TWO questions:	2,10_20
	swer any TWO questions:	2x10=20
21.	Explain the characteristic features, applications, and limitations of the vector. Write a note on plant vectors with an example.	10
22.	What is transformation in genetic engineering? Explain microinjection technique and calcium phosphate method of transformation.	10
23.	Write a note on CRISPR-Cas gene regulation. Give its applications	10

3.	a.	Explain cDNA cloning technique.	
	b.	What is PCR? Explain the principle and application.	5+5
4.		Give the principles of the following techniques.	3+3+4
		a) Southern blotting	
		b) RFLP	
		c) DNA finger print assay	
5.	a.	Explain Benzer's work on the fine structure of the r II locus of T4 phage.	
	b.	Explain Lysogenic cycle of a bacteriophage.	5+5
6.	a.	Describe any two applications of genetic engineering comment on the negative impact of genetic engineering	
	b.	What are type II restriction endonucleases? What is their application in genetic engineering?	5+5
7.	a	Explain the regulation of Lac operon by Lactose.	
	b.	What is histone code hypothesis? Explain	5+5
8.		Write short note on any TWO of the following.	5+5
		a) Attenuation control of Trp operon.	
		b) DNA footprint assay.	
		c) PBR322	