Mansoura University
Faculty of Science
Botany Department
Mansoura, Egypt

جامعة المنصورة
كلية العلوم
قسم النبات
المنصورة - مصر

Mansoura
University
BioTech
Program

Final Examination in Botany
1ˢᵗ Term: Jan. 2016
Qualifying Examination For **3ʳᵈ Level Biotechnology**
Course: **Production of proteins from Bacteria and Fungi**

Time: **2 hrs**   Date: **11 /01/2016**
Full mark: **60**   Question mark: **15**

Answer The Following Questions:

### I-A- Illustrate <u>only</u> by a labeled diagram (4.5 marks):

1- When the relation between specific synthesis of a protein and the growth rate of the bacteria is described as "repressed synthesis"
2- A tertiary structure of a protein containing 2 alpha-helices and a beta-sheet (3 anti=parallel sheets)
3- The induced strain model

B- Explain the following points (10.5 marks):

4- Why enzymes are employed in industry (2.5 marks)
5- Different strategies to improve the strain that is producing protein (5 marks)
6- The difference between absolute specificity and linkage specificity (3 marks)

II-A- In a fermentation process to produce alpha-amylase both dissolved oxygen and oxygen uptake rate were measured as in the following figure (8 marks);

1- Match the measured parameters with the indicated 1 & 2 curves
2- Comment on the results
3- Insert the figure that indicates the biomass concentration
4- What would be the curves behavior if the used bacteria is anaerobic
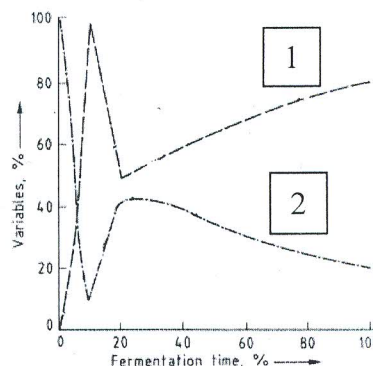
B- In the process of the production of s-2-chloropropionate, explain (7 marks);
1- The reason for the use of glucose dehydrogenase and glucose (2.5 marks).
2- The proper substrate concentration (2.5 marks).
3- If we want to use NADH instate of NADPH, what should we do?? (2 marks).

III- Enumerate (15 marks):
a) The process of production of insulin
b) Biotechnology drug process discovery
c) Application of monoclonal antibodies

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Final Examination in Botany
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IV- Give true or false and correct the false (15 marks);

1- The Measles, Mump and Rubella (MMR) Vaccine is polysaccharide vaccines
2- A substance added to the vaccine to enhance the immune system is called endotoxin
3- In same plasmids the two chain insulin genes have been introduced and then these plasmids have been transformed into bacterial cells
4- Naked monoclonal antibodies are those joined to a chemotherapy drug or radioactive particle.
5- Route of admistration is one of the factors that influencing the antigenicity.
6- Interferon is used in treating anemia resulting from chronic kidney disease.
7- The vaccines is artificially acquired active immunity

Best of Luck
Dr. Amr M. Mowafy
Dr. Mohammed Elsayed Rashed

Mansoura University
Faculty of Science
Biotechnology Program
Third Year Students ٢ hours
Elect. & Spect. Analysis Chem ٣٠١

## Answer the following questions :

Part ١ : Electrochemistry :

a) Define the followings :   (٧.٥ Marks)
    i)   Galvanic and electrolytic cells
    ii)   Nernest equation
    iii)   Equivalent conductance
    iv)   Conductance
b) Write the conditions required for a cell to be standard ?   (٧.٥ Marks)
c) Write on reference electrodes ?   (٧.٥ Marks)
d) How to use potentiometric method to determine the end point ? (٧.٥ Marks)

Part ٢ : Spectroscopy Analysis :

a) Calculate λ_{max} for each of the following   (٧.٥ Marks)
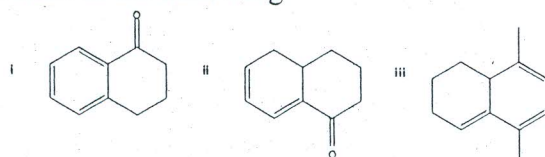
b) Write on the intramolecular factors affecting on chemical shift of NMR. (٧.٥ Marks)

c) Predict the possible structure of the following IR data   (٧.٥ Marks)
   ١- $C_٣H_٦O$, ٢٩٥٠, ١٧٢٠ cm^{-1}.
   ٢- $C_٢H_٦O$, ٣٥٠٠, ٢٩٤٠, ١١٠٠ cm^{-1}.
   ٣ - $C_٧H_٥N$, ٣٥٠٠, ٣٠٥٠, ٢٢٥٠, ١٦٠٠, ١٥٠٠ cm^{-1}
d) Write on the fragmentation rules for Mass spectroscopy ?   (٧.٥ Marks)

Prof. Dr. Abdelaziz Fouda & Prof. Dr. Mohamed M. Abou-Elzahab

Mansoura University

Faculty of Science

Department of Mathematics

First term-exam 2015/2016

Course: Biostatistics
(Math. 301)

Time: 2 hours

BioTech Program
Level 3

Full marks: 80 marks

Answer the following questions:

Q.1. (20 marks)

The following table gives the ages of 42 pupils.

T.C.I.	f_i	Med point x_i	$x_i \cdot f_i$	$x_i^2 \cdot f_i$	A .c .f.
12 -	3	14	42	588	3
16 -	4	18	72	1296	7
20 -	9	22	198	4356	16
24 -	15	26	390	10140	31
28 -	9	30	270	8100	40
32 - 36	2	34	68	2312	42
Total	42		1040	26792	

Find

a) The mean.   **b)** The mode.   **c)** The median.   **d)** The variance.

e) The Coefficient of variation.

Q.2. (20 marks)

a) The following table classifies 400 people according their smoking habits and whether or not they have a chest cancer.

	Smoker (A)	Non-Smoker $(\overline{A})$	Total
Has cancer (C)	200	50	250
Does not have cancer $(\overline{C})$	50	100	150
Total	250	150	400

If an individual is selected at random from this group, find the probability

Please look to the other side

١

that he/she

i) is a non- smoker and has a cancer, **(5 marks)**

ii) has a cancer given that he/she is a smoker and determine the relation between smoking and having a cancer. **(10 marks)**

b) if the mean and the variance of a set of data x_i are 10 and 4 respectively, then find the mean and the variance of the set of data $(2x_i +1)/3$. **(5 marks)**

Q.3. (20 marks)

a) The heights of plants of a certain species are normally distributed, the mean height being 30 cm and the standard deviation being 5 cm. Hence find
i) the proportion of the plants which are greater than 40 cm in heights. **(5 marks)**
ii) If a farm contains 1000 plants from this species, then what is the number of planets out of this farm which are between 25 cm and 35 cm in heights? **(5 marks)**

b) Suppose that 15% of a certain population have low hemoglobin levels. If randomly 5 people of this population are chosen, then find

i) the probability that 4 or more out of the selected 5 people have low hemoglobin levels, **(5 marks)**

ii) the expected number of people out of the selected 5 people with low hemoglobin levels. **(5 marks)**

Q.4. (20 marks)

Refer to Q.3 (a), if the mean height of the plants is unknown and a sample of size 36 of this plants species are randomly selected with a sample mean 28 cm. Then

a) Find the 95% C.I. of the unknown mean height. **(10 marks)**

b) Test whether or not the unknown mean height is lower than 30 cm. **(10 marks)**

With my best wishes..

Prof. Ahmed Habib

٢

جدول التوزيع الطبيعي المعياري

Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
-3.4	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002
-3.3	0.0005	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003
-3.2	0.0007	0.0007	0.0006	0.0006	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005
-3.1	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0008	0.0008	0.0007	0.0007
-3.0	0.0013	0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0011	0.0010	0.0010
-2.9	0.0019	0.0018	0.0018	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0014
-2.8	0.0026	0.0025	0.0024	0.0023	0.0023	0.0022	0.0021	0.0021	0.0020	0.0019
-2.7	0.0035	0.0034	0.0033	0.0032	0.0031	0.0030	0.0029	0.0028	0.0027	0.0026
-2.6	0.0047	0.0046	0.0044	0.0043	0.0041	0.0040	0.0039	0.0038	0.0037	0.0036
-2.5	0.0062	0.0060	0.0059	0.0057	0.0055	0.0054	0.0052	0.0051	0.0049	0.0048
-2.4	0.0082	0.0080	0.0078	0.0075	0.0073	0.0071	0.0069	0.0068	0.0066	0.0064
-2.3	0.0107	0.0104	0.0102	0.0099	0.0096	0.0094	0.0091	0.0089	0.0087	0.0084
-2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110
-2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143
-2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183
-1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233
-1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294
-1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367
-1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455
-1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559
-1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681
-1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823
-1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985
-1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170
-1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379
-0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611
-0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867
-0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148
-0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451
-0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776
-0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121
-0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483
-0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859
-0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4326	0.4286	0.4247
-0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998

Mansoura University
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Botany Department

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Final Examination in Botany
First Term - Jan. 2016
Educational Year: Third Level   Program (Branch): Biotechnology
Subject :Bot (303)   Course(s): Flora and Medicinal Plants
Time: 2 hrs   Date: 18 / 1 /2016   Full mark: 60   Question mark: 15

Answer the following questions:

Q.1   **Write in detail on each of the following:**   **(15 marks)**
A- The Western (Mareotis) Mediterranean coast of Egypt.
B- The habitat types and characteristic vegetation in the Egyptian deserts.

Q.2   A- Compare and contrast between Wadi El-Natrun Depression ans Siwa Oasis
with particular reference to: location, climate, habitat types and vegetation.
                                                            (7.5 marks)
B- Give an account on the habitat types and the characteristic vegetation in the
Red Sea coastal region of Egypt.   **(7.5 marks)**

Q.3   **A- Give the Arabic and English names of the following medicinal plants:**
                                                            (15 marks)

   1- *Citrullus colocynthis*
   2- *Glycyrrhiza glabra*
   3- *Silybum marianum*
   4- *Senna italica*
B- Identify the following:
   I- Pharmacopoeias
   II- Pharmaceutical

Q.4   **Menthion the most important uses in folk medicine for the following**
medicinal plants: **(15 marks)**
   1- *Acacia nilotica*
   2- *Anastatica hierochuntica*
   3- *Cyperus rotundus*
   4- *Conyza dioscoridis*
   5- *Thymus capitatus*
   6- *Senna italica*
   7- *Silybum marianum*
   8- *Glycyrhiza glabra*
   9- *Citrullus colocynthis*

Best Wishes and Good Luck

Examiners: Prof. Dr. Ibrahim A. Mashaly   Dr. Sekina M. Ayyad

Answer the following questions:

Q.1   A- What is meant by "Junk DNA"? Earlier it was thought to has no function. Later studies proved that some of what Junk DNA have important functions. Mention these functions   (7 marks)

B- Complete the following sentences using suitable words or phrases:
                                                                                     (8 marks)

1- DNA may be present in several forms .... , ... and ....
2- Two types of cleaved DNA fragments by endonucleases, these are .... and ....
3- Different modes of DNA replication .... , ... and ....

Q.2   Write briefly on the following: (15 marks)
1- Enumerate the DNA repair mechanisms with full account on one of them.

2- Requirements and Produce of PCR.

3- Denaturation and Renaturation of DNA.

Q.3 Answer the following questions :

A- Explain the following concepts and its application in molecular genetics   (10 marks/ 3 marks each)

    a- Linear versus parallel analysis

    b- Histone modification and gene expression

    c- Identical DNA molecule throughout the body of an organism does not express the same genes in different regions for e.g. kidney and lung

   d- Simple tandem repeats (STRs) in PCR

    e- Antibiotic resistant gene in plasmids

B- In a discussion group, you and your research co-workers wanted to start investigation on a salinity resistant gene in order to determine its effect on plant growth and development as general

Your group suggested the following plants to be used Medicago, Pisum, Kewi, Orange and Rice   (5 marks)

Which plant (s) you would suggest to work with and why?

Q.4 A- Draw the bands resulted from digesting the following plasmid using ECORI, ECORI& BAMHI, ECORI and SacI and each of the enzymes alone on gel using electrophoresis (one at a time).

(5 marks)
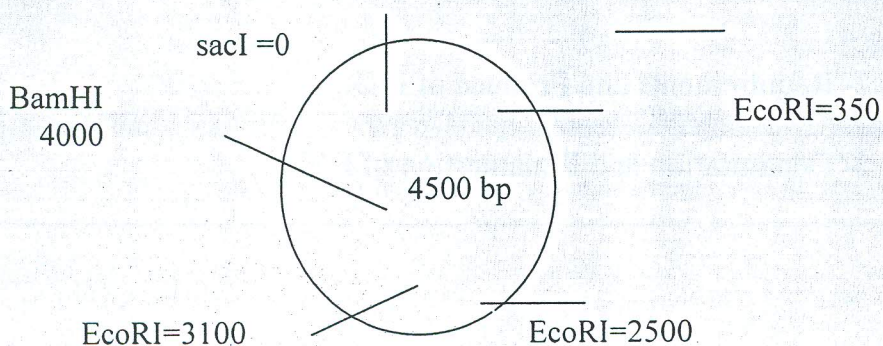
B- The following information were obtained from NCBI website
(10 marks)

PHYB phytochrome B [*Arabidopsis thaliana* (thale cress)]

Gene ID: 816394, updated on 6-Dec-2015

▲ Summary

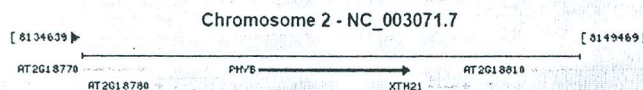|	
Gene symbol	PHYB
Gene description	phytochrome B
Primary source	TAIR:AT2G18790
Locus tag	AT2G18790
Gene type	protein coding
RNA name	phytochrome B
RefSeq status	REVIEWED
Organism	Arabidopsis thaliana (ecotype: Columbia)
Lineage	Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta; Spermatophyta; Magnoliophyta; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae; Camelineae; Arabidopsis
Also known as	HY3; MSF3.17; MSF3_17; OOP1; OUT OF PHASE 1; PHYB; phytochrome B; PHYTOCHROME B
Summary	Red/far-red photoreceptor involved in the regulation of de-etiolation. Exists in two inter-convertible forms: Pr and Pfr (active). Involved in the light-promotion of seed germination and in the shade avoidance response.

▼ Genomic context   ⌃ ?

Location: chromosome: 2   See PHYB in MapViewer

Exon count: 4

Sequence: Chromosome: 2; NC_003071.7 (8139881..8144430)

Chromosome 2 - NC_003071.7

[8134639 ▶]   [8149469 ▶]

AT2G18770 ———————   PHYB ——————▶   AT2G18810
       AT2G18780   XTH21

S I D E B A R

▼ Genomic regions, transcripts, and products   ⌃

Genomic Sequence: NC_003071.7   Go to reference sequence details

                                        Go to nucleotide: Graphics   FASTA   GenBank

Please fill in the blanks according to the information present above

a- The gene name appears here is .... and is present in an organism called .... and is specifically present on chromosome number ....

b- Can you see the sequence of this gene above? Explain your answer.

c- If you need to determine the sequence of this gene ... what you should do?

Examiners: Prof. Magda Soliman   Dr. Noha khalifa

Mansoura University
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Final Examination in Microbiology
1ˢᵗ Term: Jan. 2016

Educational Year: **B Sc** Program : **Biotechnology & Applications** (3ʳᵈ Level)
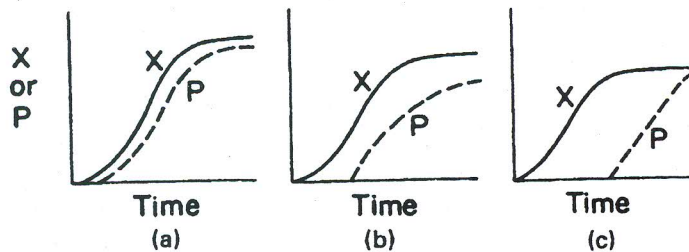Subject: **Microbiology** Course(s): **Physiology of Microorganisms** (B 301)

Time: **2 hrs** Date: **21 / 1 / 2016** Full mark: **60** Question mark: **20**

Answer the following questions:

• Question One

a- Recognize the kinetic pattern of microbial growth in the following figure and product formation in each case and **briefly discuss.** (5 marks)

X – Microbial growth
P – Product formation

b- Discuss the physiological basis of temperature tolerance in microorganisms. (5 marks)

c- Outline fungal mycelium adaptations for nutrient capture. (10 marks)

• Question Two

a- You are provided with a graphic data representing results of one experiment for growing bacteria on mixture of glucose (I) & lactose (II) as carbon source.

  i. **Discuss** the growth pattern.
  ii. **Compare** between the favorability of the two sugars. (10 marks)
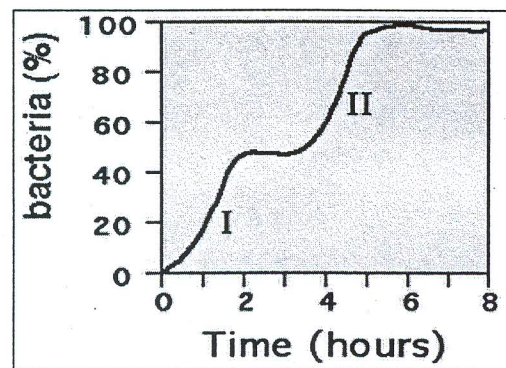
b- Demonstrate with **illustration** the effect of substrate concentration on microbial specific growth rate (Monod plot). (10 marks)

• بقية الأسئلة فى الخلف

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جامعة المنصورة
كلية العلوم
قسم النبات
المنصورة ـ مصر

Final Examination in Microbiology
1st Term: Jan. 2016

• Question Three

a- An inoculum of **4 x 10^5** *Escherichia coli* cells grew in a medium without lag to a population of **3.68 x 10^7** cells in **6** hours and had not then reached the stationary phase. **What was the mean generation time of the *E. coli* in this medium?**
(5 marks)

b- **Give an illustrated discussion on** the growth mechanism in fungal hypha and the assembly of the wall at the hyphal apex.
(15 marks)

Examiner:

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جامعة المنصورة
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المنصورة- مصر

Final Examination in Botany/Biotechnology

Subject: Biotec 548   Course(s): Genetic Engineering and Gene transfer

Time: 2hrs.   Date: 28/01/2016

Full mark: 60   Question mark:15

Q-1- Imagine that two countries (both of them are signatories to Cartagena protocol of biosafety) need to exchange shipments of GM crops, what are the steps according to the protocol should be taken?

Your answer must cover the following points:

- Protocol scope   * What should the country of import and export do
- Risk assessment measures   *Capacity building

Q-2- Choose the correct answer for Only 10 questions (1.5 mark/eacg):

1- Transformation occurs naturally in some species of bacteria, but it can also be affected by artificial means in other cells and can be best described as:
   a- transformation is the genetic alteration of a cell due to direct uptake and incorporation of exogenous genetic material through the cell membrane(s).
   b- transformation means the receiving bacteria is naturally competent.
   c- Transformation, similar to conjugation and transduction in the entry of genetic material into a bacterial cell.
   d- Transformation may be used to describe the insertion of new genetic material into nonbacterial cells, including animal and plant cells.
      a and b   f- a and c   g- a and d   h- a, b and d   i- none of the above

2- Transformation was first demonstrated in 1928 by:
   a- British bacteriologist Frederick Griffith when he was working with a strain of *Streptococcus pneumoniae*
   b- British bacteriologist Frederick Griffith when he was working with a strain of *Agrobacterium tumefaciens*.
   c- Oswald Avery, Colin MacLeod, and Maclyn McCarty when they been working with a strain of *Streptococcus pneumoniae*
   d- Stanley Cohen, Annie Chang and Leslie Hsu when working with *Klebsiella pneumonis*.

3- Transformation using electroporation was developed in the late 1982 to.
   a- increase the efficiency of in-vitro and in-vivo transformation.
   b- increase the number of bacteria, plants and animals that could be transformed.
   c- Transformation of animal and plant cells was also investigated with the first transgenic mouse being created by injecting a gene for a rat growth hormone into a mouse embryo in 1982.
   d- a and b   e- b and c   f- a and c   g- b and c

4- *Agrobacterium tumefaciens* causes plant tumors through
   a- DNA plasmid carrying a tumor inducing gene.
   b- addition of a tumor inducing agent, Ti genes, to the bacterial plasmid.
   c- Ti genes were able to infect plants with *A. tumefaciens* and let the bacteria insert their chosen DNA into the genomes of the plants.

١

d- Susceptiblity of all plants to infection by *A. tumefaciens*.

5- Competence for transformation is typically induced

   a- By high cell density and/or nutritional limitation, conditions associated with the stationary phase of bacterial growth.

   b- most efficiently at the end of exponential growth, approaches.

   c- by high cell density and is associated with biofilm formation.

   d- by DNA damaging conditions.   e- all of the above   f- none of the above

6- Viral transduction of plants is

   a- Packaging the desired genetic material into a suitable plant virus and allow this modified virus to infect the plant.

   b- If the genetic material is DNA, it can recombine with the chromosomes to produce transformant cells.

   c- If the genetic material is single stranded RNA which replicates in the cytoplasm of infected cell, the inserted genes never reach the nucleus of the cell and do not integrate into the host genome

   d- such method is a form of transfection and not a real transformation, since the inserted genes never reach the nucleus of the cell and do not integrate into the host genome.

   e- The progeny of the infected plants is virus free and also free of the inserted gene.   f- a, b, and   e- All of the above   g- none of the above

7- Gene gun: also referred to as:

   a- particle bombardment, microprojectile bombardment,

   b- particles of gold or tungsten are coated with DNA and then shot into young plant cells or plant embryos.

   c- This method also allows transformation of plant cells and plastids.

   d- The transformation efficiency is lower than in *Agrobacterium* mediated transformation, but most plants can be transformed with this method.

   e- a and b f- a, b and c   g- all of the above   h- none of the above

8- Transformation requires selection of transformants because:

   a- It produces a mixture of relatively few transformed cells and an abundance of non-transformed cells.

   b- Usually the transformed plasmid contains a gene that confers resistance to an antibiotic that the bacteria are otherwise sensitive to.

   c- The use of certain auxotrophic markers can compensate for an inability to metabolize certain amino acids, nucleotides, or sugars.

   f- Reporter genes rely on α-complementation principle, such as the β-galactosidase, are used in a blue/white screening.

   g- a and c   h- b and f   i- none of the above   j- all of the above

9- The end result of F factor mediated conjugation

   A- is that both strains are F+.

   b- involves transfer of the entire bacterial chromosome

   c- converts the recipient strain to F+ and the donor to F-

   d- a and b.   e- none of the above

10- Which of the following is a description of generalized transduction:

   a- Inaccurate excision of prophage can occasionally remove a small portion of the bacterial chromosome.

   b- Random pieces of bacterial DNA can become incorporated into a phage coa

c- Pieces of bacterial DNA may be released into the culture medium when a cell is lysed.   d- All of the above   e- None of the above

11- Which type(s) of genetic transfer lead to incorporation of new DNA into the bacterial chromosome? I. Conjugation mediated by F factor II. Hfr mediated conjugation

III. Transduction IV. Transformation

a- I and II   b- III and IV   c- II, III and IV   d- all of the above   e- None

12- **Integrons** are genetic units characterized by:

a- encoding a site-specific recombinase as well as a recognition region that allows other sequences with similar recognition regions to be incorporated into the integron by recombination.

b- acquire open reading frames embedded in exogenous gene cassettes and convert them to functional genes by ensuring their correct expression.

c- virtue of their important role in the spread of antibiotic-resistance genes.

d- containing hundreds of accessory genes and constitute a significant fraction of the genomes of many bacterial species.

e- All of the above   e- none of the above

Q-3- A- Use T for true and F for false, correct the false answer (One mark/each)

1. An exogenous DNA fragment tailed with A's which has been annealed to a plasmid DNA tailed with T's can transform competent bacteria without prior in vitro ligation, because nicks will be closed by endogenous ligases in cells that take up the recombinant plasmid.

2. Recombinant plasmids that have an exogenous DNA fragment inserted into the plasmid gene that confers ampicillin resistance can be obtained from a population of recombinant DNA molecules by transformation of a bacterial recipient and selection for ampicillin-resistance colonies

3. Rest. Fragments with sticky ends can associate by complementary base pairing only if they were produced using the same RE.

4. A eukaryotic gene cloned from genomic DNA library is more likely to be expressed in a prokaryotic host-system than the same gene cloned from cDNA library.

5. If a cloned and labeled genomic restriction fragment is used to probe a Southern transfer of a digest of genomic DNA made with the same restriction enzymes, then the number of labeled bands always will be equal to the number of times the cloned sequence is repeated in the genome.

6. Transposons are genetic elements that have the ability to generate copies of themselves; which can be reinserted at another location, apparently randomly into chromosomes.

7. The first class II RE isolated from *Bacillus amyloliqufaciens*H and *Bacillus globigii* are named-- -----and-- respectively.

8. DNA duplex fragments with fully base-paired ends can be joined directly using high concentration of the enzyme--- --- from -----

9. In the cloning of recombinant DNA molecules, a bacterial plasmid often is used as the ----- or ----- for exogenous DNA---- from ---------.

10.

Q-3-B- Choose the correct answer for 5 questions only (1 mark /each)

11- Knowing the DNA coding sequence of a gene would give you [A]; knowing the amino acid sequence of the coded protein would give you [B].

    a. [A] approximate information about the amino acid sequence; [B] approximate information about the DNA sequence

    b. [A] approximate information about the amino acid sequence; [B] precise information about the DNA sequence

    c. [A] precise information about the amino acid sequence; [B] approximate information about the DNA sequence

    d. [A] precise information about the amino acid sequence; [B] precise information about the DNA sequence

    e. none of the above

12. How would you identify the bacterium in a library if you knew the sequence of the protein it coded for?

    a. You would put radioactive protein on the petri dish

    b. You would put a synthetic radioactive nucleotide probe, designed from the protein sequence and the genetic code, onto the petri dish

    c. Because of the antibiotic, only the one of interest would survive

    d. You would check to see whether a protein of the desired sequence is being synthesized by each bacterium

    e. You would use DNA polymerase

13. What is the function of a vector in genetic engineering?

    a- Cut DNA into many fragments   b- Carry DNA into new cell

    c- Link together newly joined fragments of DNA

    d- Make millions of copies of the DNA of interest

    e- Separte fragments of DNA by their length and electric charge

14- Genetic engineering provides the ability to:

    a- propagate and grow in bulk a line of genetically identical organisms,

    b- create organisms containing the same artificially recombinant genetic molecule.

    c- amplify any genetic segment as well as the gene product encoded by it.

    d- All of the above   e- none of the above

15- In genetic engineering the term splicing describes:

    a- Cutting and joining nucleic acid fragments

    b- Cutting and joining DNA fragments

    c- Cutting and joining RNA fragments

    d- Cutting and joining proteins

    e- Cutting and joining nucleic acid fragments and proteins

    f- All of the above   e- none of the above

16. A universal vector for gene expression requires:

    a- Shine-Delgarno sequence and ribosomal binding site.

    b- Multiple cloning site, Shine-Delgarno sequence and ribosomal binding site

    c- Selectable marker, multiple cloning site, Shine-Delgarno sequence and ribosomal binding site

    d- All of the above   e- More than the above

Q-4- A: A circular plasmid vector contains two EcoRI restriction sites is cleaved with EcoRI and annealed with purified EcoRI fragment from different source. Diagram all possible annealing products that contain two fragments or less

and can replicate if introduced into a bacterium. Assume that the plasmid fragments produced by EcoRI cleavage are unequal in size and that the genes required for plasmid replication are on the larger of these fragments. (7.5 marks)

Q-4-B: You are attempting to insert a human gene into a plasmid. You cut the plasmid with a certain restriction enzyme and you cut the human gene with a different restriction enzyme. You find the sticky ends produced in the plasmid are not complementary to those in the human gene. What happened? And how can you fix this problem? Use Drawings to illustrate your answer. (7.5 marks)

Examiners: Prof. Dr. Yehia Ellazeik   Dr. Hesham Elshistawy