

فصل في



Important
remarks

- No. of pages: 3 – Solve in the table.
- Two points to each answer.

Answer the following questions in the table (write only A, B, C, or D):

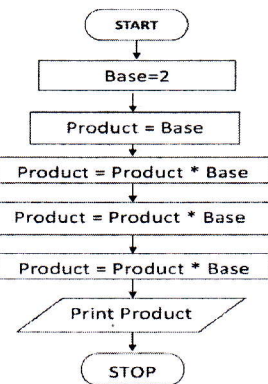
1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	

Choose the correct answer

(50 points)

Q1) What is the function of the algorithm described in this flowchart?

- | | |
|--------------|--------------|
| a. pow(2, 4) | b. pow(2, 3) |
| c. sqrt(64) | d. None |



Q2) What is the output of this flowchart?

- | | |
|-------|-------|
| a. 8 | b. 9 |
| c. 16 | d. 64 |

Q3) is a finite number of step-by-step instructions that accomplish a task.

- | | |
|--------------|---------------|
| a. Algorithm | b. Pseudocode |
| c. Code | d. None |

Q4) Sorting is essential for efficient data retrieval.

- | | |
|---------|----------|
| a. True | b. False |
|---------|----------|

Q5) What will be the time complexity order for this function?

public void ExampleMethod(int[] array)

```

{
    foreach (var item in array)
    {
        Console.WriteLine(item);
    }
}
  
```

- | | |
|-------------|-----------|
| a. $O(n*n)$ | b. $O(1)$ |
| c. $O(n^2)$ | d. $O(n)$ |

Q6) Algorithm A and B have a worst-case running time of $O(n)$ and $O(\log n)$, respectively. Therefore, algorithm B always runs faster than algorithm A.

- | | |
|---------|----------|
| a. True | b. False |
|---------|----------|

Q7) Which of the following sorting algorithms has the lowest worst-case complexity?

- | | |
|-------------------|---------------------------|
| a. Merge Sort | b. Bubble Sort |
| c. Insertion Sort | d. All have the same time |

تاريخ
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Q8) By using insertion sort how will be this array elements look like after the second pass?

34, 8, 64, 51, 32, 21

a. 8, 21, 32, 34, 51, 64

b. 8, 32, 34, 51, 64, 21

c. 8, 34, 51, 64, 32, 21

d. 8, 34, 64, 51, 32, 21

Q9) What is the Big-Oh notation of this function?

$$f(n) = n^2 + 3n! + 4\log n$$

a. $O(n^2)$

b. $O(n^2 + n! + \log n)$

c. $O(n!)$

d. $O(\log n)$

Q10) Complexity analysis focuses only on best-case and worst-case scenarios?

a. True

b. False

Q11) Which of the following examples represent the worst-case input for an insertion sort?

a. Array in sorted order

b. Array sorted in reverse order

c. Normal unsorted array

d. None

Q12) Merge sort uses which of the following technique to implement sorting?

a. Backtracking

b. Greedy algorithm

c. Divide and conquer

d. Dynamic programming

Q13) Consider an array of length 5, $arr[5] = \{9, 7, 4, 2, 1\}$. What are the steps of insertions done while running insertion sort on the array?

a. 7 9 4 2 1, 4 7 9 2 1, 2 4 7 9 1, 1 2 4 7 9

b. 9 7 4 1 2, 9 7 1 2 4, 9 1 2 4 7, 1 2 4 7 9

c. 7 4 2 1 9, 4 2 1 9 7, 2 1 9 7 4, 1 9 7 4 2

d. 7 9 4 2 1, 2 4 7 9 1, 4 7 9 2 1, 1 2 4 7 9

Q14) What is the time complexity of Breadth First Search?

a. $O(n)$

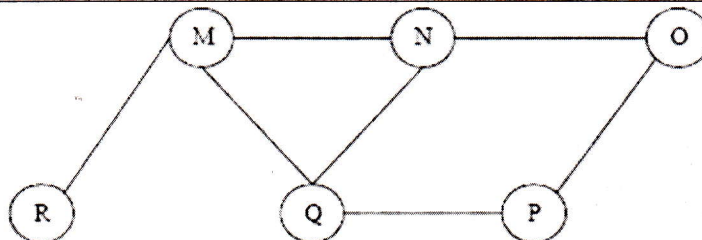
b. $O(n^2)$

c. $O(V+E)$

d. $O(V \cdot E)$

Q15)

The Breadth First Search algorithm has been implemented using the queue data structure. One possible order of visiting the nodes of the following graph is



a. MNOPQR

b. NQMPOR

c. QMNPOR

d. QMNPOR

Q16) The Data structure used in standard implementation of Depth First Search is?

a. Stack

b. Queue

c. LinkedList

d. Tree

الزمن: ساعتان ٢٤ أغسطس ٢٠٢٤ الاجابة في نفس ورقة الاسئلة	كلية العلوم جامعة أسبوط	امتحان نهاية الفصل الدراسي الصيفي : جميع المستويات المقرر: أخلاقيات المهنة والسلامة المهنية رقم المقرر ورمزه: F300
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أجب عن الاسئلة الآتية:

(٢٠ درجة)

السؤال الاول: ضع علامة ✓ او X للعبارات الآتية:

- ١- تدخل السلامة والصحة المهنية في كل مجالات الحياة ()
- ٢- الالتزام بمعايير الجودة من الأخلاقيات الهامة لأي مهنة. ()
- ٣- يشترط في الاقتباس المباشر كتابه اسم مؤلف النص المنقول فقط. ()
- ٤- التقرير هو عرض كتابي او شفوي منهجي مركز لموضوع معين يقدمه فرد او مجموعه. ()
- ٥- يؤدي النهوض بالملكية الفكرية الي دفع عجلة التنمية الاقتصادية واتاحة فرص عمل وصناعات جديدة. ()
- ٦- تستخدم طفاية الرغاوى لإطفاء الحرائق الناتجة عن المواد السائلة القابلة للاشتعال مثل الكحول والمذيبات. ()
- ٧- ضرورة استخدام معدات الوقاية والسلامة الشخصية اثناء العمل وعدم الاستهانة باهميتها ()
- ٨- حماية المهنة والجمهور العام بقواعد أخلاقية تسهل التعامل من خصائص الميثاق الأخلاقي للمهنة. ()
- ٩- من اخلاقيات مهنة التعليم المفضلة من قبل الطلبة اراقتهم بكثرة النشاطات البيتية. ()
- ١٠- عند تخفيف الأحماض المركزة يجب إضافة الحمض للماء والعكس غير صحيح. ()
- ١١- الميثاق الأخلاقي هو مجموعة من القيم العليا التي تسعى المؤسسة او العاملون بها إلي الالتزام بها اثناء ممارسة العمل. ()
- ١٢- توفير طفاية حريق و جهاز كشف الحرائق من شروط الامن و السلامة في المختبر. ()
- ١٣- أخلاقيات المهنة تعني فقط الالتزام بالقوانين والقواعد القانونية الحاكمة للعمل. ()
- ١٤- العمل يقتضي الاتقان بينما المهنة قد يتولاها غير المتقن. ()
- ١٥- من اهم اخلاقيات المهنة التي يجب ان تتوفر في الاستاذ او المعلم التواصل مع طلابه بمختلف مستوياتهم الفكرية وتقريبه منهم. ()
- ١٦- الاقتباس الغير مباشر هو تضمين المعنى بشكل غير مباشر. ()
- ١٧- الحصول علي عمل باتعاب متدنية للغاية تحت ضغط التنافس يترتب عليه تقديم خدمه ذات مستوي متواضع علي اقل تقدير. ()
- ١٨- الالتزام بأخلاقيات العمل يسهم في شيوع الرضا الاجتماعي بين غالبية الناس كنتيجة لعادلة التعامل. ()
- ١٩- الدقة والصدق والأمانة في جميع البيانات الميدانية من اخلاقيات الباحث. ()
- ٢٠- يفيد الاستنساخ في المحافظة على السلالات النادرة سواء كانت نباتية او حيوانية المعرضة للانقراض. ()

السؤال الثاني: اكتب مدلول علامات التحذير والسلامة المهنية الآتية: (١٠ درجات)

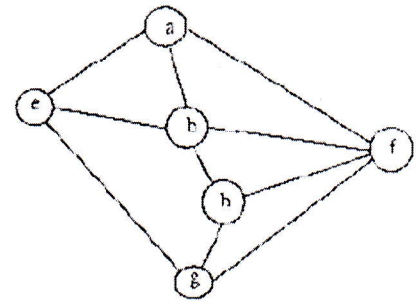
									
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Q17)

Consider the following graph, Among the following sequences:

- (I) a b e g h f
- (II) a b f e h g
- (III) a b f h g e
- (IV) a f g h b e



Which is depth first traversals of this graph?

- | | |
|------------------------|-----------------------|
| a. I, II and IV only | b. I and IV only |
| c. II, III and IV only | d. I, III and IV only |

Q18) Process of inserting an element in stack is called

- | | |
|---------------|-----------|
| a. Pop | b. Create |
| c. Evaluation | d. Push |

Q19) Process of removing an element in stack is called

- | | |
|---------------|-----------|
| a. Pop | b. Create |
| c. Evaluation | d. Push |

Q20)What is the time complexity of Merge sort?

- | | |
|-----------|------------------|
| a. $O(1)$ | b. $O(\log n)$ |
| c. $O(n)$ | d. $O(n \log n)$ |

Q21) Best case time complexity of an algorithm is commonly used for performance guarantees?

- | | |
|--------|-------|
| a. Yes | b. No |
|--------|-------|

Q22) ... time complexity of an algorithm is determined by considering the maximum number of steps it takes to complete, given any input of size n.

- | | |
|-----------------|---------------|
| a. Best Case | b. Worst Case |
| c. Average Case | d. None |

**Q23) static public void Main () {
 Console.WriteLine("Hello World");
}**

What is the time complexity of this program?

- | | |
|-----------|-------------|
| a. $O(1)$ | b. $O(n)$ |
| c. $O(2)$ | d. $O(n^2)$ |

Q24) Assume that we use Bubble Sort to sort n distinct elements in ascending order. When does the best case of Bubble Sort occur?

- | | |
|--|---|
| a. When elements are sorted in ascending order | b. When elements are sorted in descending order |
| c. When elements are not sorted by any order | d. There is no best case for Bubble Sort. It always takes $O(n*n)$ time |

Q25) In operating systems and resource management, sorting algorithms cannot optimize the allocation and scheduling of tasks.

- | | |
|---------|----------|
| a. True | b. False |
|---------|----------|



(Total 50 marks)

A- Choose the correct answer for each of the following (one mark/ each)

1. Metacercaria is an infective stage in the following parasites except
 - (a) *Fasciola gigantica*
 - (b) *Heterophyes heterophyes*
 - (c) *Clonorchis sinensis*
 - (d) *Diphyllbothrium latum*
2. The digestive system is absent in
 - (a) *Diphyllbothrium latum*
 - (b) *Enterobius vermicularis*
 - (c) *Schistosoma mansoni*
 - (d) *Fasciola gigantica*
3. Cercariae of *Schistosoma* and *Fasciola* are different in the following except
 - (a) Tail
 - (b) Penetrating glands
 - (c) a and b
 - (d) Alimentary canal
4. Which of the parasites mainly infects immunosuppressed individuals
 - (a) *Ascaris lumbricoides*
 - (b) *Toxoplasma gondii*
 - (c) *Balantidium coli*
 - (d) *Trichomonas vaginalis*
5. The infective form of *Leishmania* is
 - (a) Promastigotes
 - (b) Epimastigotes
 - (c) Metacyclic trypanosome
 - (d) Crithidia form
6. Asexual cycle in *Plasmodium* sp in human blood includes
 - (a) Gametocytes
 - (b) Trophozoite
 - (b) Merozoites
 - (d) All the above
7. Large trophozoite of *Entamoeba histolytica* feeds on
 - (a) RBC and mucosa
 - (b) blood
 - (c) Digested food
 - (d) Mucosa in the colon
8. The following parasites causes hepatomegaly except
 - (a) *Schistosoma mansoni*
 - (b) *Plasmodium falciparum*
 - (c) *Toxoplasma gondii*
 - (d) *Fasciola hepatica*
9. Habitat of *Entamoeba gingivalis* is
 - (a) Small intestine
 - (b) Large intestine
 - (c) Oral cavity
 - (d) Blood

Answer the following questions:

1- A) Find a root for the following non-linear equation by using Newton-Raphson method:

$$f(x) = x^3 - 4x^2 + 7x - 8 = 0$$

B) Consider the following differential equation:

$$\frac{dy}{dx} = x^2 + y$$

Where, $y(0) = 1$, $y(0.1) = 1.105513$, $y(0.2) = 1.224208$, $y(0.3) = 1.35957$
find $y_p(0.4)$ (predicted value) and $y_c(0.4)$ (corrected value) by using Milen's method.

2- A) Evaluate the following integral using Simpson's 1/3 rule when $h=0.25$
Hence find an approximated value of π .

$$\int_0^1 \frac{1}{1+x^2} dx$$

B) Use Lagrange's interpolation formula to find the value of y when $x = 10$,
If the values of x and y are given as below:

x	5	6	9	11
y	12	13	14	16

10. Which of the following protozoans is transmitted primarily by the motile trophozoite form?
- (a) *Balantidium coli* (b) *Entamoeba histolytica*
 (c) *Giardia lamblia* (d) *Trichomonas vaginalis*
11. Fish farmers are mainly susceptible to infect with
- (a) *Heterophyes heterophyes* (b) *Schistosoma mansoni*
 (c) *Ancylostoma duodenale* (d) None of the above
12. Granulomatous encephalitis is a disease that can be caused by
- (a) *Entamoeba histolytica* (b) *Naegleria fowleri*
 (c) *Acanthamoeba* spp. (d) *Entamoeba coli*
13. In human, malarial parasites multiply by
- (a) Binary fission (b) Budding
 (c) Gametogony (d) Schizogony
14. Auto-infection could be propagated by
- (a) *Ascaris lumbricoides* (b) *Ancylostoma duodenale*
 (c) *Taenia saginata* (d) *Enterobius vermicularis*
15. Sputum swab is used to diagnose
- (a) *Ascaris lumbricoides* (b) *Enterobius vermicularis*
 (c) *Wuchereria bancrofti* (d) *Schistosoma haematobium*
16. The second intermediate host of *Dipyllobothrium latum* is
- (a) Snails (b) Fish
 (c) Frogs (d) Cyclops
17. Which one of the following is a good general statement about the life cycle of cestodes?
- (a) A snail intermediate host is required.
 (b) The infective larval stage must be ingested: either via the predator/prey interaction or due to accidental ingestion of the intermediate host.
 (c) There is always an aquatic larval stage, such as the coracidium.
 (d) Cestodes always require 3 hosts to complete their life cycles.
18. Parasites that are to a given host, but in an abnormal situation are called
- (a) Obligatory parasites (b) Erratic parasites
 (c) Incidental parasites (d) Permanent parasites
19. Consumption of uncooked fish is likely to cause which of the following helminthic disease
- (a) *Dipyllobothrium latum* (b) *Taenia saginata*
 (c) *Fasciola hepatica* (d) *Echinococcus granulosus*

3- A) Find a polynomial satisfied by the following table (by using divided differences interpolation method), then find $f(1)$.

x	-1	0	2	3	7	10
$f(x)$	-11	1	1	1	141	561

B) Find the area enclosed between the curve pass through the points $(1, 0.2)$, $(2, 0.7)$, $(3, 1)$, $(4, 1.3)$, $(5, 1.5)$, $(6, 1.7)$, $(7, 1.9)$, $(8, 2.1)$, $(9, 2.3)$, $(x - \text{axis})$, $(x = 1)$ and $(x = 9)$ by using trapezoidal rule.

4- A) Solve the following equations by using Gauss – Seidal iteration method.

$$8x - 3y + 2z = 20$$

$$4x + 11y - z = 33$$

$$6x + 3y + 12z = 35$$

B) Solve the following differential equation by using Taylor's series method to find $y(0.2)$.

$$\frac{dy}{dx} = xy, \quad y(0) = 2$$

5- A) Solve the following differential equation to find $y(0.6)$ by using Adam's method.

$$\frac{dy}{dx} = x + y, \quad y(0) = 1$$

B) If $f(x) = x^3$ prove that $[a, b, c, d] = 1$

مع أطيب الأمنيات بالتوفيق والنجاح
لجنة الممتحنين: د/ مديحة عبد المجيد

20. The diagnostic stage of *Toxoplasma gondii* in human tissue is
- (a) Oocyst (b) Sporozoite
(c) Bradyzoite (d) Tachyzoite
21. The diagnostic stage of *Giardia lamblia* is
- (a) Cyst in feces (b) Cyst in urine
(c) Quadrinucleated cyst in feces (d) Octanucleated cyst in feces
22. What cestode has an operculated egg similar to the trematodes?
- (a) *Diphyllobothrium latum* (b) *Echinococcus granulosus*
(c) *Taenia saginata* (d) *Fasciola hepatica*
23. Nematodes are differentiated from other worms by the following except
- (a) Absent fragmentation (b) Flat or fleshy leaf-like worm
(c) Separate sexes (d) cylindrical body
24. Which of the following statement is true in respect to trematodes
- (a) Dorso-ventrally flattened (b) Intermediate host is mostly snail
(c) Hermaphrodite except Schistosomes (d) All of the above
25. All the following lead to bloody diarrhea except
- (a) *Schistosoma mansoni* (b) *Entamoeba histolytica*
(c) *Schistosoma haematobium* (d) *Trypanosoma* spp.
26. The definite host in *Trypanosoma* is
- (a) Insect (b) Human
(c) Lice (d) Winged bug
27. The diagnostic stage of *Taenia* spp. is
- (a) Blood in urine (b) Egg in feces
(c) Egg in urine (d) Cercariae in water
28. Diagnostic stage of *Plasmodium* spp. in human blood is
- (a) Ring stage (b) Sporozoites
(c) Merozoites (d) Trophozoite
29. Urogenital flagellate is transmitted by
- (a) Blood transfusion (b) Ingestion of cyst
(c) Sexually (d) Fecal-oral route
30. The diagnostic stage of *Schistosoma haematobium* is
- (a) Egg in urine (b) Egg in feces
(c) Forked tail cercaria in water (d) metacercaria

B- Mention which (True) or (False) of the following sentences (1 marks/each)

31. Infective stage of *Ascaris* sp is cysticeroid larvae ()
32. Oocyst is the zygote after the formation of the cyst wall ()
33. Metacercariae are encysted cercariae without tails ()
34. All cercariae may have both penetration and cystogenous glands ()
35. Zoonoses, are the diseases transmissible between animals ()
36. Parasites is an organism which live at the expense of another ()
37. *Balantidium coli* can reproduce asexual by budding ()
38. *Fasciola* spp. and *Clonorchis* spp. are liver flukes ()
39. Human, cats, and dogs are definitive hosts of *Heterophyes heterophyes* ()
40. Diagnostic stage of *Fasciola gigantica* is eggs in feces ()
41. All protozoans are motile ()
42. Redia stage is larval stage in *Schistosoma* sp ()
43. The vector host of *Plasmodium* spp. in Egypt is female of culex ()
44. *Taenia saginata* differs from *Taenia solium* in the shape of gravid proglottid ()
45. The infective stage of *Ancylostoma duodenale* is filariform larva ()
46. *Enterobius vermicularis* lays eggs containing larvae ()
47. Pulmonary larva is a diagnostic stage of *Ascaris lumbricoides* ()
48. Intermediate host of *Taenia saginata* is cattle ()
49. Cattle infects with liver flukes by consumption of metacercaria with food ()
50. Costa is a cytoplasmic structure seen at the base of undulating membrane of intestinal flagellates ()

Good luck.....Dr. Sara S. Abdel-Hakeem

(15 Marks)

- Form No. **1** to **15**, if we have directory named **Math** in **E:** and file named **Algebra.txt** in **Math**, put true or false:

- Q4: Choose the correct answer:**

(14 Marks)

- Page 2 of 3



Assiut University Faculty of Science Zoology Department	Final Exam of Principles of Embryology (Z334) For Zoology Students	Summer 5th -9- 2024 Time: Two hours Total marks:50
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State true or false: (10 marks)

1. Meroblastic cleavage occurs in isolecithal eggs
2. The larval stage is a characteristic feature of reptiles.
3. Ovoviviparous animals have direct contact with mother through the placenta.
4. Spermatogenesis is the changes of the spermatid to sperm.
5. Protostome animals have undetermined cleavage.
6. External fertilization occurs in terrestrial animals.
7. In human the ovum inserted in the endometrium after 7 days of fertilization
8. In oogenesis the first maturation division occurs after fertilization.
9. The FSH and LH hormones are secreted from the pituitary gland.
10. Gamete cells contain the diploid number of chromosomes.

II- Write the scientific term:(10 marks)

- 1) Period in which the zygote is mitotically divided into blastula.
- 2) The process of production of spermatozoa alone.
- 3) The process by which the ova are produced from the ovary.
- 4) The process of production of ova alone.
- 5) Period in which the organs and systems of the embryo are differentiated.
- 6) The process that the sperm meet the ovum to form the zygote.
- 7) The organ where implantation and nourishment of fertilized ovum takes place.
- 8) Process by which spermatozoa or ova are produced
- 9) Cleavage confine to the germinal disc only.
- 10) Membrane prevents the entrance of sperms.

III- Write the name of the hormone which leads to:(10 marks)

- 1) The growth of the Graafian follicle in the ovary.
- 2) The follicle rupture and the liberation of ovum.
- 3) The appearance of the male secondary sex characters.

Dr. Abdel-Rahiem Ahmed Hashem Mohammed

Dr. Abdel-Rahiem Ahmed Hashem Mohammed

End of Exam, with my best wishes:

1. One program running at all times in computer. ()
2. The programs which include all programs not associated with the operation of the system. ()
3. An extension of main memory that provides large non-volatile storage capacity. ()
4. Basic unit of CPU utilization which comprises ID, counter, register and stack. ()
5. This model maps each user thread to a kernel thread. ()
6. An interface to the services made available by an operating system, generally available as routines written in C and C++. ()
7. Technique to deal with external threats and prevent invalid access attempts. ()

Q5: State the terminology:

(14 Marks)

- a) Protection
b) Security
c) Process state
d) CPU registers
7. The mechanism that involves ensuring that all access to system resources is controlled
- a) Process Control Block
b) multiple threads
c) Process state
d) CPU registers
6. Each process is represented in the operating system through
- a) running
b) new
c) terminated
d) ready
5. When the process is being executed, this state is:
- a) Hard disk
b) Cash
c) Main memory
d) Register
4. Which of the following devices is non-volatile?
- a) Hard disk
b) Cash
c) Main memory
d) Register

- 4) The inhibition of the ovulation and growth of the endometrium.
- 5) Acts on Sertoli cells to support sperm development and maturation.

IV- Chose the correct answer for the following questions:(10 marks)

1- The average range in which the ovum stays alive inside fallopian tube is

- (a) one hour (b) one day (c) 1-2 days (d) 3 days

2-All these structures are derivatives of the endoderm except

- (a) lung (b) thyroid gland (c) epidermis (d) liver

3- FSH and LH hormones are secreted from

- (a) the Graafian follicle (b) the corpus luteum (c) the endometrium (d) the pituitary gland.

4- The skin is derived from the

- (a) Ectoderm (b) mesoderm (c) neural crest (d) ectoderm and mesoderm

5- The epimere is differentiated into

- (a) dermatome (b) myotome (c) sclerotome (d) all answers.

6- Deuterostomes animals have cleavage

- (a) radial (b) circular (c) spiral (d) all answers)

7-The mesodermal somite are found in the gastrula of Amphioxus at the

- (a) ventral side (b) dorsolateral sides (c) dorsal side (d) all answers.

8- Parthenogenesis can be carried out artificially by exposing eggs to

- (a) heat shock (b) electrical shock (c) irradiation (d) all the previous.

9- 100 female gametes are produced from

- (a) 100 original cells primary oocyte (b) 60 oocytes (c) 25 oocytes (d) 10 oocytes.

10- Dorsal root of the spinal nerves are derived from the

- (a) forebrain (b) midbrain (c) hindbrain (d) neural crest

V- Illustrate by drawing two only: (10 marks)

1- The formation of blastula in the toad from the fertilized egg.

2- The structure of hen's egg.

3- the structure of the sperm.

End of questions.....Best of Luck

Dr. Ekbal T. Wassif



Important
remarks

- No. of pages: 2 – Solve in the table.
- Two points to each answer.

Answer the following questions in the table (write only A, B, C, or D):

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	

Choose the correct answer

(50 points)

1. In the Variable View in the SPSS Data Editor, each row represents

- A) A case B) A data point C) A property D) A variable

2. SPSS uses the term 'Scale' to refer to

- A) Categorical data B) Both nominal and ordinal level data C) Both interval and ratio level data D) All of the choices A,B,C

3. Value labels are most likely to be necessary for variables

- A) Nominal B) Ordinal C) Scale D) all

4. The main purpose of using SPSS is to

- A) create presentations B) manage project schedules C) perform statistical analysis on data D) edit images and photos

5. Which type of data can be analyzed using SPSS?

- A) Textual data only B) Numeric data only C) Both textual and numeric data D) Image data only

6. In SPSS, what does "Descriptive" provide information about?

- A) The distribution of a variable B) The correlation between two variables C) The difference between two groups D) The mean of a variable

7. The "One-Way ANOVA" test in SPSS allow users to compare the

- A) means of three or more groups B) means of two groups only C) correlation between two variables D) distribution of a single variable

8. The names of variables in SPSS

- A) cannot contain spaces B) cannot begin with a numeral C) cannot contain any special characters D) All of the choices A,B,C are true

9. Nominal data

- A) have magnitude B) are categorical C) is a synonym for 'continuous' D) are dichotomous

10. The graphical representation of a frequency distribution is called a

- A) Bar chart B) Line chart C) Histogram D) Pie chart

11. In SPSS you can record values of a variable into different categories using the menu

- A) graph B) transform C) data D) analyze

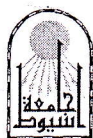
12. 100 students enrolled in 3 courses completed a 5 item 'course satisfaction' questionnaire.

Disregarding the identification variable, how many columns wide will the data file be when looking at it in the Data View of the SPSS Data Editor?

- A) 6 B) 15 C) 100 D) 5

البركة

13. For what is the 'variable view' in IBM SPSS's data editor used?
- A) Entering data B) Writing syntax C) Viewing data analysis output D) Defining variables characteristics
14. the category of the set {1 = blue, 2 = green, 3 = hazel, 4 = gray, 5 = amber}
- A) nominal B) ordinal C) scale D) string
15. the category of the set {1 = high school diploma, 2 = bachelor's degree, 3 = master's degree, 4 = doctoral degree}
- A) nominal B) ordinal C) scale D) string
16. A variable name than a variable label.
- A) is shorter and less detailed B) is longer and more detailed C) is abstract and unspecific D) refers to codes rather
17. A correlation of indicates that there is no straight-line relationship at all.
- A) -2 B) -1 C) 0 D) 1
18. A correlation of indicates that there is a straight-line relationship.
- A) -2 B) -1 C) 0 D) 0.05
19. SPSS stands for
- A) Statistical Package for Social Sciences B) Statistical Program and Software Solutions C) Social and Statistical Processing System D) Software Package for Scientific Studies
20. A cell in SPSS refers to a specific
- A) variable in the dataset B) case or individual unit C) statistical test result D) variable of one case
21. To insert a variable for the blood type we use
- A) scale B) nominal C) ordinal D) string
22. If we need to compare between two classes students' grades, we use
- A) Analyze B) correlation C) t-test D) ANOVA
23. A regression model has an R-squared value of 0.75, this mean that the model
- A) is 75% accurate in pred the dependent variable B) has a standard error of 0.75 C) has a 75% confidence interval D) explains 75% of the variation in the dependent variable
24. A correlation value of -0.8 was obtained, then the relationship between the variable is
- A) $A \propto -B$ B) $A \propto 1/B$ C) no relationship D) weak relationship
25. If the risk estimate is 6, and the patient nonsmokers was 100, then the patient smokers will be about
- A) 17 B) 106 C) 600 D) 160



Final Examination for the 3rd Year Students (Inorganic Chemistry C-321)

Section I (32 Marks)

A) Choose the correct answer from the following: (17 Marks)

- 1) The highest oxidation state normally obtained for Mn is.....
a) +3 b) +7 c) +4
- 2) The oxidation stateof Cu disproportionate in water.
a) +1 b) +2 c) +3
- 3) The oxidation state +3 of the titanium show..... band in the visible spectrum.
a) One b) Two c) Three
- 4) The most common crystalline form of the TiO_2 is.....
a) Rutile b) Anatase c) Brookite
- 5) Elements of titanium group in the oxidation state +3 are:
a) Coloured and diamagnetic b) Coloured and paramagnetic
c) Colourless and paramagnetic
- 6) For chromium, the most stable oxidation state is
a) +2 b) +3 c) +6
- 7) V_2O_5 has red orange colour due to:
a) d-d transition b) defect in the crystal structure c) charge transfer
- 8) Titanium dioxide, TiO_2 is oxide
a) Acidic b) basic c) amphoteric
- 9) The Cr^{2+} is very strong agent.
a) Reducing (b) oxidizing (c) both a,b
- 10) The 3d transition series contains elements having an atomic number from
a) 21 to 30 b) 21 to 31 c) 22 to 30
- 11) The structure of chlorotitanic acid is.....
a) H_2TiCl_6 b) H_2TiCl_4 c) H_3TiCl_3
- 12) In Kroll process, titanium tetrachloride is reduced to the titanium metal using:
a) Na b) Mg c) W
- 13) The formation of which of the following compounds is used for identification of chloride ions in the solution.....
a) CrO_2Cl_2 b) TiOCl_2 c) CrCl_3
- 14) Transition elements exhibit variable valency because they release electrons from
a) ns orbitals b) np orbitals c) (n-1)d orbitals
- 15) Which ion has the highest paramagnetic character?
a) Mn^{2+} b) Cr^{3+} c) Sc^{3+}
- 16) Which of the following reasons is responsible for the formation of alloys by transition elements?
a) They have same atomic number b) They have same electronic configuration
c) They have nearly same atomic size



أولاً: أجب عن السؤال التالي :- (14 درجة - كل فقرة 7 درجات)

- (1) (أ) إذا كانت $\varphi : (G, *) \rightarrow (H, \times)$ تماثل من الزمرة $(G, *)$ إلى الزمرة $(H, \times)$ ، وأن $\psi : (H, \times) \rightarrow (K, \otimes)$ تماثل من الزمرة $(H, \times)$ إلى الزمرة $(K, \otimes)$ فاثبت أن: $(\psi \circ \varphi) : (G, *) \rightarrow (K, \otimes)$ هو أيضاً تماثل.

- (ب) إذا كانت $(H_1, *)$, $(H_2, *)$ زميرتان جزئيتان من الزمرة $(G, *)$ فاثبت أن $(H_1 H_2, *)$ زمرة جزئية من $(G, *)$ إذا وفقط إذا كان $H_1 H_2 = H_2 H_1$.

ثانياً: أجب عن الأسئلة التالية :- (12 درجة لكل سؤال - كل فقرة 6 درجات)

- (2) (أ) أثبت أن علاقة التطابق بمعيار n هي علاقة تكافؤ.

- (ب) إذا كانت φ تشاكل من الزمرة $(G, *)$ إلى الزمرة $(G', \circ)$ فاثبت أن :

$$(\text{Ker } \varphi, *) \text{ زمرة جزئية ناظرية من الزمرة } (G, *).$$

- (3) (أ) كون جدول النظام $(Z_5, +_5)$ وبين أنه زمرة إبدالية ثم أوجد أصغر قيمة غير سالبة x في كل حالة من الحالات الآتية:

$$(i) [41] +_5 [x - 1] = [14]^{-1} \quad (ii) [x + 1]^{-1} +_5 [2] = [2]^{-1}$$

- (ب) إذا كانت φ تشاكل من الزمرة $(G, *)$ إلى الزمرة $(G', \circ)$ وكانت $(H, *)$ زمرة جزئية ناظرية من الزمرة $(G, *)$ ، وكان $\varphi(G) = G'$ فاثبت أن: $(\varphi(H), \circ)$ زمرة جزئية ناظرية من الزمرة $(G', \circ)$.

- (4) (أ) إذا كانت $(G, *)$ زمرة أثبت أن $(a * b)^{-1} = b^{-1} * a^{-1}$, $\forall a, b \in G$.

- (ب) إذا كانت φ تشاكل من الزمرة $(G, *)$ إلى الزمرة $(G', \circ)$ وكانت $(H', \circ)$ زمرة جزئية ناظرية من الزمرة $(G', \circ)$ فاثبت أن: $(\varphi^{-1}(H'), *)$ زمرة جزئية ناظرية من الزمرة $(G, *)$.

إنتهت الأسئلة مع تمنياتنا لكم بالتوفيق

د. عاطف أبو الخير

17) In alkaline solution, MnO_4^- changes to

- a) MnO_4^{2-} b) MnO_2 c) Mn_2O_3

B) Complete the following equations (balance if necessary). (15 Marks)

- a) $2\text{VF}_4 = \dots\dots\dots + \dots\dots\dots$ (at 600 °C)
- b) $\text{K}_2\text{Cr}_2\text{O}_7 + \text{S} = \dots\dots\dots + \dots\dots\dots$
- c) $2\text{NH}_4\text{VO}_3 = \dots\dots\dots + \dots\dots\dots$ (under heat)
- d) $\text{K}_2\text{Cr}_2\text{O}_7 + \text{HCl (conc. H}_2\text{SO}_4) = \dots\dots\dots + \dots\dots\dots + \dots\dots\dots$
- e) $\text{MnO}_2 + \text{Al} = \dots\dots\dots + \dots\dots\dots$
- f) $(\text{VO})^{2+} + \text{H}^+ + \text{Sn}^{2+} = \dots\dots\dots + \dots\dots\dots + \dots\dots\dots$

Section II (18 Marks)

1- Name each of the following coordination compounds: (5 Marks)

- i) $\text{K}[\text{AgCl}_2]$, ii) $[\text{Pt}(\text{NH}_3)_4(\text{NO}_2)\text{Cl}]\text{SO}_4$, iii) $[\text{Cr}(\text{en})_2\text{Cl}_2]^+$,
iv) $[\text{Co}(\text{NH}_3)_5(\text{ONO})]\text{Cl}_2$ and v) $[(\text{NH}_3)_5\text{Cr}(\text{OH})\text{Cr}(\text{NH}_3)_5]\text{Cl}_5$

2- The magnetic moment of $[\text{MnBr}_4]^{2-}$ is 5.9 B.M., what is the hybridization scheme and the geometry of this complex ion? (Atomic no. for Mn = 25).
(6 Marks)

3- For the following coordination compounds show whether EAN rule is applied or not?
 i) $[\text{Cr}(\text{en})\text{I}_4]^-$, ii) $\text{K}_3[\text{Fe}(\text{CN})_6]$, iii) $[\text{AgCl}_2]^-$ and iv) $[\text{Cu}(\text{NH}_3)_4]^{2+}$
 (Atomic no. for Cr = 24, Fe = 26, Cu = 29, Kr = 36, Ag = 47 and Xe = 54).
 (4 Marks)

4- Write the formulas for the following coordination compounds: (3 Marks)

- i) Tetraamminediaquacobalt(III)chloride
- ii) Iron (III) hexacyanoferrate(II)
- iii) Potassiumtetracyanonickelate(II)

Best Wishes

Examiners: Dr. Soliman Abdel Fadeel and Dr. Mohamed Abdel megeed

Faculty of Science		كلية العلوم
Department of Mathematics		قسم الرياضيات
امتحان نهائي الفصل الدراسي الصيفي للعام الجامعي 2024/2023م		
التاريخ: 2024/08/28م		كلية العلوم
الزمن: ساعتان	313 رياض	مقرر : معادلات تفاضلية (2)

اجب عن الأسئلة الآتية: علما بان الدرجة من 50 درجة موزعة بالتساوي
السؤال الأول:

(أ) أوجد الحل العام للمعادلة التفاضلية : $x^2 y'' - xy' + y = 2x \log x$
(ب) بالتحويل الي الصورة القياسية , أوجد الحل العام للمعادلة التفاضلية :

$$x^2 y'' + 2x^3 y' + (x^4 + x^2 + \frac{1}{4})y = 0, \quad (x > 0)$$

السؤال الثاني:

(أ) بين ما اذا كانت المعادلة التفاضلية : $(x^2 + 1)y'' + 4xy' = 2(\cos x - x) - y$ تامة ام لا , ثم اوجد الحل العام للمعادلة التفاضلية
(ب) أوجد قيمة $\phi(z)$ التي تجعل المعادلة

$$(2x^2 + 2xy + 2xz^2 + 1)dx + dy + \phi(z)dz = 0$$

قابلة للتكامل ثم اوجد حل المعادلة

السؤال الثالث:

(أ) بحذف الدوال الاختيارية f, g من العلاقة $z = f(x - 2y) + g(x + 2y)$ كون المعادلة التفاضلية الجزئية :

(ب) أوجد الحل العام للمعادلة التفاضلية الجزئية:

$$yp + xq + x + y = 0$$

والحل الخاص الذي يمر خلال المنحني : $e^{x+y} = 2x(x + y), z = 0$

السؤال الرابع :

(أ) إذا كانت α كمية ثابتة فأوجد حلا للمعادلة التفاضلية الجزئية :

$$z_{xx} - \alpha^2 z_{yy} = 0$$

إذا كان $z = 0$ عندما $x \rightarrow \infty$ او $y \rightarrow \infty$

(ب) اوجد الحل العام للمعادلة التفاضلية الجزئية:

$$(D_1^2 + 5D_1 D_2 + 6D_2^2)z = e^{2x+3y}; \quad D_1 = \frac{\partial}{\partial x}, D_2 = \frac{\partial}{\partial y}$$

Assiut University



Faculty of Science
Chemistry Department

Final Examination for 3rd (General Division)
Photochemistry and Active Intermediates (313 C) (Summer Term)

Date: Saturday, 7/09/2024

Time: 3 hours

Answer Seven Only from the following:

(50 points)

- 1) Compare between the properties of Excited state and Ground state.
- 2) Indicate the advantages of Microwave Radiations in organic synthesis.
- 3) Explain briefly the photosensitization process on the light of the photodimerization of 1,3-butadiene.
- 4) Compare between the electronic configuration of singlet and triplet carbenes.
- 5) Describe the selection rule with special reference to spin forbidden transitions.
- 6) Discuss the storage of Solar Energy in Inorganic Compounds
- 7) Discuss the photo sensitization process on the light of Wigner spin conservation rule.
- 8) Explain the difference between Photo- reactions and Thermal reactions.

الامتحان الشفوي : (10 درجات)

- 1) Describe the methods used for determination the reaction mechanism in Photochemistry with special reference to the product Quantum yield method.

Good Luck

Examiner:

Prof. Dr. Kamal Ibrahim Aly

الفرقة

Physical Chemistry III Examination (C-332)

Answer the following questions:

(50 Marks)

Question One: Choose the correct answer for the following:

(35 marks)

- successfully explained the blackbody radiation by assuming that energy is quantized.
a) Planck b) De Broglie c) Einstein d) Schrödinger e) Bohr
- proposed the wave-particle duality of matter.
a) Planck b) De Broglie c) Einstein d) Schrödinger e) Bohr
- The wavelength of a wave associated with a moving object is its mass.
a) directly dependent on b) inversely dependent on c) independent of
- In the photoelectric effect, the kinetic energy of ejected electrons is the intensity of the incident light.
a) directly dependent on b) inversely dependent on c) independent of
- The is the total energy operator.
a) Hamiltonian b) eigenvalue c) eigenfunction d) wavefunction
- The energy of a particle on a ring depends on quantum number(s)
a) 1 b) m_l c) n
- For a hydrogen atom, the degeneracy of the level with $n = 3$ is
a) 3 b) 6 c) 7 d) 9
- The energy of an electron in the 1s orbital of a hydrogen atom is eV.
a) -13.6 b) -1 c) -3.4 d) -6.8
- Ψ_{310} is referred to as the orbital(s).
a) 1s b) 3s c) 3p d) 3d
- is a system with uniform periodicity over time.
a) A harmonic oscillator b) An anharmonic oscillator c) A rigid rotor
- The potential energy of a harmonic oscillator is
a) $(kx^2)/2$ b) $-kx$ c) kx d) $(kx)/2$
- The energy of is quantized.
a) classical harmonic oscillator b) quantum harmonic oscillator
c) particle in a box d) free particle

Q1 Complete [value] and/or (unit) of 10 of the following constants [5 grades] :

Constant	Symbol	Value	units
Elementary electron charge	e	1.602×10^{-19}	()
Electron rest mass	M_e	9.11×10^{-31}	()
Electron charge to mass ratio	e/m	[]	(coul/kg)
Proton rest mass	M_p	1.67×10^{-27}	()
Boltzmann constant	k	1.38×10^{-23}	()
Proton to electron mass ratio	M_p / M_e	[]	()
Gravitation constant	G	6.67×10^{-11}	()
Acceleration of gravity	g	[]	(m / (sec) ²)
Permittivity of free space	ϵ_0	8.854×10^{-12}	()
Permeability of free space	μ_0	$4 \pi \times 10^{-7}$	()
Planck's constant	h	6.6256×10^{-34}	()
Avogadro's number	A_r	6.023×10^{23}	()

Q2 Choose the correct answer of the following (each of 1.5 grades) :

- A system of N non-interacting classical point particles is constrained to move on the two-dimensional surface of a sphere. The internal energy of the system is
 (a) $(3/2) N k_B T$ (b) $(/2) N k_B T$ (c) $(3/2) N k_B T$ (d) $(5/2) N k_B T$
- Which of the following atoms cannot exhibit Bose-Einstein condensation, even in Principle: (a) 1H_1 (b) $(/2) ^4H_2$ (c) $^{23}Na_{11}$ (d) $^{30}K_{19}$
- For a two-dimensional free electron gas, the electronic density n , and the Fermi energy E_F , are related by $n =$
 (a) $(2mE_F)^{3/2} / (3 \pi^2 \hbar^3)$ (b) $(mE_F) / \pi \hbar^2$ (c) $(mE_F) / 2 \pi \hbar^2$ (d) $(2mE_F)^{3/2} / \pi \hbar$
- A system of N non-interacting and distinguishable particle of spin 1 is in thermodynamic equilibrium. The entropy of the system is
 (a) $2k_B \ln N$ (b) $3k_B \ln N$ (c) $N k_B \ln 2$ (d) $N k_B \ln 3$
- For an ideal Fermi gas in three dimensions, the electron velocity V_F at the Fermi surface is related to electron concentration n as,
 (a) $V_f \propto n^{2/3}$ (b) $V_f \propto n$ (c) $V_f \propto n^{2/3}$ (d) $V_f \propto n^{1/3}$
- A system of N non-interacting and distinguishable particle, each of mass m and spin 1 in thermodynamic equilibrium. The entropy of the system is A and velocity components are v_x, v_y , and v_z . Its mean value of $(v_x + v_y)^2$ is
 (a) $(k_B T/m)$ (b) $(3/2) (2k_B T/m)$ (c) $(1/2) (k_B T/m)$ (d) $2(k_B T/m)$
- The total energy, E of an ideal Fermi gas in three dimensions is given by $E \propto (N^{5/3} / V^{2/3})$ where N is the number of particles and V is the volume. Identify the correct equation of state
 (a) $P V = (1/3) E$ (b) $P V = (2/3) E$ (c) $P V = E$ (d) $P V = (5/3) E$
- If Planck's constant were zero, then the total energy contained in a box filled with

13. The quantum number of a can take the value of 0.

- a) harmonic oscillator b) particle in a box c) rigid rotor

14. The energy of the $3d$ subshell of the hydrogen atom the energy of $3p$ subshell.

- a) higher than b) lower than c) equals

15. is the number of cycles per second.

- a) Wavelength b) Frequency c) Wavenumber

16. The separation between the energy levels is the lowest.

- a) rotational b) vibrational c) electronic

17. has a permanent dipole.

- a) HF b) CO c) NO₂ d) H₂O

18. CO has spectra.

- a) rotational b) vibrational c) Raman

19. is symmetric top.

- a) Benzene b) Ammonia c) Methyl chloride

20. has a center of symmetry.

- a) HCl b) CH₄ c) CHCl₃ d) CH₂Cl₂

21. show(s) rotational spectra.

- a) NO b) HCN c) Ethylene d) Acetylene

22. spectroscopy reveals the function groups in a molecule.

- a) UV-vis b) IR c) Microwave d) Raman

23. The ground state energy of is higher than zero.

- a) Rotational energy b) vibrational energy c) particle in a box

24. Water has rotational degrees of freedom.

- a) 1 b) 2 c) 3 d) 6

25. The stretching of C=C in ethylene is active.

- a) IR b) Raman

26. CCl₄ is active.

- a) IR b) microwave c) Raman

27. The asymmetric stretching of water is

- a) IR b) Raman

28. CHCl₃ is active.

- a) IR b) microwave c) Raman

radiation of all frequencies at temperature T would be (k is the Boltzmann constant and T is nonzero : (a) zero (b) infinite (c) $(3/2) k_B T$ (d) $k_B T$)

9. Across a first order phase transition, the free energy is

- (a) proportional to temperature (b) a discontinuous function of temperature
(c) a continuous function of the temperature but its first derivative is discontinuous
(d) such that the first derivative with respect to temperature is continuous

10. Two gases separated by an impermeable but movable partition are allowed to freely exchange energy. At equilibrium, the two sides will have the same

- (a) pressure and temperature (b) volume and temperature
(c) pressure and volume (d) volume and energy

11. Consider a linear collection of N independent spin $1/2$ particles, each at a fixed location. The entropy of this system is (k is the Boltzmann constant)

- (a) zero (b) $N k_B$ (c) $(1/2) N k_B$ (d) $N k_B \ln(2)$

12. Consider a system whose three energy levels are given by $0, \epsilon$ and 2ϵ . The energy level ϵ is two-fold degenerate and the other two are non-degenerate. The partition function of the system with $\beta = (1/k_B T)$ is:

- a) $(1 + 2 e^{-\beta\epsilon})$ (b) $(2 e^{-\beta\epsilon} + e^{-2\beta\epsilon})$ (c) $(1 + e^{-\beta\epsilon})^2$ (d) $(1 + e^{-\beta\epsilon} + e^{-2\beta\epsilon})$

13. Consider a gas of atoms obeying M. B. statistics. The average value of $e^{a \cdot p}$ over all the moments p of each particles where a is a constant vector and a is its magnitude, m is the mass of atom, is: (a) one (b) zero (c) $e^{-(1/2) a^2 m k T}$ (d) $e^{-(3/2) a^2 m k T}$

14. Two identical fermions:

- (a) $e^{-2\beta\epsilon} + e^{-4\beta\epsilon} + e^{-6\beta\epsilon} + e^{-8\beta\epsilon}$ (b) $e^{-3\beta\epsilon} + e^{-4\beta\epsilon} + e^{-5\beta\epsilon} + e^{-6\beta\epsilon} + e^{-7\beta\epsilon}$
(c) $(e^{-\beta\epsilon} + e^{-2\beta\epsilon} + e^{-3\beta\epsilon} + e^{-4\beta\epsilon})^2$ (d) $e^{-2\beta\epsilon} - e^{-4\beta\epsilon} + e^{-6\beta\epsilon} - e^{-8\beta\epsilon}$

15. Two distinguishable particles:

- (a) $e^{-2\beta\epsilon} + e^{-4\beta\epsilon} + e^{-6\beta\epsilon} + e^{-8\beta\epsilon}$ (b) $e^{-3\beta\epsilon} + e^{-4\beta\epsilon} + e^{-5\beta\epsilon} + e^{-6\beta\epsilon} + e^{-7\beta\epsilon}$
(c) $(e^{-\beta\epsilon} + e^{-2\beta\epsilon} + e^{-3\beta\epsilon} + e^{-4\beta\epsilon})^2$ (d) $e^{-2\beta\epsilon} - e^{-4\beta\epsilon} + e^{-6\beta\epsilon} - e^{-8\beta\epsilon}$

16. Which one of the following is a fermion

- (a) α particle (b) ${}^9_4\text{Be}$ (c) hydrogen atom (d) deuteron

17. For a black body radiation in a cavity, photons are created and annihilated freely as a result of emission and absorption by the walls of the cavity. This is because

- (a) the chemical potential of the photons is zero (b) photons obey Pauli exclusion principle
(c) photons are spin-1 particles (d) the entropy of the photons is very large

18. In Bose-Einstein condensation, the particles

- (a) have strong interparticle attraction (b) condense in real space
(c) have overlapping wavefunctions (d) have large and positive chemical potential

19. The total power emitted by a spherical black body of radius R at a temperature T is P_1 . Let P_2 be the total power emitted by another spherical black body of radius $(R/2)$ kept at temperature $2T$. The ratio (P_1 / P_2) is _____. (Give your answer upto two decimal places)

29. has the highest polarizability.
 a) CH_4 b) CH_3Br c) CH_3F d) CH_3Cl
30. has the most intense Raman signal.
 a) Ethylene b) Acetylene c) 1,3,5-hexatriene d) 1,3-butadiene
31. The possible electronic transition(s) in CHCl_3 is/are
 a) $\sigma \rightarrow \sigma^*$ b) $\pi \rightarrow \pi^*$ c) $n \rightarrow \sigma^*$ d) $n \rightarrow \pi^*$
32. The possible electronic transition(s) in CO_2 is/are
 a) $\sigma \rightarrow \sigma^*$ b) $\pi \rightarrow \pi^*$ c) $n \rightarrow \sigma^*$ d) $n \rightarrow \pi^*$
33. In fluorescence, the emitted light will have wavelength compared to the absorbed light.
 a) shorter b) longer c) the same
34. is a symmetry forbidden non-radiative transition.
 a) Phosphorescence b) Fluorescence c) Internal conversion d) Intersystem crossing
35. The wavelength of an $n \rightarrow \pi^*$ transition in a polar solvent is nonpolar solvents.
 a) higher than b) lower than c) the same as

Question Two: Answer ONLY THREE of the following:

(15 marks)

- 1) Derive the time-independent Schrödinger equation in one dimension.
- 2) Derive the solution for the Schrödinger equation for an electron moving in a one-dimensional box. Write down the expression for the energy and show that it is quantized.
- 3) Electrons are used to determine the structure of crystal surfaces. To have diffraction, the wavelength of the electrons should be on the order of the lattice constant, which is typically 0.30 nm. Calculate the energy of such electrons. ($m_e = 9.109 \times 10^{-31} \text{ kg}$)
- 4) The force constant for HCl is 477 Nm^{-1} . Calculate the frequency for the vibration of HCl.
 $H = 1.008$, $Cl = 34.969$, $H = 1.67343 \times 10^{-27} \text{ kg}$, $c = 2.99793 \times 10^8 \text{ ms}^{-1}$, $h = 6.626 \times 10^{-34} \text{ Js}$

With My Best Wishes

Dr. Ahmed A. K. Mohammed

20. The entropy S of a system of N spins, which may align either in upward or in downward direction, is given by $S = -k_B N [P \ln P + (1-P) \ln(1-P)]$. The probability of alignment in the upward direction is p . The value of p , at which the entropy is maximum, is _____. (Give your answer upto one decimal place)
21. Consider a gas atoms obeying M. B. statistics. Average value of $e^{a \cdot p}$ over all the moments p of each particles where a is a constant vector and a is its magnitude, m is the mass, is
 (a) one (b) zero (c) $e^{-(1/2)a^2mkT}$ (d) $e^{-(3/2)a^2mkT}$
22. In how many ways two particles can be arranged in three phase cells according to B-E statistics A) 6 B) 9 C) 3 D) 27
23. Pauli's exclusion principle applies to
 A) M-B Statistics B) F-D Statistics C) B-E Statistics D) None
24. Volume of phase space is
 A) h B) h^2 C) h^3 D) None
25. N atoms of an ideal gas are enclosed in a container of volume V . The volume of the container is changed to $V/4$, while keeping the total energy constant. The change in the entropy of the gas, in units of $N k_B \ln(2)$, is ____, where k_B is the Boltzmann constant.
26. A two-level system has energies zero and E . The level with zero energy is non-degenerate, while the level with energy E is triply degenerate. The mean energy of a classical particle in this system at a temperature T (take $\beta = (1/k_B T)$) is:
 (a) $E e^{-\beta E} / (1 + 3e^{-\beta E})$ (b) $E e^{-\beta E} / (1 + e^{-\beta E})$
 (c) $3E e^{-\beta E} / (1 + e^{-\beta E})$ (d) $3E e^{-\beta E} / (1 + 3e^{-\beta E})$
27. Consider N non-interacting, distinguishable particles in a two-level system at temperature T . The energies of the levels are 0 and ϵ where $\epsilon > 0$. In the high temperature limit $\epsilon < k_B T$, what is the population of particles in level energy ϵ
 A) $N/2$ B) N C) $N/4$ D) $3N/4$
28. Two solid spheres A and B have same emissivity. The radius of A is four times the radius of B and temperature of A is twice the temperature of B. The ratio of the rate of heat radiated from A to that from B is _____
29. Consider a one-dimensional gas of N non-interacting particles of mass m with the Hamiltonian for a single particle given by $H = (P^2/2m) + (1/2) m \omega^2 (x^2 + 2x)$
 The high temperature specific heat in units of $R = N k_B$ is
 A) 1 B) 1.5 C) 2 D) 2.5
30. A large number N of ideal bosons, each of mass m , are trapped in a three-dimensional Potential $V(r) = m \omega^2 r^2 / 2$. The bosonic system is kept at temperature T which is much lower than the Bose-Einstein condensation temperature (T_C). The chemical potential μ satisfies
 (a) $\mu \leq (3/2) \hbar \omega$ (b) $2\hbar \omega > \mu > (3/2) \hbar \omega$ (c) $3\hbar \omega > \mu > 2\hbar \omega$ (d) $\mu = 3\hbar \omega$

*** The End *** Good Luck *** Prof. Galal S. Hassan ***

Inorganic Chemistry III Final Examination (C-324)

Answer the following questions:

(50 Marks)

Question One: Choose the correct answer:

(14 Marks)

- Lanthanides are
a) highly electropositive b) moderately electropositive
c) highly electronegative d) moderately electronegative
- has a partially filled **4f** subshell.
a) **La** b) **Lu** c) **Ce** d) all of the preceding
- The principal oxidation state for lanthanides is
a) **+2** b) **+3** c) **+4** d) **+6**
- Lanthanides are agents in their **+2** oxidation state and agents in **+4** oxidation state.
a) oxidizing/oxidizing b) reducing/reducing c) oxidizing/reducing d) reducing/oxidizing
- The basicity of hydroxides of lanthanides with increasing the atomic number.
a) increases b) decreases c) stays constant d) a or b
- is diamagnetic.
a) **La³⁺** b) **Lu³⁺** c) **Yb²⁺** d) all the preceding
- Lanthanides resemble s-block elements in
a) electronegativity b) metallic radii c) a and b d) neither a or b
- are radioactive.
a) Lanthanides b) Actinides c) a and b d) neither a or b
- treats the interaction between the metal ion and the ligands as electrostatic.
a) VBT b) CFT c) LFT d) MOT
- treats the interaction between the metal ion and the ligands as covalent.
a) VBT b) CFT c) LFT d) MOT
- Complexes with coordination number **4** have geometry.
a) tetrahedral b) square planar c) trigonal planar d) a and b
- The most common coordination number for complexes is
a) **2** b) **3** c) **4** d) **6**
- Strong ligands form spin complexes and weak ligands form spin complexes.
a) high, high b) low, low c) low, high d) high, low
- is a strong ligand
a) **CN⁻** b) **SCN⁻** c) **NH₃** d) a and b

Please turn over the page



Answer all the following questions

Question (I): Put (✓) or (×) for all the following sentences:

(15 Marks)

1. Crystal structure = base + lattice ().
2. A crystalline material is one in which the atoms are randomly distributed relative to each other ().
3. The unit cell is the basic structural unit or building block of the crystal structure and defines the crystal structure by virtue of its geometry and the atom positions within ().
4. The primitive unit cell contains the same kind of atoms, while the Bravais lattice contains only one lattice point ().
5. Non-crystalline or amorphous materials are not crystallized, or the atoms are randomly arranged ().
6. The primitive cell is a larger cell and contains more than one lattice point ().
7. In Bravais lattice, all lattice points are equivalent and all atoms in the crystal are of the same kind ().
8. In a simple cubic (SC) crystal structure, the number of atoms per unit cell is 2 ().
9. The cubic system has the greatest degree of symmetry, but the orthorhombic system has the least symmetry ().
10. In a simple cubic (SC) crystal structure, the atomic packing factor (APF) for this structure is 0.57 ().
11. The coordination number is the number of nearest-neighbor or touching atoms ().
12. In a simple cubic (SC) crystal structure, the coordination number for this structure is 6 ().
13. The unit cell geometry is completely defined in terms of six parameters (lattice parameters of a crystal structure): the three edge lengths a , b , and c , and the three inter-axial angles α , β , and γ ().
14. In Face-Centered Cubic (FCC) crystal structure, the relation between atomic radius, R , and unit cell length, a , given by $a=2\sqrt{2}R$ ().
15. In the cubic system $a = b = c$ and $\alpha = \beta = \gamma = 120^\circ$ ().
16. In the triclinic system $a \neq b \neq c$ and $\alpha \neq \beta \neq \gamma$ ().
17. In a simple cubic (SC) crystal structure, the relation between atomic radius, R , and unit cell length, a , is given by $R=2a$ ().
18. In Face-Centered Cubic (FCC) crystal structure, the number of atoms per unit cell is 6 ().
19. In the Hexagonal Close-Packed (HCP) crystal structure, the coordination number for this structure is 8 ().

Question Two: Answer only three of the following

(12 Marks Each)

1- a) Identify the type of hybridization and geometry for the following complexes



b) Explain briefly the crystal field splitting in octahedral complexes.

c) Discuss briefly the effect of the nature of the ligand on the magnitude of Δ_o .

2- a) Explain the blue colour of the $[\text{Cu}(\text{NH}_3)_4]^{2+}$ by CFT.

b) Compare between lanthanides and actinides regarding:

- binding energies of f electrons - maximum oxidation state
- f electrons shielding effect - colour of ions
- magnetic properties - tendency to form complexes

3- a) Complete the following equations:

1. $\text{Ln} + \text{H}_2\text{O} \rightarrow$
2. ${}^{226}_{88}\text{Ra} + {}^1_0\text{n} \rightarrow$
3. $\text{UO}_3 + \text{CO} \rightarrow$
4. $\text{Ln}_2\text{O}_3 + \text{NH}_4\text{Cl} \rightarrow$

b) Give reasons for the following:

- i) Although lanthanum has an empty $4f$ subshell, it is considered in the group of lanthanides.
- ii) The elements **La**, **Gd** and **Lu** display only +3 valency.
- iii) Lanthanides are moderate in their complex forming ability.
- iv) Chemical properties of lanthanides are very similar to each other.

4- a) What is meant by the following:

- lanthanide contraction - crystal field splitting
- Jahn–Teller Effect - crystal field stabilization energy

b) "Crystal field theory is a definite improvement over the valence bond theory." Discuss this statement and give reasons.

Atomic numbers: Co=27, Ni=28, Cu=29, La=57, Ce=58, Gd=64, Yb=70, Lu=71

20. In Face-Centered Cubic (FCC) crystal structure, the atomic packing factor (APF) for this structure is 0.74 ().
21. In Hexagonal Close-Packed (HCP) crystal structure, the ratio between c and a is $\frac{\sqrt{8}}{3}$ ().
22. In Body-Centered Cubic (BCC) crystal structure, the number of atoms per unit cell is 4 ().
23. In Face-Centered Cubic (FCC) crystal structure, the coordination number for this structure is 10 ().
24. In Body-Centered Cubic (BCC) crystal structure, the atomic packing factor (APF) for this structure is 0.54 ().
25. In the Hexagonal Close-Packed (HCP) crystal structure, the atomic packing factor (APF) for this structure is 0.74 ().
26. In Body-Centered Cubic (BCC) crystal structure, the relation between atomic radius, R, and unit cell length, a, given by $a = \frac{4\sqrt{3}R}{3}$ ().
27. In the Hexagonal Close-Packed (HCP) crystal structure, the number of atoms per unit cell is 4 ().
28. In Hexagonal Close-Packed (HCP) crystal structure, the relation between atomic radius, R, and unit cell length, a, is given by $a = 2R$ ().
29. The atomic radius (R) is defined as the distance between the atom's center and the atom's surface. ().
30. The most efficient packing is present in BCC and SC cells ().

Question (II):

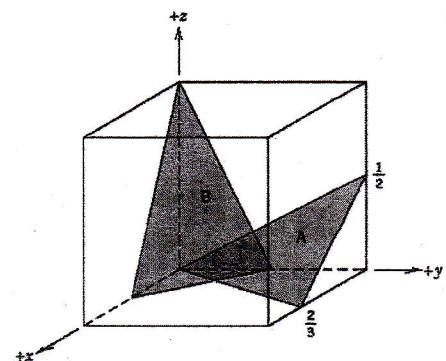
(18 Marks)

In the following multiple-choice questions, circle the correct answer. You MUST write down the steps to get the correct answer.

1. Miller indices for the indicated A plane in the figure below is:

A. $(2\bar{1}0)$ B. $(3\bar{2}4)$ C. (221) D. $(\bar{1}21)$ E. $(0\bar{1}1)$

.....



2. Iridium has an FCC crystal structure, a density of 22.4 g/cm^3 , and an atomic weight of 192.2 g/mol , then the radius of an iridium atom is:
 A. 0.553nm B. 0.439nm C. 0.363nm D. 0.211nm E. 0.136nm

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3. Iron has a BCC crystal structure, an atomic radius of 0.124 nm, and an atomic weight of 55.85 g/mol; its theoretical density is closest to [Hint: $N_A=6.025 \times 10^{23}$ atoms/mol]:
- A. 9.92 g/cm³ B. 8.40 g/cm³ C. 7.90 g/cm³ D. 6.35 g/cm³ E. 4.3 g/cm³

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4. The linear density expression for FCC [100] direction in terms of the atomic radius R is:
- A. $\frac{1}{2\sqrt{2}R}$ B. $\frac{1}{\sqrt{2}R}$ C. $\frac{1}{2\sqrt{6}R}$ D. $\frac{1}{6R}$ E. $\frac{1}{2\sqrt{3}R}$

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5. Copper has a density of 8.89 g/cm³, an FCC crystal structure, and an atomic weight of 63.5 g/mol. Then its atomic radius in nm [Hint: $N_A=6.023 \times 10^{23}$ atoms/mol]:
- A. 0.63 B. 0.128 C. 0.612 D. 1.59 E. 2.021

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6. Aluminum has FCC cubic structure of lattice constant $a=4.04 \text{ \AA}$, then the inter planner spacing d_{100} in $\text{\AA}$ is:
- A. 3.73 B. 8.18 C. 8.6 D. 4.04 E. 2.8

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7. For BCC iron, calculate the diffraction angle (2θ) for the (220) set of planes. If the lattice parameter for iron is 0.2866 nm. Also, assume that monochromatic radiation having a wavelength of 0.1790 nm is used, and the order of reflection is 1.

- A. 124.26° B. 35.66° C. 88.42° D. 100.36° E. 62.13°

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8. For which set of crystallographic planes (hkl) will a first-order diffraction peak occur at a diffraction angle of 46.21 for BCC iron when monochromatic radiation having a wavelength of 0.0711 nm is used? (Hint: radius of the iron atom is 0.1241 nm)

- A. (310) B. (101) C. (002) D. (300) E. (222)

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9. Rhodium has an atomic radius of 0.1345 nm, its atomic weight is 102.91 g/mol, and a density of 12.41 g/cm³. Then the crystal structure of Rhodium should be:

- A. SC B. FCC C. BCC D. HCP E. None of them

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Question (III): Answer the following questions:

(11 Marks)

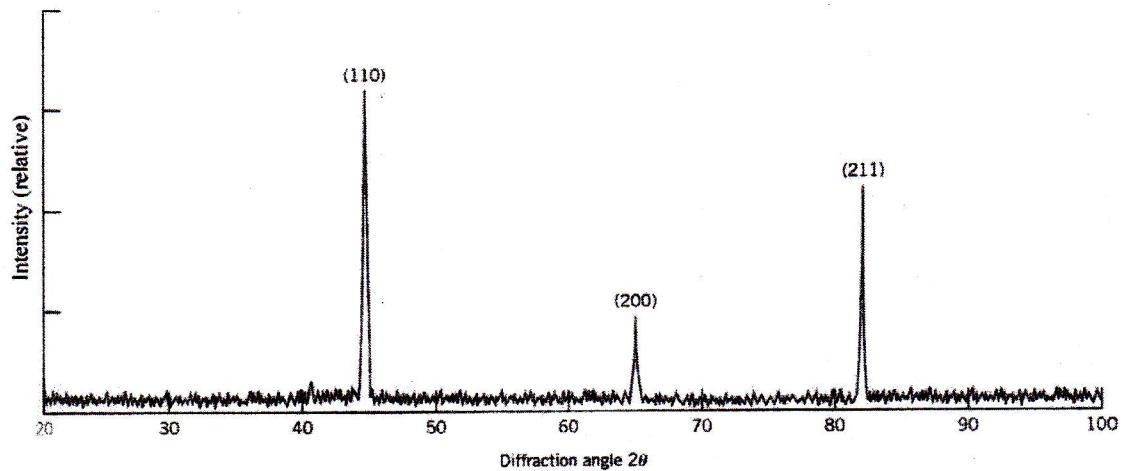
1. For which set of crystallographic planes will a first-order diffraction peak occur at a diffraction angle of 46.21° for BCC iron when monochromatic radiation having a wavelength of 0.0711 nm is used? **(3 Marks)**

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2. The figure below shows an X-ray diffraction pattern for α -iron taken using a diffractometer and monochromatic X-radiation having a wavelength of 0.1542 nm; each diffraction peak on the pattern has been indexed. Compute the interplanar spacing for each set of planes indexed; also determine the lattice parameter of Fe for each of the peaks. **(4 Marks)**



3. The metal rubidium has a BCC crystal structure. If the angle of diffraction for the (321) set of planes occurs at $2\theta=27^\circ$ (first-order reflection) when monochromatic X-radiation having a wavelength of 0.711 Å is used, compute: **(4 Marks)**
- The inter-planar spacing for this set of planes.
 - The atomic radius for the rubidium atom.

[illegible]

Question (IV):

(6 Marks)

Write a short note for any of the following:

- (b) Thermal properties of solid materials.
(c) Optical properties of solid materials.

[illegible]

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امتحان مادة جيوكيمياء عضوية (٣٣٢ ج ب)
الفصل الدراسي الصيفي - العام الجامعي (٢٠٢٤)

الزمن ساعتان

المستوى الثالث

ملحوظة: الامتحان في صفتين

(50 M) الجزء التحريري

Answer (T) for true sentences or (F) for false sentences: (One mark each.)

1. Organic chemistry is the study of carbon and its compounds.
2. Carbon has four valence electrons, so it can bond four times to achieve a stable octet.
3. Autochthonous organic matter is considered derived, detrital, or washed-in material.
4. The condensed/collapsed formula is a combination of both structural and molecular formulas.
5. Allochthonous organic matter is produced in the depositional environment.
6. The lubricating oil fraction contains hydrocarbons containing 1–4 carbon atoms in each molecule.
7. Benzene is an example of an aromatic hydrocarbon.
8. During catagenesis, hydrogen is stripped from kerogen slower than carbon to form hydrocarbons.
9. Aromatic hydrocarbons have 6 carbons in a closed ring with alternating double and single bonds.
10. Hydrocarbons are organic, and all organic compounds are hydrocarbons.
11. Alkanes have single-bonded hydrocarbons containing only C-C.
12. Electrolytes react slowly, have low melting and boiling points, and are insoluble and immiscible in water.
13. Isomers have the same molecular formula but are rearranged in a different structure with different chemical and physical properties.
14. Electrolytes react slowly, have low melting and boiling points, and are insoluble and immiscible in water.
15. Methane, ethane, and propane do not have any isomers.
16. At least four carbons must be present in a molecule to have isomers.
17. Benzene is an unstable compound.
18. Functional groups replace hydrogen atoms in a hydrocarbon and give the compound distinctive physical and chemical properties.
19. Addition polymerization means the creation of a polymer plus water as a product.
20. Carboxylic acids are strong electrolytes because they generate H^+ ions in solution.
21. Condensation polymerization is unsaturated monomers join by breaking their double or triple bonds to bond with one another, making long chains.
22. The hydrocarbons, although varying widely depending on location, are mainly alkanes (or "paraffins"), cycloalkanes, and various aromatic hydrocarbons.
23. Because the C-C single bond (348 kJ mol^{-1}) and the C-H bond (412 kJ mol^{-1}) are weak, carbon compounds are unstable.
24. The autochthonous organic matter predominantly comprises phytoplankton (algae, diatoms, etc.), zooplankton, and bacteria.
25. The melting point and boiling point decrease with more carbon atoms.
26. The organic compounds may contain nitrogen, oxygen, and sulfur, in addition to trace amounts of metals such as iron.
27. Isomers have the same physical properties, such as melting point and boiling point.
28. Esterification is the process of making ester and water from an organic acid and alcohol.
29. Saponification is a fat reacting with a base to produce alcohol (look for glycerol) and a soap.

30. Surface processes convert organic matter into a substance called humin and then into kerogen.
31. Several monomers combine to make the polymer.
32. Carbon can form chains and rings.
33. Terrestrial organic matter is less resistant because it includes structural materials such as lignins that are not necessary in the marine environment.
34. Alkane have physical properties that vary regularly as the number of carbon atoms increases.
35. Different isomers are completely different compounds.
36. In an oxic environment, methanogenic bacteria produce methane.
37. Geochemical methods used in exploring for oil and natural gas are based on the premise that hydrocarbons migrate upward from subsurface petroleum accumulations and produce anomalous patterns near the surface.
38. Geochemical exploration techniques are both direct and indirect.
39. Unsaturated compounds increase in abundance compared with their saturated equivalents due to the hydrogenation of double carbon bonds.
40. The applications HTGC organic geochemistry is mainly focused on aspects such as the simulated distillation of crude oils and petroleum residues, the analysis of high-molecular-weight waxes and biomarkers, and geochemical petroleum prospecting.
41. The petroleum that is pumped out of the ground is a complex mixture of several thousand organic compounds, including straight-chain alkanes, cycloalkanes, alkenes, and aromatic hydrocarbons with four to several hundred carbon atoms.
42. The amount of kerogen in sedimentary rocks decreases the amount of 'exogenic' carbon (biosphere, atmospheric CO₂, marine bicarbonate) by orders of magnitude.
43. The degree of thermal maturation of kerogen can be monitored from its H/C and O/C ratios.
44. Geochemical exploration for petroleum is the search for chemically identifiable surface or near-surface occurrences of hydrocarbons and their alteration products, which serve as clues to the location of undiscovered oil and gas accumulations.
45. Nitrogen and hydrogen are the main constituents of kerogen.
46. Roughly 98% of the organic matter reaching the sediment is already degraded.
47. Functional groups are preferentially removed from their parent molecules, decreasing the oxygen and, to a lesser degree, the hydrogen.
48. As temperatures approach 150 °C, higher amounts of hydrocarbons ($\leq C_5$) become dominant.
49. Kerogen forms from humus, humic, and fulvic acids through condensation reactions.
50. In the Precambrian, blue-green algae and photosynthetic bacteria were the only producers of organic matter.
51. During the Cambrian, Ordovician, and Silurian, the dominant sources of organic carbon were different marine phytoplankton organisms, bacteria, and blue-green algae, until the appearance of terrestrial plants in the Middle Devonian.



2023/2024 Summer Semester, Final Examination

7 September 2024

On: Environmental Geophysics (G-353)

Time: 2 hours

Answer ONLY the required questions, illustrating your answer by suitable SKETCHES wherever possible:

First Question: Write short notes on ONLY TWO of the following: (10 marks)

1. Describe the process of planning a geophysical survey for an environmental site assessment, including how to choose the most suitable methods and equipment.
2. For a site with a suspected underground oil spill, create a GPR survey strategy to detect and map the contamination. Consider aspects like signal frequency, grid spacing, and data processing in your plan.
3. Discuss the different deployment methods used in Electrical Resistivity surveys.

Second Question: True or False: (20 marks)

1. Ground Penetrating Radar (GPR) is effective for detecting objects buried in highly conductive soils, such as clay.
2. Electrical resistivity methods can be used to map groundwater contamination by detecting changes in the subsurface resistivity.
3. Seismic refraction is the preferred method for determining the depth to bedrock in areas with thick overburden.
4. Magnetic surveys are primarily used in environmental geophysics to locate underground utilities and metallic objects.
5. Gravity surveys are frequently used in environmental geophysics to map small-scale subsurface features such as voids or tunnels.
6. Electrical resistivity tomography (ERT) can produce 3D images of the subsurface, allowing for a detailed understanding of geological structures.
7. The use of passive geophysical methods, such as magnetic surveys, involves introducing energy into the ground to measure subsurface properties.
8. Ground Penetrating Radar (GPR) can be effectively used to detect non-metallic objects, such as plastic pipes, buried underground.
9. A well-planned geophysical survey should always include a preliminary site visit to assess the terrain and environmental conditions.
10. Data acquisition equipment such as seismometers and resistivity meters should be calibrated before each survey to ensure accurate measurements.

11. The spacing of measurement points in a geophysical survey does not significantly affect the resolution of the data.
12. When planning a geophysical survey, the selection of the survey method should be based only on the budget constraints.
13. The use of GPS in geophysical surveys is essential for accurately recording the locations of measurement points.
14. The use of drone-based geophysical surveys is becoming increasingly popular for conducting rapid and efficient surveys over large or inaccessible areas.
15. During a resistivity survey, it is unnecessary to take into account the presence of buried metallic objects, as they do not significantly affect the results.
16. The depth of investigation is determined by the type of equipment used and the specific survey parameters, such as electrode spacing in resistivity surveys.
17. Data processing and interpretation are less critical steps in a geophysical survey, as the raw data typically provide clear answers to environmental questions.
18. Geophysical surveys are routinely used in the assessment and monitoring of dam safety, particularly in detecting seepage paths and voids.
19. Identifying sinkholes and subsidence areas is commonly done using magnetic surveys.
20. Geophysical methods are used in coastal management to study shoreline erosion, sediment transport, and subsurface features beneath the seabed.

Third Question: Match the following:

(5 marks)

1. Match the survey design consideration with its description:

Consideration	Description
a) Grid spacing	1) Provides initial information about the site conditions
b) Method selection	2) Affects the resolution and coverage of the survey area
c) Preliminary assessment	3) Essential for interpreting and analyzing collected data
d) Surface conditions	4) Influences the depth of investigation and type of data collected
e) Data processing	5) Impacts the performance and choice of geophysical equipment

2. Match the GPR component with its function:

Component	Function
a) Antenna	1) Measures distance travelled during survey
b) Control unit	2) Transmits and receives electromagnetic waves
c) Display	3) Provides power to the GPR system
d) Battery	4) Processes and stores data
e) Survey wheel	5) Visualizes real-time data

Fourth Question: Choose the correct answer:

(15 marks)

1. Which of the following is a critical factor in determining the depth of investigation in a geophysical survey?
 - a) Weather conditions
 - b) Type of geophysical method used
 - c) Color of the survey equipment
 - d) Surveyor's experience
2. In geophysical survey design, what is the main purpose of using a grid layout?
 - a) To increase the survey's cost
 - b) To systematically cover the area of interest
 - c) To reduce the amount of data collected
 - d) To make the survey easier to visualize from space
3. Which of the following is a key advantage of using GPR for environmental investigations?
 - a) High penetration depth in all soil types
 - b) Ability to detect non-metallic objects
 - c) Minimal data processing requirements
 - d) Inexpensive equipment costs
4. In which of the following scenarios is a magnetic survey most likely to be used?
 - a) Identifying groundwater contamination
 - b) Detecting subsurface density variations
 - c) Locating buried steel pipelines
 - d) Mapping bedrock topography
5. What type of data is typically obtained from a vertical electrical sounding (VES)?
 - a) Lateral variations in resistivity
 - b) Vertical variations in resistivity with depth
 - c) Horizontal resistivity profiles
 - d) Electrical conductivity maps
6. What does a high resistivity value typically indicate about a subsurface material?
 - a) High water content
 - b) High metal content
 - c) Low water content or a dry material
 - d) High organic matter content
7. Which of the following is NOT a common application of electrical resistivity methods?
 - a) Mapping subsurface contamination
 - b) Detecting buried archaeological features
 - c) Locating mineral deposits
 - d) Measuring soil temperature
8. Which type of subsurface feature can be effectively mapped using electrical resistivity methods?
 - a) Surface topography
 - b) Magnetic anomalies
 - c) Variations in groundwater levels
 - d) Vegetation cover
9. What is a typical range of resistivity values for fresh water compared to saltwater?
 - a) Fresh water has higher resistivity than saltwater
 - b) Fresh water has lower resistivity than saltwater
 - c) Fresh water and saltwater have similar resistivity values
 - d) Saltwater has higher resistivity than fresh water
10. How does increasing the electrode spacing affect the results of an electrical resistivity survey?
 - a) It decreases the depth of investigation
 - b) It increases the depth of investigation
 - c) It improves resolution of shallow features
 - d) It has no effect on the depth of investigation

11. Which factor is least likely to influence the choice of a geophysical method?
- a) Depth of the target
 - b) Electrical properties of the subsurface
 - c) Age of the survey equipment
 - d) Environmental conditions
12. Which of the following frequencies would provide the deepest penetration with GPR?
- a) 100 MHz
 - b) 200 MHz
 - c) 400 MHz
 - d) 900 MHz
13. In which of the following conditions is GPR most effective?
- a) Wet, clay-rich soils
 - b) Dry, sandy soils
 - c) Rocky terrains
 - d) Highly vegetated areas
14. Which environmental application is best suited for seismic methods?
- a) Identifying soil moisture content
 - b) Mapping groundwater contamination
 - c) Assessing bedrock depth and geological structure
 - d) Measuring air quality
15. What is the primary advantage of using 3D seismic surveys over 2D seismic surveys in environmental geophysics?
- a) Higher cost and complexity
 - b) Improved spatial resolution and depth analysis
 - c) Reduced data acquisition time
 - d) Simplicity in data processing

Good Luck,,,

Assoc. Prof. Rashad Sawires

Answer (T) for true sentences or (F) for false sentences. (One mark each.)

1. Basalt is the most abundant volcanic rock on the Earth's surface and comprises >99% of all the volcanic rocks.
2. Dunite mostly comprises bright green olivine and usually contains chromite as pods, lenses, and layers.
3. Most of the primary plagioclase crystals in granitic rocks are of calcic composition.
4. Gabbro appears as a dense, homogeneous rock and often displays fairly the same type of texture and composition throughout the entire gabbroic body.
5. Lava flows cover roughly 70% of the Earth and are very common on other terrestrial planets, covering 90% of Venus and 50% of Mars.
6. Olivine and hypersthene are present in minor amounts in granitic rocks.
7. Trachyte is a common intrusive rock and occurs in a wide variety of tectonic environments on Earth.
8. Plagioclase laths are partly or completely enclosed in augite in the gabbroic rocks.
9. Dunite occurs in layered gabbroic complexes.
10. Plutonic rocks show a vesicular texture.
11. Texturally, dolerite falls between gabbro and basalt, as it is finer than the gabbro but coarser than the basalt.
12. Rhyolite is essentially composed of calcic plagioclase and pyroxenes (mostly augite) with or without olivine.
13. Lava flows are the most common volcanic feature on Earth.
14. A boss is a large stock.
15. Dunite intrusions form sills or dikes.
16. Pyroclastics consist of broken bits of pre-existing rocks, ash, or blasted-out lava.
17. Lopoliths are generally dis-concordant with the intruded strata, with dike- or funnel-shaped feeder bodies below the body.
18. Mafic rocks that contain about 40% olivine are classified as peridotite.
19. The common minerals of basic rocks are feldspar, orthoclase, quartz, and plagioclase.
20. Basalt contains hornblende, hypersthene, feldspathoid, and a rarely minor amount of quartz and biotite.
21. The common mafic rocks are peridotite, pyroxenite, and dunite.
22. Intrusive or plutonic textures indicate rapid cooling beneath the surface.
23. The influx of new magma causes the reaction of pre-existing crystals and the pressure in the chamber to increase.
24. Lopoliths typically consist of large, layered intrusions that range in age from the Archean to the Eocene.
25. Phacolith is a pluton of igneous rock parallel to the bedding plane or foliation of folded country rock.
26. Early crystallizing dense olivine grains float to the top of the low silica magma.
27. The mantle beneath is made of granite.
28. A stock has a discordant relationship with the rocks that it intrudes on.
29. A diapir is a type of geologic intrusion in which a more mobile and ductily deformable material is forced into brittle overlying rocks.

30. Basalt is a common extrusive or volcanic rock and occurs in a wide variety of tectonic environments on Earth.
31. Dolerite is a fine- to medium-grained, dark-colored, holocrystalline rock. It is the hypabyssal equivalent of gabbro and basalt and occurs as dykes.
32. Andesitic rocks are melanocratic (dark colored) and contain 90% ferromagnesian minerals with almost no plagioclase.
33. Gabbro chiefly consists of augite Cpx, which is replaced by hypersthene Opx.
34. Ultramafic rocks generally contain 90% mafic minerals.
35. Most of the crystals in extrusive rocks are visible to the naked eye.
36. Basaltic rocks are made of elements that include high amounts of silica, sodium, potassium, and aluminum, which form minerals like quartz and feldspar.
37. Dolerite shows a typically ophitic and sub-ophitic texture.
38. More specifically, phacolith is a typically lens-shaped pluton that occupies either the crest of an anticline or the trough of a syncline.
39. A stock is an igneous intrusion that has a surface exposure of less than 100 square kilometers (40 sq mi), differing from batholiths only in being smaller.
40. Layered gabbros are large intrusions of gabbro exhibiting internal chemical and mineralogical layering.
41. Gabbro is an ultramafic plutonic rock composed exclusively of olivine.
42. Hot magma rises because it is denser than the surrounding rock.
43. Lopolith is a small igneous intrusion that is tabular in shape with a depressed central region.
44. Ultramafic igneous rocks contain < 45% SiO₂, 18% MgO, high FeO, and low K₂O.
45. Peridotite that contains more than 90% pyroxene is called dunite.
46. Basalt is fine-grained, and it is difficult to identify many minerals with unaided eyes, except for a few phenocrysts.
47. Intermediate lavas are highly viscous lavas that erupt at low temperatures of around 650–750 degrees C.
48. Essentially, dolerite is composed of plagioclase feldspars (mostly labradorite) and pyroxene (augite).
49. Ultramafic rocks are very abundant on the Earth's surface.
50. Olivine in dunite is commonly altered to serpentine.

9. Which of the following lists includes the three most common sedimentary environments..... (2 marks).

- a. fluvial, aeolian, marine. b. land, sea, air. c. continental, transitional, marine.

10. When depositional environment migrate laterally, sediment of one environment come to lie on top of sediment of an adjacent environment is called.....(2 marks).

- a. Euler's law b. Jame's law Walther's law d. Franklin's law

11. Aulacogen is..... (2 marks).

- a. the failed arm of a three-armed rift, two of whose arms continued to open to form an ocean basin.
b. aulacogen starts at the passive continental margin.
c. extending from the margins toward the open sea.

12. The official definition of a sedimentary basin is a low area in the Earth's crust, of(2 marks).

- a. stratigraphic origin. b. tectonic origin. c. sedimentary origin.

13. Basins are separated from another by.....(2 marks).

- a. raised linear areas termed arches, paleohighs, schwelle, axis of uplift, or positive areas.
b. artificial dams constructed by man. c. natural lakes and forests.

14. Sedimentary basins are filled with strata deposited entirely in.....(2 marks).

- a. terrestrial environments, others with strata deposited below sea level in marine environments.
b. many basins include both kinds of sediments. c. all the above.

15. In plan view sedimentary basins may be approximately..... (2 marks).

- a. circular, or more frequently elongate depressions, troughs, or embayments.
b. cubic, triangular and sometimes dendroid.
c. all the above.

Part Two (20 marks)

16. Depositional environments generate sedimentary facies (2 marks).

- a. True. b. False.

17. Sedimentary facies is defined as the place of deposition and physical, chemical, and biological conditions that characterize the depositional setting (2 marks).

- a. True. b. False.

18. The chemical parameters of an environment include the composition of waters and the geochemistry of the rocks in the catchment area of a terrestrial environment (2 marks).

a. True.

b. False.

19. Environments of equilibrium are surfaces of the earth, both on the land and under the sea, which for long periods of time are neither sites of erosion nor of deposition (2 marks).

a. True.

b. False.

20. A sedimentary basin has an axis, a line connecting the lowest structural points of the basin (2 marks).

a. True.

b. False.

21. The depocenter is the part of the basin with the thickest sedimentary fill (2 marks).

a. True.

b. False.

22. Certain basins may show a complex history and therefore contain pre-tectonic as well as syn-tectonic or post-tectonic sediments (2 marks).

a. True.

b. False.

23. Basin relief can be created mechanically on a regional scale thermally or flexurally, or by a combination of those two effects (2 marks).

a. True.

b. False.

24. The essential element of the sedimentary basin is tectonic creation of relief, to provide both a source of sediment and a relatively low place for the deposition of that sediment (2 marks).

a. True.

b. False.

25. Embayments are basins that are not completely closed structurally, but which open out into a deeper area (2 marks).

a. True.

b. False.

Good Luck

Prof. Dr. Abdalla El Ayyat

University of Assiut

Faculty of Science

Department of Geology

3rd Level Examination for Geology, Geophysics and Geochemistry students

In Field Geology (306G)

Time: Two Hours

50 Marks

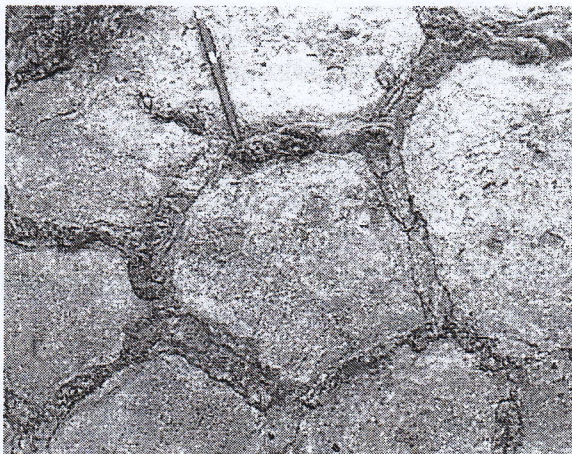
Summer Semester, 2024

ملحوظة هامة: الامتحان يتكون من ثلاث صفحات

Answer the following question:

First Question: choose the correct answer: (10 Marks, one Mark for each)

- 1- When all the grains in a rock are roughly the same size, the rock is said to be
a- well rounded b- well sorted c- spherical d- clastic
- 2- The group of processes that transform sediments into rock is known as.....
a- compaction b-) transportation c- diagenesis d- lithification
- 3- In the figure below, are formed in wet and dry environments.



- a- ripple marks b- mud cracks c- footprints d- flute mark
- 4- Seasonal lakes, or, are common in arid areas.
a- alluvial fans b- evaporites c- playas d- loess
- 5- The task of matching up rocks of similar ages in different regions is known as.....
a- Succession b- Correlation c- linking d- superposition
- 6- laminations are best observed in.....
a- shales b- limestone c- conglomerate d- sandstones

7- Graded bedding occurs due to which phenomenon?

- a- Wind settling b- Erosion c- Gravitational settling d- Loading

8- Which one of the following is a secondary biologic sedimentary structure?

- a- stromatolites b- load cast c- cone-in-cone d- stylolite

9- A short time break or a change in the sediment type in a depositional environment results in the creation of between individual beds.

- a- an unconformity b- a bedding plane
c- a graded bed d- an intrusive contact

10- The showing field photo represents



- a- unconformity b- load cast c- cross bedding d- none of them

Second Question (10 Marks)

1- Write on only three of the following concepts: (6 Marks)

- a- Ripple Marks b- Boring c- Stylolites d- Datum section

2- Explain the field criteria of unconformities. (4 Marks)

Third Question (10 Marks)

1- From the figure at below answer the following questions: (5 Marks)



a- Define the sedimentary structure.

b- Draw the figure in your paper describing the important indicator of this sedimentary structure.

2- Clasify the expression of the: Fault- bend folds

(5 Marks)

Fourth Question (10 Marks)

Write on the main structural types of the basic Lavas

(10 Marks)

Fifth Question (10 Marks)

Mention the main classes of the pyroclastic deposits

(10 Marks)

----- *GOOD LUCK* -----

Prof.Dr. A. A. Khoudier

Prof. Dr. N. A. Obaidalla

فَصَحْ

الْأَنْتِ

Answer All The Following Questions

(A) Define the following (5 marks):

- 1) LD50 2) Pyrogenicity effect 3) Bacterial Toxins Type III
4) Non protein bacterial toxin 5) Estrogenic toxin

(B) Choose the correct answer (15 marks):

1- What is the main producer of cyanobacteria cytotoxin ?

- a) *Aphanizomenon* sp
- b) *Oscillatoria* sp
- c) *Nostoc* sp
- d) *Microcystis* sp

2- What is the first neurotoxic alkaloid to be identified?

- a) Saxitoxin
- b) Anatoxin-a
- c) Microcystin
- d) Nodularin

3- What is the toxin which produced by *Aphanizomenon flos-aquae* and associated with a large fish-kill in water bloom?

- a) Saxitoxin
- b) Anatoxin-a
- c) Microcystin
- d) Nodularin

4- Which one of the following that causes Immunosuppression and Immunotoxicity in animals?

- a) Alternaria toxin
- b) Ochratoxin A
- c) Citrinin
- d) Sterigmatocystin

5- What is the toxin which acts as a depolarizing agent at the neuromuscular junction?

- a) Microcystin
- b) Okadic acid
- c) Nodularin

d) Anatoxin-a

6- What is the toxin which induces pallor and panting, and the cause of acute death is blood loss into the liver?

- a) Nodularin
- b) Microcystin
- c) domoic acid
- d) gonyautoxin

7- What is the algal toxin which has the tumour-promoting activity?

- a) Neosaxitoxins
- b) Brevetoxins
- c) Nodularin
- d) Ciguatoxin

8- What is the main producer of toxin which caused Diarrheic Shellfish Poisoning?

- a) *Nitzschia* sp
- b) *Alexandrium* sp
- c) *Gymnodium* sp
- d) *Dinophysis* sp

9- Which one of the following caused by domoic acid (DA)?

- a) Amnesic Shellfish Poisoning
- b) Diarrheic Shellfish Poisoning
- c) Paralytic Shellfish Poisoning
- d) Neurotoxic Shellfish Poisoning

10- What are the algal toxins which their mode of action is enhancing sodium entry into the cell?

- a) Anatoxins
- b) Microcystins
- c) Brevetoxins
- d) Ciguatoxins

11- Which fluorescence of the following that produced by Ochratoxin A under UV light?

- a) Red fluorescence
- b) Yellow fluorescence
- c) Blue fluorescence
- d) Green fluorescence

12- What are the algal toxins which induce a significant increase in intracellular Ca^{2+} concentration in lymphocyte and can lead to cell death?

- a) Microcystins
- b) Anatoxins
- c) Azaspiracids
- d) Brevetoxins

13- Which one of the following caused by endo-bacterial toxins?

- a) Cancer
- b) Pyrogenicity
- c) Diarrhea
- d) Hemolysis

14- Which one of the following is the producer of Shiga toxin?

- a) *Vibrio cholera*
- b) *Bacillus anthracis*
- c) *Escherichia coli* O157:H7
- d) *Vibrio vulnificus*

15- Which one of the following bacteria its toxin could cause immunosuppression and nonspecific T cell proliferation?

- a) *Staphylococcus aureus*
- b) *Bacillus cereus*
- c) *Clostridium botulinum*
- d) *Corynebacterium diphtheria*

(C) Answer each of the following with (X) or (✓) (15 marks):

- 1- Ozonation and filtration reduce *Oscillatoria* toxins by 100%.
- 2- The mortality in male mice exceeded that in female mice when they exposure to low concentrations of Nodularin
- 3- Paralytic Shellfish Poisoning is dose dependent
- 4- Microcystins form a family of closely related cyclic heptapeptides
- 5- About 25% of the known toxic marine algal species are dinoflagellates
- 6- Some of the toxins associated with Neurologic Shellfish Poisoning may promote the development of stomach tumors

- 7- Amnesic Shellfish Poisoning is age dependent
- 8- The chemical nature of Brevetoxins is lipid soluble, non-nitrogen containing complex polyethers.
- 9- Ciguatera Fish Poisoning usually reaches humans through the consumption of finfish.
- 10- Aflatoxin was partially lost in mashing and brewing process
- 11- Volatile sulfur compounds which produced by bacteria known as exobacterial toxins
- 12- Okadic acid its target organs include liver, spleen, the small intestine and it has also been shown to be carcinogenic.
- 13- Exobacterial toxin released into the medium after lysis and cell division
- 14- Staphylococcal enterotoxins are fully functional in the digestive tract after infection.
- 15- Citrinin has been found in the tissues and organs of animals, including human blood and breast milk.

(D) Compare between each of the following (9 marks, 3 for each):

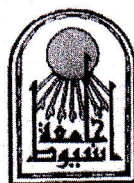
- 1) Botulinus toxins and Anthrax toxin (producer, occurrence, symptoms)
- 2) Neurotoxic Shellfish Poisoning and Paralytic Shellfish Poisoning (producer and toxicity)
- 3) Detoxification of the aflatoxin B₁ by alkalis and acids treatment.

(E) Write on each of the following : (6 marks 3 for each)

- 1- Biological effect of Ochratoxin A
- 2- Alternaria toxins (Occurrence and Toxicity)

Dr: Maysa M. A. Ali

Good luck



Answer the following: [Total 50 marks]

Q1: Complete the following:

(10 Marks)

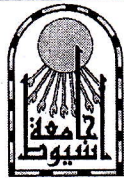
- 1- In protein translation, peptide bond formation is catalyzed by
- 2- Translation of protein consists of three stages, these stages areand.....
- 3- The respiratory electron flow in eubacteria occurs in whereas in plant cell occurs in
- 4- The Calvin cycle in plant occurs inand in photosynthetic bacteria occurs in
- 5- Lithotrophs mean
- 6- ETC abbreviation means

Q2: Answer on Five only of the following: 8 marks each (40 Marks)

- A. Explain the autotrophic CO₂ fixation.
- B. Compare between fermentation and aerobic respiration in bacteria.
- C. Explain the pathway of Entner Doudorf
- D. Describe the lipid biosynthesis
- E. Explain the Embden-Mayerhof pathway
- F. Explain the Krebs cycle
- G. Describe the process of protein biosynthesis

Best wishes,

Prof. Naeima Yousef

 كلية العلوم جامعة أسيوط Botany and Microbiology Department	Environment Bioremediation Final exam. (2023-2024) 3 ^{ed} level biotechnology students كود ن 306 السبت 2024/9/7 المدة المتاحة : ساعتين	 Assiut University
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Write on 5 only of the following (50 marks, 5 points × 10 degree)

1. Methods involved in in-situ bioremediation.
2. Bioremediation of halogenated organic compounds.
3. Two chemical pathways illustrate hydrocarbon degradation.
4. Role of some microorganisms in biodegradation of simple aromatic compounds.
5. Microbial role in Bioremediation of heavy metals.
6. Advantages and disadvantages of Phytovolatalization.
7. Define (i) hyperaccumulator (ii) Phytoextraction (iii) Immobilization and (iv) Rhizofiltration (v) Cometabolism.

With my Best Wishes

Dr. Ahmed Amro

Assistant Professor in Botany and Microbiology Department



Final Exam

Summersemester 2023/2024



Botany & Microbiology Department

Bacterial Biotechnology (301 B)

Faculty of Science

Biotechnology students

Time: 2 hours

Answer the following: [Total 50 marks]

Q1: Choose the correct answer

(10 Marks)

1- Which of the following statement is false about DNA?

- a. Abundantly found in cytoplasm
- b. Formed from polynucleotide chain
- c. Located in chromosomes
- d. Carries genetic information from parent to offspring

2- Which of the following is the functional unit of inheritance?

- a. Chromosome
- b. RNA
- c. Gene
- d. DNA

3- Which of the following is not an essential feature for being a perfect vector?

- a. Selectable marker
- b. Origin of replication
- c. Virulent gene
- d. Restriction site

4- From which organism is the enzyme reverse transcriptase isolated?

- a- Plant
- b. Bacteria
- c. Fungi
- d. Virus

5- Reverse transcriptase produces DNA from RNA

- a- True
- b. False

6- There is one amino acid for one genetic code.

- a- True
- b. False

7- The genetic codon is

- a. Singlet
- b. Duplet
- c. Triplet
- d. Quadruplet

8- Polymerase used for PCR is extracted from

- a. *Saccharomyces cerevisiae*
- b. Yeasts
- c. *Escherichia coli*
- d. *Thermus aquaticus*

9- Transfection is important step in

- a. Introduction of recombinant DNA into eukaryotic cell
- b. Packaging of DNA into virus-derived particles
- c. Introduction of recombinant DNA into prokaryotic cell
- d. PCR

10- The three main steps in a PCR cycle are

- a. Polymerization, chain elongation, recombination
 - b. Denaturation, recombination, primer synthesis
 - c. Polymerization, primer synthesis, DNA synthesis
- Denaturation, annealing, elongation

Q2: Complete the following: (5 Marks)

- 1- In Biotech Ice Cream used gene coding of antifreeze protein from ...
- 2- *Bacillus subtilis* produce biotech protease called
- 3- *Pseudomonas syringae* called ice-plus due to
- 4- *Alcaligenes eutrophus* produce polymer called
- 5- *Lactobacillus acidophilus* produce monomer called that can be used in production of polymer called
- 6- *EcoR1* produced by bacteria called
- 7- Restriction enzyme *EcoR1* produce end.
- 8- PHB abbreviation means
- 9- *Taq* DNA polymerase produced from

Q3: What meant the following: (5 Marks)

- a- Bioplastic b- Microbial biotechnology c- Restriction enzymes
- d- Recombinant DNA e- PHA

Q4: Compare between the following: (10 Marks)

- 1- feed batch culture and continuous culture
- 2- extracellular and intracellular enzymes

Q5: Write with drawing TWO only of the following: (20 Marks)

- a- Production of human insulin by bacteria
- b- Production of biotech human growth hormone
- c- Restriction enzymes

Best Wishes

Prof. Dr. Naeima Yousef



Faculty of Science
Assiut university

Botany and Microbiology Department
Summer semester exam. (2024-2025), Ecology of algae (374 B)
Time allowed: 2 hours

Answer the following questions

Question no (1): Choose (T) for true or (F) for the false statements from the following. (20 marks)

1	Endophytic algae are those algae live inside the plant	
2	Aerial epilithic algae found on surface of the rocks	
3	Soil algae are algae found on living aquatic animals such as shells, fishes	
4	The green colour of sea sludge comes from growth of Chlorella sp in symbiotic relationship with it	
5	The decrease no. and occurrence of phytoplankton in summer may be caused by high grazing	
6	Algae can be used in production of oil , fertilizers ,cosmetics.	
7	Silicon is absolute requirement element for the growth of diatoms and chlorophyta	
8	The depth of the photic zone can be affected greatly by seasonal turbidity	
9	The algae which float on the surface of the water are called cryptophyta.	
10	Carrageenan extracted from phaeophyta has innumerable uses, and a component of toothpaste.	
11	Microcystis is known to inhibit several species of bacteria and effective against other algae.	
12	Soil algae can fix atmospheric nitrogen and increased the soil fertility	
13	Algae are chlorophyll bearing autotrophic thallophytes with a cell wall made of carbohydrates	

14	Nitrogen fixation by cyanophyta and the excretion nitrogenous products are temperature dependents	
15	Blue green algae are generally photosynthesize and grow better at low PFD	
16	<i>Paramecium bursaria</i> has a mutualistic endosymbiosis relationship with Chlorella sp.	
17	Phosphorus is irrepressible element of all microorganism and play an important role in all biological processes.	
18	Magnisum effect algal growth and its amount of productivity	
19	Algae may be used as an indicator of climate change	
20	Algae can be live and grow in the stomata of the tropical plants	

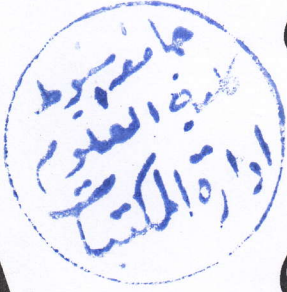
Question no (2): Discuss in detail Three only from the following (30 marks)

1. Effect of phosphorus and pH on algal productivity.
2. Symbiosis relationship between algae and invertebrate animals.
3. Beneficial Importance of terrestrial algae
4. Classify algae according to their possible habitats.

Best wishes and Good luck

Prof.Dr /Awatief F. Hifney

جامعة أسيوط _ كلية العلوم



إدارة المكتبات

امتحانات الفصل

الدراسي الصيفي

للعام الجامعي

٢٠٢٣ - ٢٠٢٤ م

المكتبة العامة

الفرقة الثالثة

