Einstein PUBLIC SCHOOL

Nurturing a better tomorrow

SUMMER VACATION HOLIDAY HOMEWORK-2026

Class-XII

Subject- English

Q1. Fill in the Blank – The Last Lesson

M. Hamel said, “When a people are enslaved, as long as they hold fast to their *_* , it is as if they had the key to their prison.”

a) traditions b) language c) culture d) history

Q2. Analogy – Lost Spring

Saheb : Ragpicker :: Mukesh : *_*

a) Student b) Bangle maker c) Driver d) Farmer

Q3. Statement-Based – The Third Level

Statement 1: Charley believed the third level was a medium of escape.

Statement 2: Sam called it ‘waking dream wish fulfillment’.

a) Both true, 2 explains 1 b) Both true, 2 doesn’t explain 1

c) 1 true, 2 false d) Both false

Q4. Vocabulary – My Mother at Sixty-six

‘Ashen’ in “her face ashen like that of a corpse” means:

a) Glowing b) Pale grey c) Angry d) Peaceful

Q5. Assertion-Reason – Lost Spring

Assertion (A): The bangle makers of Firozabad cannot organize into cooperatives.

Reason (R): They are afraid of the police and lack a leader.

a) Both A & R true, R explains A b) Both true, R doesn’t explain A

c) A true, R false d) A false, R true

Q6. Sequence – The Last Lesson

Arrange M. Hamel's actions on the last day:

i) Wrote 'Vive La France' on board ii) Asked Franz to recite participles

iii) Said it was his last lesson iv) Made village elders sit on back benches

a) iii, ii, iv, i

b) iii, iv, ii, i

c) ii, iii, i, iv

d) iv, iii, ii, i

Q7. Match the Following – The Third Level

Column A	Column B
1. Charley	p. Psychiatrist friend
2. Sam	q. Grandfather's town
3. Galesburg	r. Protagonist, 31 years old

a) 1-r, 2-p, 3-q b) 1-p, 2-r, 3-q c) 1-q, 2-p, 3-r d) 1-r, 2-q, 3-p

Q8. Inference – My Mother at Sixty-six

The 'merry children spilling out' contrast with the poet's mood because:

a) She hates children b) They symbolize youth/life while she fears mother's death

c) Children are noisy d) She wants to join them

Q9. Fill in the Blank – Lost Spring

"Few airplanes fly over *_*" – shows Saheb's limited exposure.

a) Seemapuri b) Firozabad c) Mumbai d) Dhaka

Q10. Fact-Based – The Last Lesson

Who brought an old primer to the last lesson?

a) Franz b) Old Hauser c) Wachter d) Postmaster

Q11. Analogy – My Mother at Sixty-six

Late winter's moon : Pale :: Young trees : *_*

a) Sprinting b) Dying c) Sleeping d) Withered

Q12. Cause-Effect – Lost Spring*

Cause: Bangle makers work in glass furnaces with high temperature.

Effect:

a) They earn more money b) They lose eyesight at young age

c) They become famous d) They migrate

Q13. Extract-Based – The Third Level

“But that’s the reason, he said, and my friends all agreed.” What is ‘the reason’?

a) Charley was unhappy b) Charley was seeking escape from modern world

c) Charley was rich d) Charley hated Grand Central

Q14. True/False – All Chapters

i) M. Hamel taught for 40 years – True

ii) Mukesh’s dream is to fly a plane – False

iii) The third level had gas lights and brass spittoons – True

a) T, F, T b) F, F, T c) T, T, T d) T, F, F

Q15. Literary Device – The Last Lesson

“The pigeons cooed very low on the roof” – This is an example of:

a) Irony – birds free but humans enslaved b) Simile

c) Metaphor d) Hyperbole

Long Questions…….

Q16. You are Rohan/Rohini. After studying _My Mother at Sixty-six_, you are disturbed by how children ignore their aging parents due to busy lives. Write a letter to the Principal of your school requesting to start a ‘Grandparents’ Day’ every month where students spend time with senior citizens of old age homes. 120-150 words.

*Q.17Email Writing

You are Head Girl/Boy, Sunbeam School. Write an email to the District Magistrate of Firozabad appreciating the recent crackdown on child labour in bangle units. Request him to start evening schools for rescued children under CSR. 50 words.

*Question18…..

Lost Spring shows how tradition and poverty force children into labor. Contrast Saheb and Mukesh. Do you think education alone can break this cycle? Why/Why not?

Subject- Hindi

1. काव्य खंड (आरोह भाग-2) — गहन अध्ययन व लेखन

निर्देश: निम्नलिखित प्रश्नों के उत्तर अपनी हिंदी की गृहकार्य उत्तर-पुस्तिका *(Notebook)* में सटीक शब्दों में लिखें।

A. आत्मपरिचय / एक गीत (हरिवंश राय बच्चन)

- **प्रश्न 1:** "जग-जीवन का भार लिए फिरने" और "जग का ध्यान न करने" में क्या अंतर्विरोध है? कवि ने इन दोनों स्थितियों में अपने जीवन में कैसे सामंजस्य बिठाया है? स्पष्ट कीजिए।
- **प्रश्न 2:** 'दिन जल्दी-जल्दी ढलता है' कविता में बच्चे घोंसलों से क्यों झाँक रहे होंगे? यह वात्सल्य भाव चिड़िया की गति और उसके पंखों की चंचलता पर क्या प्रभाव डालता है?
- **रचनात्मक कार्य:** कवि हरिवंश राय बच्चन जी के 'हालावाद' (मस्ती, प्रेम और आत्मानुभूति का संदेश) पर अपने शब्दों में लगभग 50 शब्दों का एक संक्षिप्त वैचारिक लेख लिखिए।

B. पतंग (आलोक धन्वा)

- **प्रश्न 3:** "बच्चों के बहाने पतंग उड़ाना और छतों के खतरनाक कोनों से गुजरना"— कविता के आलोक में स्पष्ट कीजिए कि पतंगबाज़ी बच्चों को किस प्रकार निडर, साहसी और रोमांचित बनाती है?
- **प्रश्न 4:** 'पतंग' कविता में बाल-सुलभ इच्छाओं और उमंगों के चित्रण के लिए 'शरद ऋतु' के आगमन से जुड़े किन-किन प्राकृतिक बिंबों (Images) का प्रयोग किया गया है? सूची बनाइए।

2. गद्य खंड (आरोह भाग-2) — चरित्र-चित्रण एवं वैचारिक प्रश्न

भक्तिन (महादेवी वर्मा)

- **प्रश्न 5:** भक्तिन के आ जाने से लेखिका महादेवी वर्मा अधिक देहाती (ग्रामीण) कैसे हो गईं? पाठ में वर्णित खान-पान और जीवनशैली के उदाहरण देकर स्पष्ट कीजिए।
- **प्रश्न 6:** "भक्तिन का दुर्भाग्य भी उससे कम हठी नहीं था।" इस कथन के आलोक में भक्तिन के जीवन में आए पारिवारिक और सामाजिक संघर्षों का एक संक्षिप्त विवरण प्रस्तुत कीजिए।

- **चरित्र-चित्रण:** भक्तिन के चरित्र की तीन मुख्य विशेषताओं (जैसे- स्वाभिमानी, कर्तव्यपरायण, और तर्कशील) का पाठ के संदर्भ के साथ विश्लेषण कीजिए।

3. पूरक पाठ्यपुस्तक (वितान भाग-2)

सिल्वर वैडिंग (मनोहर श्याम जोशी)

- **प्रश्न 7:** यशोधर बाबू का तकियाकलाम (जुमला) "समहाउ इम्प्रॉपर" (Somehow improper) उनके किस मानसिक द्वंद्व और वैचारिक असमंजस को दर्शाता है? क्या वे बदलते दौर के साथ तालमेल बिठाने में पूरी तरह असफल रहे?
- **प्रश्न 8:** 'सिल्वर वैडिंग' कहानी के आधार पर आधुनिक समाज में बढ़ते 'पीढ़ियों के अंतराल' (Generation Gap) की समस्या पर प्रकाश डालिए। आपके अनुसार इस दूरी को कम करने के क्या उपाय हो सकते हैं?
- **गतिविधि:** यशोधर बाबू के परंपरागत मूल्यों और उनके बच्चों के आधुनिक विचारों में से आपको किसका पक्ष अधिक तर्कसंगत लगता है और क्यों? (अपनी नोटबुक में 100 शब्दों में उत्तर दीजिए)।

4. अभिव्यक्ति और माध्यम — विभिन्न माध्यमों के लिए लेखन

> निर्देश: बोर्ड परीक्षा के दृष्टिकोण से यह खंड अत्यंत महत्वपूर्ण है, इसके उत्तर ध्यानपूर्वक तैयार करें।

- **प्रश्न 9:** **प्रिंट माध्यम (मुद्रित माध्यम)** की किन्हीं दो मुख्य खूबियों और दो सीमाओं (कमियों) का उल्लेख कीजिए। मुद्रित माध्यम में लेखन करते समय किन आवश्यक बातों का ध्यान रखना अनिवार्य है?
- **प्रश्न 10:** **रेдио और टेलीविज़न (टीवी)** माध्यमों के लिए समाचार लेखन में क्या बुनियादी अंतर है? 'उल्टा पिरामिड शैली' (Inverted Pyramid Style) से आप क्या समझते हैं? इसके तीनों भागों (इंट्रो, बॉडी, समापन) को समझाइए।
- **प्रश्न 11:** **इंटरनेट पत्रकारिता (वेब पत्रकारिता)** से क्या अभिप्राय है? भारत में इंटरनेट पत्रकारिता के इतिहास और उसके वर्तमान (तीसरे दौर) की स्थिति पर एक संक्षिप्त व्यावहारिक नोट लिखिए।

5. परियोजना एवं रचनात्मक गतिविधि (Project Work)

> निर्देश: इस कार्य को एक ए-4 साइज *(A4 Size Sheet)* प्रोजेक्ट फ़ाइल या स्क्रैपबुक में सचित्र *(with pictures)* कलात्मक रूप से तैयार करें।

- **साहित्यकार परिचय:** महादेवी वर्मा अथवा हरिवंश राय बच्चन में से किसी एक साहित्यकार का विस्तृत जीवन परिचय तैयार करें। इसमें उनका जीवन वृत्त, प्रमुख कृतियाँ, काव्य/गद्यगत विशेषताएँ, भाषा-शैली और साहित्य में स्थान को रेखांकित करते हुए एक **सचित्र प्रोजेक्ट रिपोर्ट (4-5 पृष्ठ)** तैयार कीजिए।
- **शब्दकोश वृद्धि (Vocabulary Building):** अवकाश के दौरान प्रतिदिन एक नया कठिन हिंदी शब्द खोजें, उसका अर्थ लिखें और उस शब्द का वाक्य में प्रयोग करें (कुल 20 शब्द)।

Subject-Computer

MCQ

CH-REVISION TOUR-1

1. Which of these in not a core data type?
a) Lists
b) Dictionary
c) Tuples
d) Class
2. Given a function that does not return any value, What value is thrown by default when executed in shell.
a) int
b) bool
c) void
d) None

3. Following set of commands are executed in shell, what will be the output?

```
>>>str="hello"
>>>str[:2]
>>>
```

a) he
b) lo
c) olleh
d) hello

4. Which of the following will run without errors?
a) round(45.8)
b) round(6352.898,2,5)
c) round()
d) round(7463.123,2,1)
5. What is the return type of function id ?
a) int
b) float
c) bool
d) dict
6. In python we do not specify types,it is directly interpreted by the compiler, so consider the following operation to be performed.

```
>>>x = 13 ? 2
```

objective is to make sure x has a integer value, select all that apply (python 3.xx)
a) x = 13 // 2
b) x = int(13 / 2)
c) x = 13 % 2
d) All of the mentioned

7. What error occurs when you execute? apple = mango
a) SyntaxError
b) NameError

c) ValueError
d) TypeError

8. Carefully observe the code and give the answer.

```
def example(a): a = a + '2'
    a = a*2 return a
>>>example("hello")
```

a) indentation Error
b) cannot perform mathematical operation on strings
c) hello2
d) hello2hello2

9. What data type is the object below ? L = [1, 23, 'hello', 1].
a) list
b) dictionary
c) array
d) tuple

10. In order to store values in terms of key and value we use what core data type.
a) list
b) tuple
c) class
d) dictionary

11. Which of the following results in a SyntaxError ?
a) '"Once upon a time…", she said.'
b) "He said, 'Yes!'"
c) '3\'
d) "'That's okay"'

12. What is the average value of the code that is executed below ?

```
>>>grade1 = 80
>>>grade2 = 90
>>>average = (grade1 + grade2) / 2
```

a) 85
b) 85.1
c) 95
d) 95.1

13. Select all options that print hello-how-are-you
a) print('hello', 'how', 'are', 'you')
b) print('hello', 'how', 'are', 'you' + '-' * 4)
c) print('hello-' + 'how-are-you')
d) print('hello' + '-' + 'how' + '-' + 'are' + 'you')

14. What is the return value of trunc() ?
a) int

b) bool

c) float
d) None

15. What is the output of print 0.1 + 0.2 == 0.3?
a) True
b) False
c) Machine dependent
d) Error

16. Which of the following is not a complex number?
a) k = 2 + 3j
b) k = complex(2, 3)
c) k = 2 + 3l
d) k = 2 + 3J

17. What is the type of int?
a) Boolean
b) Integer
c) Float
d) Complex

18. What does ~4 evaluate to?
a) -5
b) -4
c) -3
d) +3

19. What does ~~~~~~5 evaluate to?
a) +5
b) -11
c) +11
d) -5

20. Which of the following is incorrect?
a) x = 0b101
b) x = 0x4f5
c) x = 19023
d) x = 03964

1. What is the output of the following?

```
i = 5
while True:
    if i%0O11 == 0:
        break print(i)
    i += 1
```

a) 5 6 7 8 9 10
b) 5 6 7 8
c) 5 6
d) error

2. What is the output of the following?

```
 i = 5
while True:
    if i%0O9 == 0:
        break print(i)
    i += 1
```

a) 5 6 7 8
b) 5 6 7 8 9
c) 5 6 7 8 9 10 11 12 13 14 15 ....
d) error

3. What is the output of the following?

```
i = 1
while True:
    if i%2 == 0: break
    print(i) i += 2
```

a) 1
b) 1 2
c) 1 2 3 4 5 6 ...
d) 1 3 5 7 9 11 ...

4. What is the output of the following?

```
i = 2
while True:
    if i%3 == 0: break
    print(i) i += 2
```

a) 2 4 6 8 10 ...
b) 2 4
c) 2 3
d) error

5. What is the output of the following?

```
 i = 1
while False:
    if i%2 == 0: break
    print(i) i += 2
```

a) 1
b) 1 3 5 7 ...
c) 1 2 3 4 ...
d) none of the mentioned

6. What is the output of the following?

```
True = False while True:
    print(True) break
```

a) True
b) False

c) None
d) none of the mentioned

7. What is the output of the following?

```
i = 0
        while i < 5: print(i)
                i += 1
                        if i == 3:
                           break
else:
    print(0)
```

a) 0 1 2 0
b) 0 1 2
c) error
d) none of the mentioned

8. What is the output of the following?

```
i = 0
        while i < 3: print(i)
                i += 1
            else:
                print(0)
```

a) 0 1 2 3 0
b) 0 1 2 0
c) 0 1 2
d) error

9. What is the output of the following?

```
x = "abcdef" while i in x:
    print(i, end=" ")
```

a) a b c d e f
b) abcdef
c) i i i i i i ...
d) error

10. What is the output of the following?

```
x = "abcdef" i = "i"
while i in x: print(i, end=" ")
```

a) no output
b) i i i i i i ...
c) a b c d e f
d) abcdef

11. What is the output of the following? x = 'abcd'

```
for i in x: print(i.upper())
```

a) a b c d
b) A B C D
c) a B C D
d) error

12. What is the output of the following?

```
x = 'abcd'
```

```
for i in range(len(x)): i.upper()
print (x)
```

a) a b c d
b) 0 1 2 3
c) error
d) none of the mentioned

13. What is the output of the following?

```
x = 'abcd'
for i in range(len(x)): x = 'a'
    print(x)
```

a) a
b) abcd abcd abcd
c) a a a a
d) none of the mentioned

14. What is the output of the following?

```
x = 'abcd'
for i in range(len(x)): print(x)
    x = 'a'
```

a) a
b) abcd abcd abcd abcd
c) a a a a
d) none of the mentioned

15. What is the output of the following?

```
x = 123
for i in x: print(i)
```

a) 1 2 3
b) 123
c) error
d) none of the mentioned

16. What is the output of the following?

```
x = 'abcd'
for i in range(len(x)): i.upper()
print (x)
```

a) a b c d
b) 0 1 2 3
c) error
d) none of the mentioned

17. What is the output of the following?

```
x = 'abcd'
for i in range(len(x)): x = 'a'
    print(x)
```

a) a

b) abcd abcd abcd
c) a a a a
d) none of the mentioned

18. What is the output of the following?

```
x = 'abcd'
for i in range(len(x)): print(x)
    x = 'a'
```

a) a
b) abcd abcd abcd abcd
c) a a a a
d) none of the mentioned

19. What is the output of the following?

```
x = 123
for i in x: print(i)
```

a) 1 2 3
b) 123
c) error
d) none of the mentioned

20 . What is the output of the following?

```
d = {0: 'a', 1: 'b', 2: 'c'}
for i in d: print(i)
```

a) 0 1 2
b) a b c
c) 0 a 1 b 2 c
d) none of the mentioned

MCQ

CHAPTER - REVISION TOUR

1. What is the output when following statement is executed ?

```
>>>"a"+"bc"
```

a) a
b) bc
c) bca
d) abc

2. What is the output when following statement is executed ?

```
>>>"abcd"[2:]
```

a) a
b) ab
c) cd
d) dc

3. The output of executing string.ascii_letters can also be achieved by:
a) string.ascii_lowercase_string.digits
b) string.ascii_lowercase+string.ascii_upercase
c) string.letters
d) string.lowercase_string.upercase

4. What is the output when following code is executed ?

```
>>> str1 = 'hello'
>>> str2 = ','
>>> str3 = 'world'
>>> str1[-1:]
```

a) olleh
b) hello
c) h
d) o

5. What arithmetic operators cannot be used with strings ?

a) +
b) *
c) –
d) All of the mentioned

6. What is the output when following code is executed ?

```
>>>print r"\nhello"
```

The output is

a) a new line and hello
b) \nhello
c) the letter r and then hello
d) error

7. What is the output when following statement is executed ?

```
>>>print('new' 'line')
```

a) Error
b) Output equivalent to print 'new\nline'
c) newline
d) new line

8. What is the output when following statement is executed ?

```
>>> print('x\97\x98')
```

a) Error
b) 97
98
c) x\97
d) \x97\x98

9. What is the output when following code is executed ?

```
>>>str1="helloworld"
>>>str1[::-1]
```

a) dlrowolleh
b) hello
c) world
d) helloworld

10. print(0xA + 0xB + 0xC) :
a) 0xA0xB0xC
b) Error
c) 0x22
d) 33
11. What is the output of the following?
print("xyyzxyzxzxyy".count('yy'))
a) 2
b) 0
c) error
d) none of the mentioned

12. What is the output of the following?
print("xyyzxyzxzxyy".count('yy', 1))
a) 2
b) 0
c) 1
d) none of the mentioned
13. What is the output of the following?
print("xyyzxyzxzxyy".count('yy', 2))
a) 2
b) 0
c) 1
d) none of the mentioned

14. What is the output of the following?
print("xyyzxyzxzxyy".count('xyy', 0, 100))
a) 2
b) 0
c) 1
d) error
15. What is the output of the following?

print("xyyzxyzxzxyy".count('xyy', 2, 11))
a) 2
b) 0
c) 1
d) error
16. What is the output of the following?
print("xyyzxyzxzxyy".count('xyy', -10, -1))
a) 2
b) 0
c) 1

Find the output:

```
>>>A = [17, 24, 15, 30]
>>>A.insert(2, 33)
>>>print (A[-4])
```

Name the Python Library modules which need to be imported to invoke the following functions:

(a) ceil() (b) randrange()

What will be the result of the following code?

```
>>>d1 = {“abc” : 5, “def” : 6, “ghi” : 7}
>>>print (d1[0])
```

(a) abc (b) 5 (c) {“abc”:5} (d) Error

Suppose list L is declared as

L = [5 * i for i in range (0,4)], list L is

a) [0, 1, 2, 3,] b) [0, 1, 2, 3, 4]

c) [0, 5, 10, 15]d) [0, 5, 10, 15, 20]

Write a function HowMany(ID, VALUE) to count and display number of times the VALUE is present in the list ID.

For example, if the ID contains [115, 25, 65, 59, 74, 25, 110, 250] and the VALUE contains 25, the function should print:

25 found 2 time

Subject-Physical Education

Based on Unit 1: Management of Sporting Events & Unit 2: Children and Women in Sports

Section A: Very Short Answer Type [4 x 1 = 4 marks]

Answer in 20-30 words each.

1. What is the meaning of 'Intramural' tournaments?

2. Name any two functions of sports event management.

3. What is Knock Knee?

4. Expand IOC and NOC.

Section B: Short Answer Type [3 x 3 = 9 marks]

Answer in 60-80 words each.

1. Write the objectives of organizing community sports programs like Run for Unity and Health Run.

2. Explain any 3 responsibilities of the Technical Committee during a sports event.

3. Mention the physical and social benefits of women's participation in sports.

Section C: Long Answer Type [3 x 5 = 15 marks]

Answer in 150-200 words each.

1. Explain the 5 functions of Sports Events Management with examples.

2. Draw a Knock-Out fixture for 11 teams and explain the concept of 'Bye'.

3. Describe the Female Athlete Triad. Explain its causes and prevention.

Instructions:

- Do this work in your PE practical file/notebook.

- Write neatly with headings and subheadings.

- Draw diagrams where required, especially for fixtures and postural deformities.

Want me to make a sample answer sheet for this so you can use it for reference?

Subject-Chemistry

PART A: THEORY & NUMERICAL CONCEPT APPLICATION

Chapter 1: Solutions

Short Answer Questions (2 Marks)

1. Define **Azeotropes**. Differentiate between minimum boiling and maximum boiling azeotropes with an example of each.
2. State **Henry's Law**. Why do aquatic species feel more comfortable in cold water rather than in warm water?
3. What is the **Van't Hoff factor (i)**? What is its value for a dilute solution of $Al_2(SO_4)_3$ assuming complete dissociation?

Long Answer & Numerical Problems (3 & 5 Marks)

4. State **Raoult's Law** for a solution containing volatile liquids. Write two differences between an ideal and a non-ideal solution showing negative deviation.
5. A solution is prepared by dissolving $10\ \text{g}$ of non-volatile solute in $200\ \text{g}$ of water. It has a vapor pressure of $31.84\ \text{mm Hg}$ at $308\ \text{K}$. If the vapor pressure of pure water at this temperature is $32\ \text{mm Hg}$, calculate the molar mass of the solute.
6. Calculate the boiling point elevation and the actual boiling point of a solution prepared by dissolving $6.00\ \text{g}$ of urea (NH_2CONH_2) in $200\ \text{g}$ of water. (K_b for water $= 0.52\ \text{K kg mol}^{-1}$).

Chapter 2: Electrochemistry

Short Answer Questions (2 Marks)

7. State **Kohlrausch's Law of Independent Migration of Ions**. Write its one important application.

8. What is a **Fuel Cell**? Write the cathode and anode reactions taking place in a Hydrogen-Oxygen (H_2-O_2) fuel cell.

9. Suggest a method to determine the Λ_m° value of a weak electrolyte like acetic acid (CH_3COOH).

Long Answer & Numerical Problems (3 & 5 Marks)

10. State **Faraday's First and Second Laws of Electrolysis**. How many coulombs of electricity are required to reduce $1\ \text{mole}$ of $Cr_2O_7^{2-}$ to Cr^{3+}?

11. Represent the cell in which the following reaction takes place:

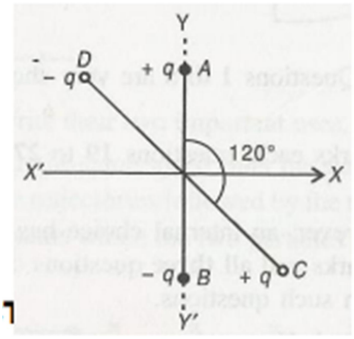
$$Mg(s) + 2Ag^+(0.0001\ M) \rightarrow Mg^{2+}(0.130\ M) +$$

Calculate its E_{cell} if $E^\circ_{cell} = 3.17\ V$. (Use Nernst Equation).

12. The resistance of a conductivity cell containing $0.001\ M$ KCl solution at $298\ K$ is $1500\ \Omega$. What is the cell constant if conductivity (κ) of $0.001\ M$ KCl solution at $298\ K$ is $0.146 \times 10^{-3}\ S\ cm^{-1}$?

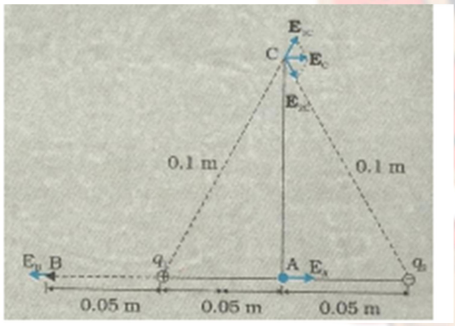
Subject- Physics

1. Two small identical electrical dipoles AB and CD , each of dipole moment ‘p’ are kept at an angle of 0 120 as shown in the figure. What is the resultant dipole moment of this combination? If this system is subjected to electric field (E) directed along + X direction , what will be the magnitude and direction of the torque acting on this ?

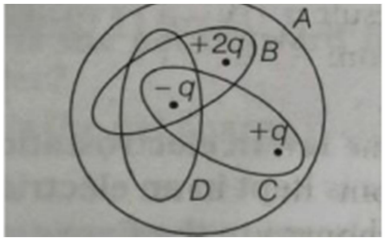


2. Does a dipole experience a force when placed in the non – uniform electric field? Calculate the amount of work done in rotating a dipole, of dipole moment 3×10^{-8}cm, from its position of stable equilibrium to the position of unstable equilibrium, in a uniform electric field of intensity 10^4 N / C.

3. Two point charges q_1 and q_2 of magnitudes 10^{+8} C and 10^{-8} C respectively are placed 0. 1m apart. Calculate the electric field at point B,C and A.



4. (i)Rank the Gaussian surfaces as shown in the figure. In order of increasing electric flux, starting with the most negative.

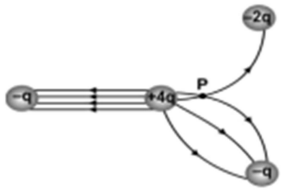


(ii) Obtain the expression for the electric field intensity due to a uniformly charged infinite plane sheet.

5.(i)Derive the equation for capacitance of a parallel plate capacitor with a dielectric slab as medium.

(ii) A charge q is placed inside a sphere of radius 'a' filled with water and another charge 2q is placed inside cube of side '2a' which is vacuumed inside. Find the ratio of the flux linked with the sphere to that linked with the cube. (Take relative permittivity of water as 80)

6. The figure below shows an arrangement of four charges along with some electric field lines drawn between the charges.



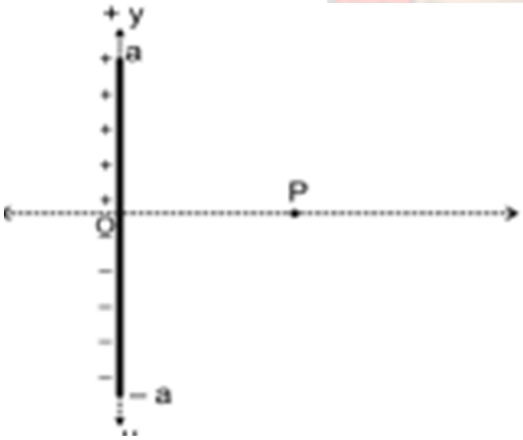
(a) Identify three things that are incorrect in this figure.

(b) Draw a correct diagram representing the electric field lines for this system of charges.

7. (a) Given is a line of charge of uniform linear density. A charge +q is distributed uniformly between y = 0 and y = a and charge –q is distributed uniformly between y = 0 and y = -a.

Explain how the direction of the resultant electric field at point P can be obtained. Represent using a vector diagram.

(b) Two point charges 4Q, Q are separated by 1 m in air. At what point on the line joining the charges are the electric field intensity zero?

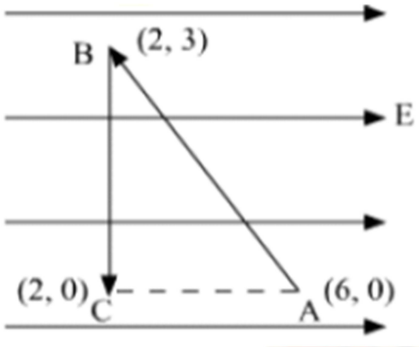


8. (a) Obtain the expression for the amount of work done in bringing a point charge q from infinity to a point, distance r, in front of the line charge.

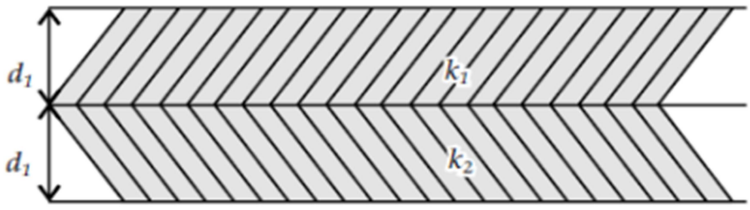
(b) An infinite line charge produces a field of 9×10^4 N/C at a distance of 2 cm. Calculate the linear charge density.

9. A charge is distributed uniformly over a ring of radius _a'. Obtain an expression for the electric intensity E at a point on the axis of the ring. Hence show that for point's at large distances from the ring, it behaves like a point charge.

10. A test charge q is moved without acceleration from A to C along the path from A to B and then from B to C in electric field E as shown in the figure. (i) Calculate the potential difference between A and C. (ii) At which point (of the two) is the electric potential more and why?



11. A parallel plate capacitor is made of two dielectric blocks in series. One of the blocks has thickness d_1 and dielectric constant k_1 and the other has thickness d_2 and dielectric constant k_2 as shown in Figure. This arrangement can be thought as a dielectric slab of thickness d (= d_1+d_2) and effective dielectric constant k. Then find k.



12.(i) Assertion (A): Electric field is always normal to equipotential surfaces and along the direction of decreasing order of potential.

Reason (R): Negative gradient of electric potential is electric field.

(ii) Assertion: A uniformly charged disc has a pin hole at its center. The electric field at the center of the disc is zero.

Reason: Disc can be supposed to be made up of many rings. Also electric field at the center of uniformly charged ring is zero.

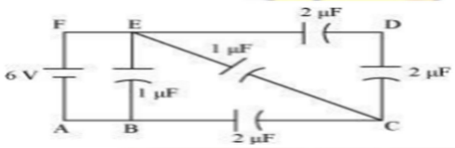
(iii) Assertion (A): Increasing the charge on the plates of a capacitor means increasing the capacitance.

Reason(R): Capacitance is directly proportional to charge.

(iv) Assertion: Electric potential and electric potential energy are different quantities.

Reason: For a system of positive test charge and point charge electric potential energy = electric potential.

13. Find the total energy stored in the capacitors

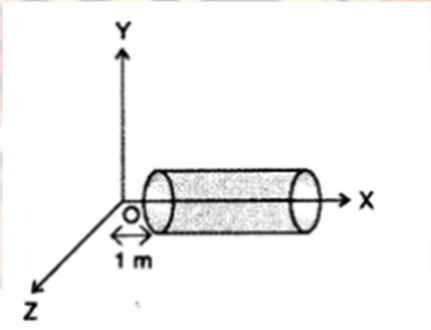


in the given network.

14. A hollow cylindrical box of length 1m and area of cross-section 25 cm2 is placed in a three dimensional coordinate system as shown in the figure. The electric field in the region is given by E=50xi where E is in NC^{-1} and x is in meters and i is unit vector along X-axis.

Find

• Net flux through the cylinder.



• Charge enclosed by the cylinder.

15. Sixty four conducting drops each of radius 0.02 m and each carrying a charge of 5 μC are combined to form a bigger drop. Find the ratio of surface density of bigger drop to the smaller drop.

16. Two-point charges A and B having charges + Q and -Q respectively, are placed at a distance apart and the force acting between them is F. If 25% charge on A is transferred to B, then what will be the force between the charges?

17. Five point charges, each of value +q are placed on five vertices of a regular hexagon of side L m.

What is the magnitude of the force on a point charge of value -q coulomb placed at the center of the hexagon?

18. (a) Derive an expression for electric field at a point outside and inside for a uniformly charged spherical shell

b) An early model for an atom considered it to have a positively charged point nucleus of charge Ze, surrounded by a uniform density of negative charge up to a radius R. The atom as a whole is neutral. For this model, what is the electric field at a distance r from the nucleus?

19. (i) Can two equipotential surfaces intersect each other? Give reasons.

(ii) Two charges -q and + q are located at points A (0, 0, – a) and B (0, 0, +a) respectively. How much work is done in moving a test charge from point P (7, 0, 0) to Q (-3,0,0)?

20. Draw 3 equipotential surfaces corresponding to a field that uniformly increases in magnitude but remains constant along Z-direction. How are these surfaces different from that of a constant electric field along Z-direction?

Mathematics, Class XII

Chapter: Matrices and Determinants

1. Construct a matrix $A=\left[a_{ij}\right]_{2\times 2}$ whose elements a_{ij} are given by

   a) $a_{ij}=e^{2ix}\sin jx$. b) $a_{ij}=\frac{(i-2j)^2}{2}$ c) $a_{ij}=\left|-2i+3j\right|$

2. Show that a matrix which is both symmetric and skew symmetric is a zero matrix.

3. If $X=\begin{bmatrix}3 & 1 & -1\\ 5 & -2 & -3\end{bmatrix}$ and $Y=\begin{bmatrix}2 & 1 & -1\\ 7 & 2 & 4\end{bmatrix}$, find a matrix Z such that $X+Y+Z$ is a zero matrix.

4. Find values of a and b if $A=B$ where $A=\begin{bmatrix}a+4 & 3b\\ 8 & -6\end{bmatrix}$ and $B=\begin{bmatrix}2a+2 & b^2+2\\ 8 & b^2-5b\end{bmatrix}$.

5. Find the value of x if $\begin{bmatrix}1 & x & 1\end{bmatrix}\begin{bmatrix}1 & 3 & 2\\ 2 & 5 & 1\\ 15 & 3 & 2\end{bmatrix}\begin{bmatrix}1\\ 2\\ x\end{bmatrix}=O$

6. If $A=\begin{bmatrix}1 & 3 & 2\\ 2 & 0 & -1\\ 1 & 2 & 3\end{bmatrix}$, then show that A satisfies the equation $A^3-4A^2-3A+11I=O$.

7. Let $A=\begin{bmatrix}2 & 3\\ -1 & 2\end{bmatrix}$, then show that $A^2-4A+7I=O$. Using this result calculate A^5 also.

8. If $A=\begin{bmatrix}3 & -5\\ -4 & 2\end{bmatrix}$, then find $A^2-5A-14I$. Hence obtain A^3.

9. If the matrix $\begin{bmatrix}0 & a & 3\\ 2 & b & -1\\ c & 1 & 0\end{bmatrix}$ is a skew symmetric matrix, find the values of a, b and c.

10. If $P(x)=\begin{bmatrix}\cos x & \sin x\\ -\sin x & \cos x\end{bmatrix}$, then show that $P(x).P(y)=P(x+y)=P(y).P(x)$.

11. If $A=\begin{bmatrix}\cos\alpha & \sin\alpha\\ -\sin\alpha & \cos\alpha\end{bmatrix}$ and $A^{-1}=A'$, find the value of α.

12. Find the matrix A satisfying the following equations:

    a) $\begin{bmatrix}2 & 1\\ 3 & 2\end{bmatrix}A\begin{bmatrix}-3 & 2\\ 5 & -3\end{bmatrix}=\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$

    b) $\begin{bmatrix}4\\ 1\\ 3\end{bmatrix}A=\begin{bmatrix}-4 & 8 & 4\\ -1 & 2 & 1\\ -3 & 6 & 3\end{bmatrix}$

    c) $\begin{bmatrix}2 & -1\\ 1 & 0\\ -3 & 4\end{bmatrix}A=\begin{bmatrix}-1 & -8 & -10\\ 1 & -2 & -5\\ 9 & 22 & 15\end{bmatrix}$

13. If $A=\begin{bmatrix}\cos\theta & \sin\theta\\ -\sin\theta & \cos\theta\end{bmatrix}$, then show that $A^2=\begin{bmatrix}\cos 2\theta & \sin 2\theta\\ -\sin 2\theta & \cos 2\theta\end{bmatrix}$

14. If $A=\begin{bmatrix}1 & 5\\ 7 & 12\end{bmatrix}$ and $B=\begin{bmatrix}9 & 1\\ 7 & 8\end{bmatrix}$, find a matrix C such that $3A+5B+2C$ is a null matrix

15. Show that A′A and AA′ are both symmetric matrices for any matrix A.

16. Express the following matrices as sum of a symmetric and skew-symmetric matrices

a) $\begin{bmatrix}2 & 3 & 1\\ 1 & -1 & 2\\ 4 & 1 & 2\end{bmatrix}$ b) $\begin{bmatrix}2 & 4 & -6\\ 7 & 3 & 5\\ 1 & -2 & 4\end{bmatrix}$

17. Give an example of matrices A, B and C such that AB = AC, where A is nonzero matrix, but B ≠ C.

18. Show by an example that for A ≠ O, B ≠ O, AB = O.

19. Find inverse of the following matrices, if exists.

a) $\begin{bmatrix}2 & -1 & 3\\ -5 & 3 & 1\\ -3 & 2 & 3\end{bmatrix}$ b) $\begin{bmatrix}2 & 3 & -3\\ -1 & -2 & 2\\ 1 & 1 & -1\end{bmatrix}$ c) $\begin{bmatrix}2 & 0 & -1\\ 5 & 1 & 0\\ 0 & 1 & 3\end{bmatrix}$

20. Evaluate a) $\begin{vmatrix}a+ib & c+id\\ -c+id & a-ib\end{vmatrix}$. b) $\begin{vmatrix}\cos 15^\circ & \sin 15^\circ\\ \sin 75^\circ & \cos 75^\circ\end{vmatrix}$ c) $\begin{bmatrix}1 & -3 & 2\\ 4 & -1 & 2\\ 3 & 5 & 2\end{bmatrix}$ d) $\begin{bmatrix}0 & 2 & 6\\ 1 & 5 & 0\\ 3 & 7 & 1\end{bmatrix}$

21. Find x if $\begin{vmatrix}3 & x\\ x & 1\end{vmatrix}=\begin{vmatrix}3 & 2\\ 4 & 1\end{vmatrix}$

22. Find the value of k such that the points are collinear
    a) A(−3, 7) , B(7, k) and (2, 1).
    b) A(1, −5) , B(−4, 5) and (k, 7).

23. Find the area of the triangle whose vertices are A (11, 7), B (5, 5) and C (-1, 3)

24. Compute A^{-1} for the matrix $A=\begin{bmatrix}0 & 1 & 2\\ 1 & 2 & 3\\ 3 & 1 & 1\end{bmatrix}$

    Hence solve the system of equations: $y+2z+8=0$, $x+2y+3z+14=0$, $3x+y+z+8$

25. Find A^{-1} for the matrix $A=\begin{bmatrix}0 & 1 & 1\\ 1 & 0 & 1\\ 1 & 1 & 0\end{bmatrix}$ and show that $A^{-1}=\dfrac{A^2-3I}{2}$

26. Using matrix method solve the following system of equations:

a) $6x-9y-20z=-4$, $4x-15y+10z=-1$, $2x-3y-5z=-1$

b) $2x+y+z=1$, $x-2y-z=\dfrac{3}{2}$, $3y-5z=9$

c) $3x+2y-2z=3$, $x+2y+3z=6$, $2x-y+z=2$

27. If $A=\begin{bmatrix}1 & 2 & 0\\ -2 & -1 & -2\\ 0 & -1 & 1\end{bmatrix}$, find A^{-1}. Using A^{-1} solve the system of equations

$x-2y=10,\ 2x-y-z=8,\ -2y+z=7$.

28. Use product $\begin{bmatrix}1 & -1 & 2\\ 0 & 2 & -3\\ 3 & -2 & 4\end{bmatrix}\begin{bmatrix}-2 & 0 & 1\\ 9 & 2 & -3\\ 6 & 1 & -2\end{bmatrix}$ to sole the system of equations
$x-y+2z=1,\ 2y-3z=1,\ 3x-2y+4z=2$

29. Given $A=\begin{bmatrix}2 & 2 & -4\\ -4 & 2 & -4\\ 2 & -1 & 5\end{bmatrix}$ and $B=\begin{bmatrix}1 & -1 & 0\\ 2 & 3 & 4\\ 0 & 1 & 2\end{bmatrix}$, find BA and use this to solve the system of equations $y+2z=7,\ x-y=3,\ 2x+3y+4z=17$

30. Prove that $(A^{-1})'=(A')^{-1}$, where A is an invertible matrix.

31. Show that the points $(a+5,\ a-4)$, $(a-2,\ a+3)$ and $(a,\ a)$ do not lie on a straight line for any value of a.

32. The sum of three numbers is 6. If we multiply third number by 3 and add second number to it, we get 11. By adding first and third numbers, we get double of the second number. Represent it algebraically and find the numbers using matrix method.

33. If A and B are invertible matrices, then prove that $(AB)^{-1}=B^{-1}A^{-1}$.

34. If $A=\begin{bmatrix}3 & 1\\ 2 & -3\end{bmatrix}$, find $|adj\ A|$ and $|A\,adj\ A|$.

35. If $A=\begin{vmatrix}1 & -2 & 3\\ 0 & -1 & 4\\ -2 & 2 & 1\end{vmatrix}$, find $\left(A^T\right)'$. (Ans: $\begin{bmatrix}-9 & -8 & -2\\ 8 & 7 & 2\\ -5 & -4 & -1\end{bmatrix}$)

Chapter: Relations and Functions

36. Let $A=\{1,2,3,.....9\}$ and R be the relation in A × A defined by $(a,b)R(c,d)$ if $a+d=b+c$ for $(a,b),(c,d)\in A\times A$. Prove that R is an equivalence relation and also obtain the equivalence class $[(2,5)]$ and $[(1,3)]$.

37. Show that the relation R on the set Z of all integers defined by $(x,y)\in R\Leftrightarrow(x-y)$ is divisible by 3 is an equivalence relation.

38. Let N be the set of all natural numbers and let R be a relation on N × N, defined by $(a,b)R(c,d)\Leftrightarrow ad=bc$ for all $(a,b),(c,d)\in N\times N$. Show that R is an equivalence relation. Also, find the equivalence class $[(2,6)]$.

39. Let N be the set of all natural numbers and let R be a relation on N × N, defined by $(a,b)R(c,d)\Leftrightarrow ad(b+c)=bc(a+d)$ for all $(a,b),(c,d)\in N\times N$. Show that R is an equivalence relation. Also, find the equivalence class $[(2,6)]$.

40. Let R be the equivalence relation in the set $A=\{0,1,2,3,4,5\}$ given by $R=\{(a,b):2\ divides\ (a-b)\}$. Write the equivalence class $[0]$.

41. Let $A=[-1,1]$. Then discuss whether the following functions defined on A are one-one onto or bijective.

a) $f(x)=\frac{x}{2}$ b) $g(x)=|x|$ c) $h(x)=x|x|$ d) $k(x)=x^2$

42. Check whether following functions are one-one onto or not?

(i) $f(x)=\frac{x}{x^2+1}$, $f:R\to R$ (ii) $f(x)=\cos x$ iii) $f(x)=9x^2+6x-5$, $f:R_+\to[-5,\infty)$

iv) $f(x)=5x^2+6x-9$, $f:R_+\to[-9,\infty)$ (R_+ is the set of all non-negative real numbers)

v) $f(x)=4x^2+12x+15$, $f:N\to S$ where S is the range of S

43. Show that $f:N\to N$ given by $f(x)=\begin{cases}x+1, & \text{if } x \text{ is odd}\\ x-1, & \text{if } x \text{ is even}\end{cases}$ is both one-one and onto.

44. Find the number of all one-one functions from set $A=\{a,b,c\}$ to itself.

Chapter: Inverse Trigonometric Functions

45. Find the principal value of $\tan^{-1}\left(\tan\frac{7\pi}{6}\right)$ (Ans: $\frac{\pi}{6}$)

46. Find the principal values of i) $\tan^{-1}\left(\tan\frac{9\pi}{8}\right)$ ii) $\cot^{-1}\left(-\frac{1}{\sqrt{3}}\right)$ iii) $\sec^{-1}\left(\sec\frac{9\pi}{5}\right)$

47. Evaluate: $\sin\left(\cot^{-1}\left(\cot\frac{17\pi}{3}\right)\right)$. (Ans: $\frac{\sqrt{3}}{2}$)

48. Find the domain of the following functions:

a) $\sin x+\sin^{-1}x$ b) $\cos^{-1}(3x-2)$

49. Evaluate: i) $\sin^{-1}(\sin 10)$ ii) $\sin^{-1}(\sin 5)$ iii) $\cos^{-1}(\cos 10)$

50. Find the principal value of $\cot^{-1}\left(-\sqrt{3}\right)+\tan^{-1}(1)+\sec^{-1}\left(\frac{2}{\sqrt{3}}\right)$. (Ans: $\frac{5\pi}{4}$)

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