Class – XII
Session 2021-22
Computer Science (083)
Half Yearly Paper

Maximum Marks : 35 **Time Allowed :2 hours**

General Instruction:

1. The examination will comprise of Objective type Multiple Choice Questions (MCQs)
2. All questions are compulsory
3. Each question carries one mark.
4. There will be no negative marking for the wrong answers
5. Only one answer is correct per numbered item

Question : Vishal is a software developer with a reputed firm. He has been given the task to computerize the operations for which he is developing a firm which will accept customer data as follows: The data to be entered is: Name, Age, Items Bought, Total Amount.

Q.1 Choose the most appropriate data type to store the above information in the given sequence.

a. string, tuple, float, integer b. string, integer, dictionary, float
c. string, integer, integer, float d. string, integer, list, float

Q.2 Now the data of each customer needs to be organized in such that the items bought followed by the item price.

a. List b. Dictionary c. Nested Dictionary d. Tuple

Q.3 Now to calculate total bill amount of customers, Vishal can use which data type to store the sum.

a. Integer b. Float c. List d. Tuple

Q.4 In order to calculate the total bill amount for 15 customers, Vishal Statement 1. Must use a variable of the type float to store the sum.
Statement 2. May use a loop to iterate over the values

a. Both statements are correct.
b. Statement 1 is correct, but statement 2 is not.
c. Both statements are incorrect.

d. Statement 1 is incorrect but statement 2 is correct.

Q.5 Vishal wants to update name of the customer in list. Which function from the given option can be used.

L=[“Mayank”, 18]

a. L[0]= “Ajay”
b. update(“Ajay”)
c. L[1]= “Ajay”
d. L[0]=update(“Ajay”)

Question :

```
print("Enter Marks Obtained in 5 Subjects: ") markOne = int(input()) markTwo = int(input()) markThree = int(input())
markFour = int(input())
markFive = int(input())
tot = markOne+markTwo+markThree+markFour+markFive
avg = tot/5 if avg>=91 and avg<=100:
    print("Your Grade is A1")          #Statement 1
elif avg>=81 and avg<91:
    print("Your Grade is A2")          #Statement 2
elif avg>=71 and avg<81:
    print("Your Grade is B1")          #Statement 3
elif avg>=61 and avg<71:
    print("Your Grade is B2")
elif avg>=51 and avg<61:
print("Your Grade is C1") elif
avg>=41 and avg<51:
print("Your Grade is C2") elif
avg>=33 and avg<41:
print("Your Grade is D") elif
avg>=21 and avg<33:
print("Your Grade is E1") elif
avg>=0 and avg<21:
    print("Your   Grade   is   E2")
else:
    print("Invalid Input!")            #Statement 4
```

On the basis of the above code, choose the correct option which will be executed when different inputs are given.

Q.6 If markOne,markTwo,markThree,markFour=100,97,82,85 and markFive= “Nil” then total will be

a. 364 b. 0 c. Syntax Error d. TypeError

Q.7 If avg= “Nil” then which statement will execute.

a. Statement 1 b. Statement 2 c. Statement 3 d. Statement 4

Q.8 If markOne,markTwo,markThree,markFour,markFive=100,95,90,80,85 then which statement will execute.

a. Statement 1 b. Statement 2 c. Statement 3 d. Statement 4

Q.9 If markOne,markTwo,markThree,markFour,markFive=100,83,92,80,100 then which statement will execute.

a. Statement 1 b. Statement 2 c. Statement 3 d. Statement 4

Q.10 If avg=81, then which statement will execute.

a. Statement 1 b. Statement 2 c. Statement 3 d. Statement 4

Question : Ram is looking for his dream job but has some restrictions. He loves Delhi and would take a job there if he is paid over Rs.40,000 a month. He hates Chennai and demands at least Rs. 1,00,000 to work there. In any another location he is willing to work for Rs. 60,000 a month. The following code shows his basic strategy for evaluating a job offer. Code:

```
pay= _________  location= _________  if location ==
"Mumbai":  print ("I'll take it!")
#Statement 1  elif location == "Chennai":
        if pay < 100000:
                print ("No way")            #Statement 2  else:
                print("I am willing!")              #Statement 3
elif location == "Delhi" and pay > 40000:
        print("I am happy to join")                 #Statement 4  elif
pay > 60000:
        print("I accept the offer")                 #Statement 5  else:
        print("No thanks, I can find something better")              #Statement 6
```

On the basis of the above code, choose the right statement which will be executed when different inputs for pay and location are given.

Q.11 Input: location = "Chennai”, pay = 50000

a. Statement 1 b. Statement 2 c. Statement 3 d. Statement 4

Q.12 Input: location = "Chennai", pay = 150000

a. Statement 1 b. Statement 2 c. Statement 3 d. Statement 6

Q.13 Input- location = "Any Other City", pay = 1

a Statement 1 b. Statement 2 c. Statement 4 d. Statement 6

Q.14 Input location = "Delhi", pay = 400000

a. Statement 6 b. Statement 5 c. Statement 4 d. Statement 3

Q.15 Input- location = "Lucknow", pay = 70000

a. Statement 2 b. Statement 3 c. Statement 4 d. Statement 5

Question : Naman prepare a code for different conditions and take different inputs in variable str1. What will be the output for the different inputs given below:

```
str1="_________"
str2=""  I=0 while I<len(str1):        if
str1[I]>="A" and str1[I]<="M":
str2=str2+str1[I+1]                elif
str1[I]>="0" and str1[I]<="9":
str2=str2+str1[I-1]                    else:
str2=str2+"*"     I=I+1
print(str2)
```

Q.16 If input will be str1= “Exam2021” then output will be

a. X***M202 b. X**M2021

c. x***m201 d. x***m202

Q.17 If input will be str1= “CBSE-Exam” then output will be

a. Bs*-*x*** b. BS*-*x***

c. BS*-*x** d. BS**-*x**

Q.18 If input will be str1= “PT1” then output will be

a. **T b. *T* c. T** d. **t

Q.19 If input will be str1= “ABCD” then output will be

a. BCD b. BCD* c. ABCD d. Error : String index out of range

Q.20 If input will be str1= “xyzA” then output will be

a. **A b. ***A c. *xyz d. Error : String index out of range

Question : If a user change its passing parameter of function calling display( ).
What will be the output of the following code.

```
def display(a):
   a1=""     for i in
range(0,len(a)):
if(a[i].isspace()):
          a1=a1+"*"
elif(a[i].isdigit()):
          a1=a1+"&"
elif(a[i].isalpha()):
a1=a1+a[i].upper()     print(a1)
display("_________")
```

Q.21 If passing parameter will be “Python”, then output will be

a. PYTHON b. Python c. python d. None of these

Q.22 If passing parameter will be “Exam2021”, then output will be

a. Exam&&&& b. EXAM**** c. EXAM&&&& d. Exam****

Q.23 If passing parameter will be “PT1”, then output will be

a. pt& b. PT* c. Pt& d. PT&

Question : Assume, you are given two lists: a = [1,2,3,4,5] b = [6,7,8,9]
The task is to create a list which has all the elements of a and b in one dimension.

Q.24 If Output : a = [1,2,3,4,5,6,7,8,9] , Which of the following option would you choose?

a. a.append(b) b. a.extend(b) c. Any of the above d. None of these

Q.25 If Output : a = [1,2,3,4,5,[6,7,8,9]] , Which of the following option would you choose?

a. a.append(b) b. a.extend(b) c. Any of the above d. None of these

Question: Suppose you are defining a tuple given below: tup = (1, 2, 3, 4, 5)

Q.26 You want to update the value of this tuple at 2nd index to 10. Which of the following option will you choose?

a. tup(2) = 10 b. tup[2] = 10 c. tup{2} = 10 d. None of these

Q.27 You want to check the index of value 5. Which of the following option will you choose?

a. tup.index(5) b. tup=index(5) c. tup.index(4) d. tup=index(4)

Q.28 You want to check the minimum value of tup. Which of the following option will you choose?

a. min=tup() b. tup=min(1) c. tup=min() d. min(tup)

Q.29 You want to check the length of tup. Which of the following option will you choose?

a. len.tup b. len(tup) c. len=tup d. None of these

Q.30 You want to delete tup. Which of the following option will you choose?

a. delete(tup) b. remove(tup) c. del tup d. tup.remove()

Q.31 Which of the following function headers is correct?

a. def f(a=1,b): b. def f(a=1,b,c=2):
c. def f(a=1,b=1,c=2): d. def f(a=1,b=1,c=2,d):

Q.32 Which of the following function calls will cause Error while invoking/calling the below function definition?

```
def test(a,b,c,d)
```

a. test(1,2,3,4) b. test(4,5,6,7)
c. test(a=1,b=2,c=3,d=4) d. test(a=1,2,3,4)

Q.33 Which of the following function calls can be used to invoke/calling the below function definition?

```
def test(a,b,c,d)
```

a. test(1,2,3,4) b. test(a=1,2,3,4)
c. test(a=1,b=2,c=3,4) d. test(a=1,b=2,3,4)

Q.34 What is a variable defined outside all the function referred to as?

a. A static variable b. A global variable
c. A local variable d. An automatic variable

Q.35 What is a variable defined inside a function referred to as?

a. A static variable b. A global variable
c. A local variable d. An automatic variable

Sample Question Paper 2021-22
Term 1
Subject: Physics (042)

Time: 90 Minutes **Max. Marks 35**

General Instructions:

1. The Question Paper contains three sections.

2. Section A has 25 questions. Attempt any 20 questions.

3. Section B has 24 questions. Attempt any20 questions.

4. Section C has 6 questions. Attempt any 5 questions.

5. All questions carry equal marks.

6. There is no negative marking.

SECTION A

This section consists of 25 multiple choice questions with overall choice to attempt any 20 questions. In case more than desirable numberof questions are attempted, ONLY first 20 will be considered for evaluation.

Q1.Which of the following is NOT the property of equipotential surface?

(i) They do not cross each other.

(ii) The rate of change of potential with distance on them is zero.

(iii) For a uniform electric field they are concentric spheres.

(iv) They can be imaginary spheres.

Q2. Two point charges +8q and -2q are located at x=0 and x=L respectively. The point on x axis at which net electric field is zero due to these charges is-

(i) 8L

(ii) 4L

(iii) 2 L

(iv) L

Q3. An electric dipole of moment p is placed parallel to the uniform electric field. The amount of work done in rotating the dipole by 90° is-

(i) 2pE

(ii) pE

(iii) pE/2

(iv) Zero

Q4. Three capacitors 2μF, 3μF and 6μF are joined in series with each other. The equivalent capacitance is-

(i) 1/2μF

(ii) 1μF

(iii) 2μF

(iv) 11μF

Q5. Two point charges placed in a medium of dielectric constant 5 are at a distance r between them, experience an electrostatic force 'F'. The electrostatic force between them in vacuum at the same distance r will be-

(i) 5F

(ii) F

(iii) F/2

(iv) F/5

Q6. Which statement is true for Gauss law-

(i) All the charges whether inside or outside the gaussian surface contribute to the electric flux.

(ii) Electric flux depends upon the geometry of the gaussian surface.

(iii) Gauss theorem can be applied to non-uniform electric field.

(iv) The electric field over the gaussian surface remains continuous and uniform at every point.

Q7.A capacitor plates are charged by a battery with 'V' volts. After charging battery is disconnected and a dielectric slab with dielectric constant 'K' is inserted between its plates, the potential across the plates of a capacitor will become

(i) Zero

(ii) V/2

(iii) V/K

(iv) KV

Q8.The best instrument for accurate measurement of EMF of a cell is-

(i) Potentiometer

(ii) metre bridge

(iii) Voltmeter

(iv) ammeter and voltmeter

Q9.An electric current is passed through a circuit containing two wires of same material, connected in parallel. If the lengths and radii of the wires are in the ratio of 3:2 and 2:3, then the ratio of the current passing through the wire will be

(i) 2:3

(ii) 3:2

(iii) 8:27

(iv) 27:8

Q10.By increasing the temperature, the specific resistance of a conductor and a semiconductor-

(i) increases for both.

(ii) decreases for both.

(iii) increases for a conductor and decreases for a semiconductor.

(iv) decreases for a conductor and increases for a semiconductor.

Q11.We use alloys for making standard resistors because they have

(i) low temperature coefficient of resistivity and high specific resistance

(ii) high temperature coefficient of resistivity and low specific resistance

(iii) low temperature coefficient of resistivity and low specific resistance

(iv) high temperature coefficient of resistivity and high specific resistance

Q12. A constant voltage is applied between the two ends of a uniform metallic wire, heat 'H' is developed in it. If another wire of the same material, double the radius and twice the length as compared to original wire is used then the heat developed in it will be-

(i) H/2

(ii) H

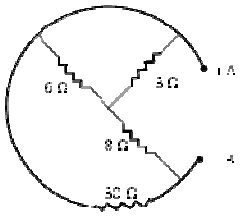
(iii) 2H

(iv) 4H

Q13.If the potential difference V applied across a conductor is increased to 2V with its temperature kept constant, the drift velocity of the free electrons in a conductor will -

(i) remain the same.
(ii) become half of its previous value.
(iii) be double of its initial value.
(iv) become zero.

Q14.The equivalent resistance between A and B is-



(i) 3 ohms

(ii) 5.5 ohms

(iii) 7.5 ohms

(iv) 9.5 ohms

Q15. The SI unit of magnetic field intensity is

(i) AmN^{-1}
(ii) $NA^{-1}m^{-1}$

(iii) $NA^{-2}m^{-2}$

(iv) $NA^{-1}m^{-2}$

Q16.The coil of a moving coil galvanometer is wound over a metal frame in order to

(i) reduce hysteresis
(ii) increase sensitivity
(iii) increase moment of inertia
(iv) provide electromagnetic damping

Q17.Two wires of the same length are shaped into a square of side 'a' and a circle with radius 'r'. If they carry same current, the ratio of their magnetic moment is

(i) 2 : π
(ii) π : 2
(iii) π : 4
(iv) 4 : π

Q18. The horizontal component of earth's magnetic field at a place is √3 times the vertical component. The angle of dip at that place is

(i) π/6
(ii) π/3
(iii) π/4
(iv) 0

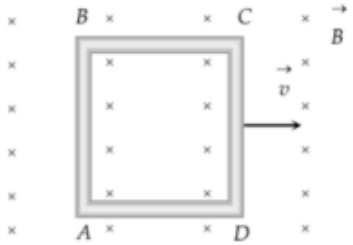
Q19. The small angle between magnetic axis and geographic axis at a place is-

(i) Magnetic meridian
(ii) Geographic meridian
(iii) Magnetic inclination
(iv) Magnetic Declination

Q20.Two coils are placed close to each other. The mutual inductance of the pair of coils depends upon the

(i) rate at which current change in the two coils
(ii) relative position and orientation of the coils
(iii) rate at which voltage induced across two coils
(iv) currents in the two coils

Q21. A conducting square loop of side 'L' and resistance 'R' moves in its plane with the uniform velocity 'v' perpendicular to one of its sides. A magnetic induction 'B' constant in time and space pointing perpendicular and into the plane of the loop exists everywhere as shown in the figure. The current induced in the loop is



(i) BLv/R Clockwise

(ii) BLv/R Anticlockwise

(iii) 2BLv/R Anticlockwise

(iv)Zero

Q22. The magnetic flux linked with the coil (in Weber) is given by theequation –

$\Phi = 5t^2 + 3t + 16$

The induced EMF in the coil at time, t=4 will be-

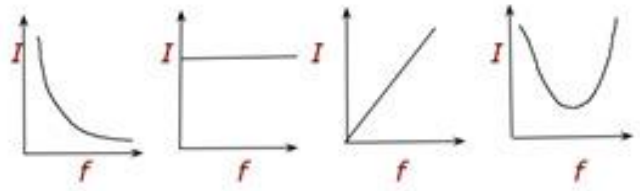
(i) -27 V

(ii) -43 V

(iii) -108 V

(iv) 210 V

Q23. Which of the following graphs represent the variation of current(I) with frequency (f) in an AC circuit containing a pure capacitor?



(i) **(ii)** **(iii)** **(iv)**

Q24. A 20 volt AC is applied to a circuit consisting of a resistance and a coil with negligible resistance. If the voltage across the resistance is 12 volt, the voltage across the coil is-

(i) 16 V

(ii) 10 V

(iii) 8 V

(iv) 6 V

Q25. The instantaneous values of emf and the current in a series ac circuit are-

E = Eo Sin ωt and I= Io sin(ωt+π/3) respectively, then it is

(i) Necessarily a RL circuit

(ii) Necessarily a RC circuit

(iii)Necessarily a LCR circuit

(iv) Can be RC or LCR circuit

SECTION B

This section consists of 24 multiple choice questions with overall choice to attempt any 20 questions. In case more than desirable number of questions are attempted, ONLY first 20 will be considered for evaluation.

Q26. A cylinder of radius r and length l is placed in an uniform electric field parallel to the axis of the cylinder. The total flux for the surface of the cylinder is given by-

(i) zero

(ii) πr^2

(iii) $E \pi r^2$

(iv))2 $E\pi r^2$

Q27. Two parallel large thin metal sheets have equal surface densities

26.4×10^{-12} C/m^{2}of opposite signs. The electric field between these sheets is-

(i) 1.5N/C

(ii) 1.5×10^{-16} N/C

(iii) 3×10^{-10}N/C

(iv) 3N/C

Q28. Consider an uncharged conducting sphere. A positive point charge is placed outside the sphere. The net charge on the sphere is then,

(i) negative and uniformly distributed over the surface of sphere

(ii) positive and uniformly distributed over the surface of sphere

(iii) negative and appears at a point the surface of sphere closest to point charge.

(iv) Zero

Q29. Three Charges 2q, -q and -q lie at vertices of a triangle. The value of E and V at centroid of triangle will be-

(i) E#0 and V#0

(ii) E=0 and V=0

(iii) E#0 and V=0

(iv) E=0 and V#0

Q30. Two parallel plate capacitors X and Y, have the same area of plates and same separation between plates. X has air and Y with dielectric of constant 2 , between its plates. They are connected in series to a battery of 12 V. The ratio of electrostatic energy stored in X and Y is-

(i) 4:1

(ii) 1:4

(iii) 2:1

(iv) 1:2

Q31.Which among the following, is not a cause for power loss in a transformer-

(i) Eddy currents are produced in the soft iron core of a transformer.

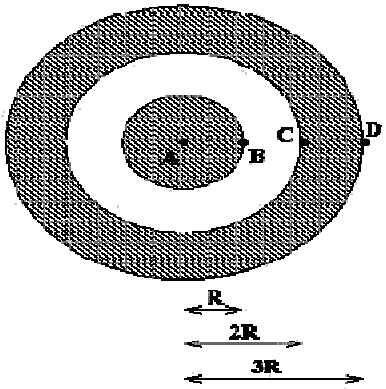
(ii) Electric Flux sharing is not properly done in primary and secondary coils.

(iii) Humming sound produed in the tranformers due to magnetostriction.
(iv) Primary coil is made up of a very thick copper wire.

Q32. An alternating voltage source of variable angular frequency 'w' and fixed amplitude 'V' is connected in series with a capacitance C and electric bulb of resistance R(inductance zero). When 'w' is increased-

(i) The bulb glows dimmer.
(ii) The bulb glows brighter.
(iii) Net impedance of the circuit remains unchanged.
(iv) Total impedance of the circuit increases.

Q33. A solid spherical conductor has charge +Q and radius R. It is surrounded by a solid spherical shell with charge -Q, innerradius 2R, and outer radius 3R. Which of the following statements is true?



(i)The electric potential has a maximum magnitude at C and the electric field has a maximum magnitude at A

(ii) The electric potential has a maximum magnitude at D and the electric field has a maximum magnitude at B.

(iii) The electric potential at A is zero and the electric field has a maximum magnitude at D.

(iv). Both the electric potential and electric field achieve a maximum magnitude at B.

Q34. A battery is connected to the conductor of non-uniform cross section area. The quantities or quantity which remains constant is-

(i) electric field only

(ii) drift speed and electric field

(iii)electric field and current

(iv) current only

Q35. Three resistors having values R_1, R_2, and R_3 are connected in series to a battery. Suppose R_1 carries a current of 2.0 A, R_2 has a resistance of 3.0 ohms, and R_3 dissipates 6.0 watts of power. Then the voltage across R_3 is-

(i) 1V

(ii) 2V

(iii) 3V

(iv) 4V

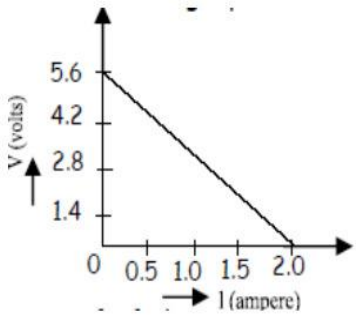
Q36. A straight line plot showing the terminal potential difference (V) of a cell as a function of current (I) drawn from it, is shown in the figure. The internal resistance of the cell would be then-

(i) 2.8 ohms

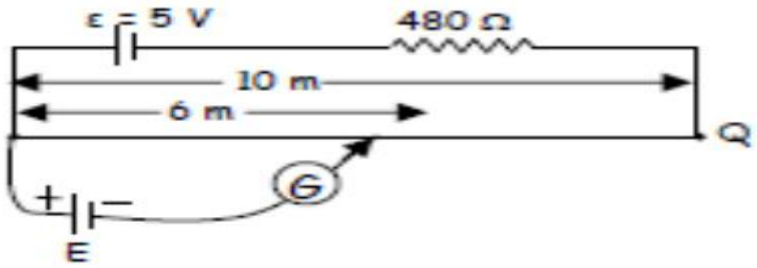
(ii) 1.4 ohms

(iii) 1.2 ohms

(iv) zero



Q37. A 10 m long wire of uniform cross-section and 20 Ω resistance is used in a potentiometer. The wire is connected in series with a battery of 5 V along with an external resistance of 480 Ω. If an unknown emf E is balanced at 6.0 m length of the wire, then the value of unknown emf is-



(i) 1.2 V

(ii) 1.02 V

(iii) 0.2 V

(iv) 0.12 V

Q38.The current sensitivity of a galvanometer increases by 20%. If its resistance also increases by 25%, the voltage sensitivity will

(i) decrease by 1%

(ii) increased by 5%

(iii) increased by 10%

(iv) decrease by 4%

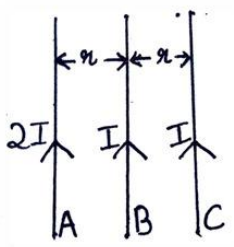
Q39. Three infinitely long parallel straight current carrying wires A, B and C are kept at equal distance from each other as shown in the figure . The wire C experiences net force F .The net force on wire C, when the current in wire A is reversed will be

(i) Zero

(ii) F/2

(iii) F

(iv) 2F



Q40. In a hydrogen atom the electron moves in an orbit of radius 0.5 A° making 10 revolutions per second, the magnetic moment associated with the orbital motion of the electron will be

(i) 2.512×10^{-38} Am^2

(ii) 1.256×10^{-38} Am^2

(iii) 0.628×10^{-38} Am^2

(iv) zero

Q41. An air-cored solenoid with length 30 cm, area of cross-section 25 cm^2 and number of turns 800, carries a current of 2.5 A. The current is suddenly switched off in a brief time of 10^{-3}s. Ignoring the variation in magnetic field near the ends of the solenoid, the average back emf induced across the ends of the open switch in the circuit would be

(i) zero

(ii)3.125 volts

(iii) 6.54 volts

(iv) 16.74 volts

Q42. A sinusoidal voltage of peak value 283 V and frequency 50 Hz is applied to a series LCR circuit in which R = 3 Ω, L = 25.48 mH, and C = 796 μF, then the power dissipated at the resonant condition will be-

(i)39.70 kW

(ii) 26.70 kW

(iii)13.35 kW

(iv)Zero

Q43. A circular loop of radius 0.3cm lies parallel to much bigger circular of radius 20 cm. The centre of the small loop is on the axis of the bigger loop. The distance between their centres is 15 cm. If a current of 2.0 A flows through the smaller loop, then the flux linked with the bigger loop is

(i) 3.3×10^{-11}weber

(ii) 6×10^{-11}weber

(iii) 6.6×10^{-9}weber

(iv) 9.1×10^{-11}weber

Q44.If both the number of turns and core length of an inductor is doubled keeping other factorsconstant, then its self-inductance will be-

(i) Unaffected
(ii) doubled
(iii) halved
(iv) quadrupled

45. Given below are two statements labelled as Assertion (A) and Reason (R)

Assertion (A): To increase the range of an ammeter, we must connect a suitable high resistance in series to it.

Reason (R): The ammeter with increased range should have high resistance.

Select the most appropriate answer from the options given below:

(i) Both A and R are true and R is the correct explanation of A

(ii) Both A and R are true but R is not the correct explanation of A.

(iii)A is true but R is false.

(iv) A is false and R is also false.

46. Given below are two statements labelled as Assertion (A) and Reason (R)

Assertion (A): An electron has a high potential energy when it is at a location associated with a more negative value of potential, and a low potential energy when at a location associated with a more positive potential.

Reason (R): Electrons move from a region of higher potential to region of lower potential.

Select the most appropriate answer from the options given below:

(i) Both A and R are true and R is the correct explanation of A

(ii) Both A and R are true but R is not the correct explanation of A.

(iii)A is true but R is false.

(iv) A is false and R is also false.

47. Given below are two statements labelled as Assertion (A) and Reason (R)

Assertion(A): A magnetic needle free to rotate in a vertical plane, orients itself (with its axis) vertical at the poles of the earth.

Reason (R): At the poles of the earth the horizontal component of earth's magnetic field will be zero.

Select the most appropriate answer from the options given below:

(i) Both A and R are true and R is the correct explanation of A

(ii) Both A and R are true but R is not the correct explanation of A.

(iii)A is true but R is false.

(iv) A is false and R is also false.

48. Given below are two statements labelled as Assertion (A) and Reason (R)

Assertion(A): A proton and an electron, with same momenta, enter in a magnetic field in a direction at right angles to the lines of the force. The radius of the paths followed by them will be same.

Reason(R): Electron has less mass than the proton.

Select the most appropriate answer from the options given below:

(i) Both A and R are true and R is the correct explanation of A

(ii) Both A and R are true but R is not the correct explanation of A.

(iii)A is true but R is false.

(iv) A is false and R is also false.

49. Given below are two statements labelled as Assertion (A) and Reason (R)

Assertion (A): On Increasing the current sensitivity of a galvanometer by increasing the number of turns, may not necessarily increase its voltage sensitivity.

Reason(R): The resistance of the coil of the galvanometer increases on increasing the number of turns.

Select the most appropriate answer from the options given below:

(i) Both A and R are true and R is the correct explanation of A

(ii) Both A and R are true but R is not the correct explanation of A.

(iii)A is true but R is false.

(iv) A is false and R is also false.

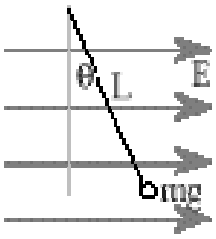
SECTION C

This section consists of 6 multiple choice questions with an overall choice to attempt any 5. In case more than desirable number of questions are attempted, ONLY first 5 will be considered for evaluation.

Q50. A small object with charge q and weight mg is attached to one end of a string of length 'L' attached to a stationary support. The system is placed in a uniform horizontal electric field 'E', as shown in the accompanying figure. In the presence of the field, the string makes a constant angle θ with the vertical. The sign and magnitude of q-

(i) positive with magnitude mg/E

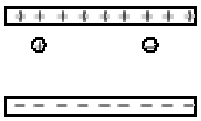
(ii) positive with magnitude (mg/E)tanθ



(iii) negative with magnitude mg/E tanθ

(iv) positive with magnitude E tanθ/mg

Q51. A free electron and a free proton are placed between two oppositely charged parallel plates. Both are closer to the positive plate than the negative plate.



Which of the following statements is true?

I. The force on the proton is greater than the force on the electron.

II. The potential energy of the proton is greater than that of the electron.

III. The potential energy of the proton and the electron is the same.

(i) I only

(ii) II only

(iii) III and I only

(iv) II and I only

Case study :

Read the following paragraph and answers the questions:

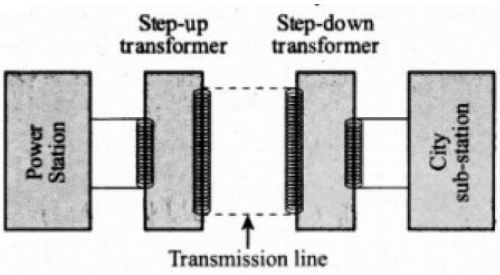


Figure: Long distance power transmissions

The large-scale transmission and distribution of electrical energy over long distances is done with the use of transformers. The voltage output of the generator is stepped-up. It is then transmitted over long distances to an area sub-station near the consumers. There the voltage is stepped down. It is further stepped down at distributing sub-stations and utility poles before a power supply of 240 V reaches our homes.

Q52. Which of the following statement is true?

(i) Energy is created when a transformer steps up the voltage

(ii) A transformer is designed to convert an AC voltage to DC voltage

(iii) Step–up transformer increases the power for transmission

(iv) Step–down transformer decreases the AC voltage

Q53. If the secondary coil has a greater number of turns than the primary,

(i) the voltage is stepped-up (Vs >Vp) and arrangement is called a step-up transformer

(ii) the voltage is stepped-down (Vs <Vp) and arrangement is called a step-down transformer

(iii) the current is stepped-up (Is >Ip) and arrangement is called a step-up transformer

(iv) the current is stepped-down (Is <Ip) and arrangement is called a step-down transformer

Q54. We need to step-up the voltage for power transmission, so that

(i) the current is reduced and consequently, the I^2R loss is cut down

(ii) the voltage is increased , the power losses are also increased

(iii) the power is increased before transmission is done

(iv) the voltage is decreased so V^2/R losses are reduced

Q55. A power transmission line feeds input power at 2300 V to a step down transformer with its primary windings having 4000 turns. The number of turns in the secondary in order to get output power at 230 V are

(i) 4

(ii) 40

(iii) 400

(iv) 4000

Sample Question Paper 2021-22
Term 1
Subject: Chemistry (043)

Time: 90 Minutes Max. Marks: 35

General Instructions:

1. The Question Paper contains three sections.

2. Section A has 25 questions. Attempt any 20 questions.

3. Section B has 24 questions. Attempt any 20 questions.

4. Section C has 6 questions. Attempt any 5 questions.

5. All questions carry equal marks.

6. There is no negative marking.

SECTION A

This section consists of 25multiple choice questions with overall choice to attempt **any 20** questions. In case more than desirable number of questions are attempted, ONLY first 20 will be considered for evaluation.

1.Which of the following statements is true:
(a)Melting point of Phosphorous is less than that of Nitrogen
(b)N_2 is highly reactive while P_4 is inert
(c)Nitrogen shows higher tendency of catenation than P
(d)N-N is weaker than P-P

2. Which of the following is a non-stoichiometric defect?
(a)Frenkel defect
(b)Schottky defect
(c)metal deficiency defect
(d)interstitial defect

3. Identify the law which is stated as:
"For any solution, the partial vapour pressure of each volatile component in the solution is directly proportional to its mole fraction."
(a)Henry's law
(b) Raoult's law
(c)Dalton's law
(d)Gay-Lussac's Law

4. Pink colour of LiCl crystals is due to:
(a) Schottky defect
(b)Frenkel defect
(c) Metal excess defect
(d) Metal deficiency defect

5. Which of the following isomer has the highest meltingpoint:
(a) 1,2-dicholorbenzene
(b) 1,3 -dichlorobenzene
(c) 1,4-dicholorbenzene
(d) all isomers have same melting points

6. Which one of the following reactions is not explained by the open chain Structureof glucose:
(a) Formation of pentaacetate of glucose with acetic anhydride.
(b) formation of addition product with 2,4 DNP reagent
(c) Silver mirror formation with Tollen's reagent
(d) existence of alpha and beta forms of glucose.

7. Williamson's synthesis of preparing dimethyl ether is an:
(a) S_N^1 reaction
(b) Elimination reaction
(c) S_N^2 reaction
(d) Nucleophilic addition reaction

8. Chlorine water loses its yellow colour on standing because:
(a) HCl gas is produced, due to the action of sunlight.
(b) a mixture of HOCl and HCl is produced in the presence of light
(c) HOCl and hydrogen gas is produced
(d) a mixture of HCl and ClO_3 is produced, due to the action of sunlight

9. During dehydration of alcohols to alkenes by heating with concentrated H_2SO_4, the initiation step is:
(a) protonation of alcohol molecule
(b) formation of carbocation
(c) elimination of water
(d) formation of an ester

10. Amorphous solids are:
(a) isotropic
(b)anisotropic
(c) isotopic
(d) isomeric

11. Which of the following reactions is used to prepare salicylaldehyde?
(a) Kolbe's reaction
(b) Etard reaction
(c) Reimer- Tiemann reaction
(d) Stephen's reduction.

12. Which of the following is an example of a solid solution?
(a)sea water
(b)sugar solution
(c)smoke
(d)22 carat gold

13. The boiling points of alcohols are higher than those of hydrocarbons of comparable masses due to:
(a) Hydrogen bonding
(b) Ion – dipole interaction
(c) Dipole- dipole interaction
(d) Van der Waal's forces.

14. Which of the following has the lowest boiling point:
(a)H_2O
(b)H_2S
(c)H_2Se
(d)H_2Te

15. Which of the following statement is correct:
(a)Fibrous proteins are generally soluble in water
(b)Albumin is an example of fibrous proteins
(c)In fibrous proteins, the structure is stabilised by hydrogen bonds and disulphide bonds
(d)pH does not affect the primary structure of protein.

16. Major product obtained on reaction of 3-Phenyl propene with HBr in presence of organic peroxide
(a)3- Phenyl 1- bromopropane
(b) 1 –Phenyl -3- bromopropane
(c) 1-Phenyl -2-bromopropane
(d) 3-Phenyl -2- bromopropane

17. Which of the following is a correct statement for C_2H_5Br?
(a) It reacts with metallic Na to give ethane.
(b) It gives nitroethane on heating with aqueous solution of $AgNO_2$
(c) It gives C_2H_5OH on boiling with alcoholic potash.
(d) It forms diethylthioether on heating with alcoholic KSH.

18.Covalency of nitrogen is restricted to:
(a)2
(b)3
(c)4
(d)5

19.Solubility of gases in liquids decreases with rise in temperature because dissolution is an:
(a)endothermic and reversible process
(b)exothermic and reversible process
(c)endothermic and irreversible process
(d) exothermic and irreversible process

20.All elements of Group 15 show allotropy except:
(a)Nitrogen
(b)Arsenic
(c)Antimony
(d)Bismuth

21.Which of the following is a polysaccharide?
(a)glucose
(b)maltose
(c)glycogen
(d)lactose

22. Substance having the lowest boiling point:
(a)Hydrogen
(b)Oxygen
(c)Nitrogen
(d) Helium

23.Lower molecular mass alcohols are:
(a)miscible in limited amount of water
(b) miscible in excess of water
(c) miscible in water in all proportions
(d) immiscible in water

24.Maximum oxidation state exhibited by Chlorine is:
(a) +1
(b) +3
(c)+5
(d)+7

25.In which of the following cases blood cells will shrink:
(a)when placed in water containing more than 0.9% (mass/ volume) NaCl solution.
(b)when placed in water containing less than 0.9% (mass /volume) NaCl solution.
(c)when placed in water containing 0.9% (mass/volume) NaCl solution.
(d)when placed in distilled water.

SECTION B

This section consists of 24multiple choice questions with overall choice to attempt **any 20** questions. In case more than desirable number of questions are attempted, ONLY first 20 will be considered for evaluation.

26. How much ethyl alcohol must be added to 1 litre of water so that the solution will freeze at– 14°C ? (K_f for water = 1.86°C/mol)
(a) 7.5 mol
(b)8.5 mol
(c)9.5 mol
(d)10.5 mol

27. Which reagents are required for one step conversion of chlorobenzene to toluene?
(a) CH_3Cl / $AlCl_3$
(b) CH_3Cl, Na, Dry ether
(c)CH_3Cl/Fe dark
(d) $NaNO_2$/ HCl /0-5^{0}C

28. On partial hydrolysis, XeF_6 gives:
(a) XeO_3 +4HF
(b) XeO_2F + HF
(c) $XeOF_4$+ H_2
(d) XeO_2F_2 + 4HF

29. Which one of the following statement is correct about sucrose :
(a) It can reduce tollen's reagent however cannot reduce fehling's reagent
(b) It undergoes mutarotation like glucose and fructose
(c) It undergoes inversion in the configuration on hydrolysis
(d) It is laevorotatory in nature .

30. Phenol does not undergo nucleophilic substitution reaction easily due to:
(a) acidic nature of phenol
(b) partial double bond character of C-OH bond
(c) partial double bond character of C-C bond
(d)instability of phenoxide ion

31. Which of the following has highest ionisation enthalpy?
(a)Nitrogen
(b)Phosphorus
(c)Oxygen
(d)Sulphur
32. Metal M ions form accp structure. Oxide ions occupy ½ octahedral and ½ tetrahedral voids. What is the formula of the oxide?
(a)MO
(b)MO_2
(c)MO_3
(d) M_2O_3

33. The reaction of toluene with Cl_2 in presence of $FeCl_3$ gives 'X' while theof toluene with Cl_2in presence of light gives 'Y'. Thus 'X' and 'Y'are:
(a) X = benzyl chloride Y = o and p – chlorotoluene
(b) X = m – chlorotoluene Y = p – chlorotoluene
(c) X = o and p–chlorotoluene Y = trichloromethylbenzene
(d) X= benzyl chloride, Y = m-chlorotoluene

34.Ozone is a/ an _____ molecule and the two O-O bond lengths in ozone are (i)_____-and (ii) _____

(a) linear ,110pm ; 148pm

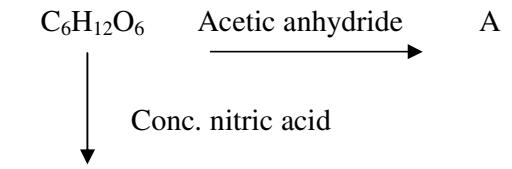
(b) angular, 110pm ; 148pm

(c)linear, 128pm ; 128pm

(d)angular, 128pm ; 128pm

35. Water retention or puffiness due to high salt intake occurs due to:
(a)diffusion
(b)vapour pressure difference
(c) osmosis
(d)reverse osmosis

36. In the following reaction,identify A and B:



(a) A= $COOH-(CH_2)_4-COOH$, B= $OHC-(CHOCOCH_3)_4-CH_2OCOCH_3$
(b) A= $COOH-(CH_2)_4-CHO$, B= $OHC-(CHOCOCH_3)_4-CH_2OCOCH_3$
(c) A= $OHC-(CHOCOCH_3)_3-CH_2OCOCH_3$ B= $COOH-(CH_2)_4-CHO$,
(d) A= $OHC-(CHOCOCH_3)_4-CH_2OCOCH_3$ B= $COOH-(CH_2)_4-COOH$

37. In lake test for Al^{3+} ions, there is the formation of coloured 'floating lake'. It is due to:
(a)Absorption of litmus by $[Al(OH)_4]^-$
(b)Absorption of litmus by $Al(OH)_3$
(c)Adsorption of litmus by $[Al(OH)_4]^-$
(d) Adsorption of litmus by $Al(OH)_3$

38. A unit cell of NaCl has 4 formula units. Its edge length is 0.50 nm. Calculate the density if molar mass of NaCl = 58.5 g/mol.
(a) 1 g/cm^3
(b)2 g/cm^3
(c) 3 g/cm^3
(d)4g/cm^3

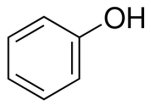
39.Which one of the following are correctly arranged on the basis of the property indicated:
(a)$I_2 < Br_2 < F_2 < Cl_2$ [increasing bond dissociation enthalpy]
(b) $H_2O > H_2S < H_2Te < H_2Se$ [increasing acidic strength]
(c) $NH_3 < N_2O < NH_2OH < N_2O_5$ [increasing oxidation state]
(d) $BiH_3 < SbH_3 < AsH_3 < PH_3 < NH_3$ [increasing bondangle]

40. What would be the reactant and reagent used to obtain 2, 4-dimethyl pentan-3-ol?
(a) Propanal and propyl magnesium bromide
(b) 3-methylbutanal and 2-methyl magnesium iodide
(c) 2-dimethylpropanone and methyl magnesium iodide
(d) 2- methylpropanal and isopropyl magnesium iodide

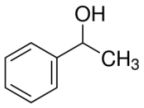
41. o-hydroxy benzyl alcohol when reacted with PCl_3 gives the product as (IUPAC name)
(a) o- hydroxy benzyl chloride
(b) 2- chloromethylphenol
(c) o-chloromethylchlorobenzene
(d) 4-hydroxymethylphenol

42. Which of the following statements is true:
(a)Ammonia is the weakest reducing agent and the strongest base among Group 15 hydrides.
(b) Ammonia is the strongest reducing agent as well as the strongest base among Group 15 hydrides.
(c)Ammonia is the weakest reducing agent as well as the weakest base among Group 15 hydrides.
(d) Ammonia is the strongest reducing agent and the weakest base among Group 15 hydrides.

43.Identify the secondary alcohols from the following set:
(i)$CH_3CH_2CH(OH)CH_3$
(ii) $(C_2H_5)_3COH$
(iii)



(iv)



(a)(i) and (iv)
(b)(i) and (iii)
(c)(i) and (ii)
(d)(i), (iii) and (iv)

44.Alkenes decolourise bromine water in presence of CCl_4 due to formation of:
(a)allyl bromide
(b)vinyl bromide
(c)bromoform
(d)vicinal dibromide

45**.** Given below are two statements labelled as Assertion (A) and Reason (R)
Assertion (A): Electron gain enthalpy of oxygen is less than that of Flourine but greater than Nitrogen.
Reason (R): Ionisation enthalpies of the elements follow the order Nitrogen > Oxygen > Fluorine
Select the most appropriate answer from the options given below:
(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is not the correct explanation of A.
(c)A is true but R is false.
(d) A is false but R is true.

46. Given below are two statements labelled as Assertion (A) and Reason (R)
Assertion (A): Alkyl halides are insoluble in water.
Reason (R): Alkyl halides have halogen attached to sp^3 hybrid carbon.
Select the most appropriate answer from the options given below:
(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is not the correct explanation of A.
(c)A is true but R is false.
(d) A is false but R is true.

47. Given below are two statements labelled as Assertion (A) and Reason (R)
Assertion(A): Molarity of a solution changes with temperature.
Reason (R): Molarity is a colligative property.
Select the most appropriate answer from the options given below:
(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is not the correct explanation of A.
(c)A is true but R is false.
(d) A is false but R is true.

48. Given below are two statements labelled as Assertion (A) and Reason (R)
Assertion(A):SO_2 is reducing while TeO_2 is an oxidising agent.
Reason(R): Reducing property of dioxide decreases from SO_2 to TeO_2.
Select the most appropriate answer from the options given below:
(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is not the correct explanation of A.
(c)A is true but R is false.
(d) A is false but R is true.

49.Given below are two statements labelled as Assertion (A) and Reason (R)
Assertion (A): Cryoscopic constant depends on nature of solvent.
Reason(R): Cryoscopic constant is a universal constant.
Select the most appropriate answer from the options given below:
(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is not the correct explanation of A.
(c)A is true but R is false.
(d) A is false but R is true.

SECTION C

This section consists of 6multiple choice questions with an overall choice to attempt any**5.** In case more than desirable number of questions are attempted, ONLY first 5 will be considered for evaluation.

50.Match the following:

I	II
(i)Amino acids	(A)protein
(ii)Thymine	(B)Nucleic acid
(iii)Insulin	(C)DNA
(iv)phosphodiester linkage	(D)Zwitter ion
(v) Uracil	

Which of the following is the best matched options?

(a) i-A, v- D, iii- C, iv-B

(b) i-D, ii-C, iii- A, iv-B

(c) i-D, v- D, iii- A, iv-B

(d) i-A, ii- C, iii- D, iv-B

51. Which of the following analogies is correct:
(a)Nitrogen: $1s^2 2s^2 2p^3$ :: Argon:$1s^2 2s^2 2p^6$
(b)Carbon: maximum compounds :: Xenon: no compounds
(c) XeF_2: Linear :: ClF_3: Trigonal planar
(d)Helium: meteorological observations:: Argon: metallurgical processes

52. Complete the following analogy:
Same molecular formula but different structures: A:: Non superimposable mirror images: B
(a) A:Isomers B: Enantiomer
(b) A: Enantiomers B: Racemic mixture
(c) A: Sterioisomers B: Retention
(d) A: IsomersB: Sterioisomers

CASE1: **Read the passage given below and answer the following questions 53-55**

Early crystallographers had trouble solving the structures of inorganic solids using X-ray diffraction because some of the mathematical tools for analyzing the data had not yet been developed. Once a trial structure was proposed, it was relatively easy to calculate the diffraction pattern, but it was difficult to go the other way (from the diffraction pattern to the structure) if nothing was known *a priori* about the arrangement of atoms in the unit cell. It was important to develop some guidelines for guessing the coordination numbers and bonding geometries of atoms in crystals. The first such rules were proposed by Linus Pauling, who considered how one might pack together oppositely charged spheres of different radii. Pauling proposed from geometric considerations that the quality of the "fit" depended on the **radius ratio** of the anion and the cation.

If the anion is considered as the packing atom in the crystal, then the smaller cation fills interstitial sites ("holes"). Cations will find arrangements in which they can contact the largest number of anions. If the cation can touch all of its nearest neighbour anions then the fit is good. If the cation is too small for a given site, that coordination number will be unstable and it will prefer a lower coordination structure. The table below gives the ranges of cation/anion radius ratios that give the best fit for a given coordination geometry.

Coordination number	Geometry	$\rho = r_{cation}/r_{anion}$
2	linear	0 - 0.155
3	triangular	0.155 - 0.225
4	tetrahedral	0.225 - 0.414
4	square planar	0.414 - 0.732
6	octahedral	0.414 - 0.732
8	cubic	0.732 - 1.0
12	cuboctahedral	1.0

(Source: Ionic Radii and Radius Ratios. (2021, June 8). Retrieved June 29, 2021, from https://chem.libretexts.org/@go/page/183346)

Q53. The radius of Ag^+ ion is 126pm and of I^- ion is 216pm. The coordination number of Ag^+ ion is:
(a)2
(b)3
(c)6
(d)8

Q54. A solid AB has square planar structure. If the radius of cation A^+ is 120pm, calculate the maximum possible value of anion B^-
(a)240 pm
(b)270 pm
(c)280 pm
(d)290 pm

Q55.A “good fit” is considered to be one where the cation can touch:
(a)all of its nearest neighbour anions.
(b) most of its nearest neighbour anions.
(c)some of its nearest neighbour anions.
(d) none of its nearest neighbour anions.

English Core (301)
Sample Question Paper (Term 1)
Class - XII

Time: 90 Minutes **Max. Marks 40**

General Instructions:

1. The Question Paper contains THREE sections.
2. Section A-READING has 18 questions. Attempt a total of 14 questions, as per specific instructions for each question.
3. Section B-WRITING SKILLS has 12 questions. Attempt a total of 10 questions, as per specificinstructions for each question.
4. Section C-LITERATURE has 30 questions. Attempt 26 questions, as per specific instructions for each question.
5. All questions carry equal marks.
6. There is no negative marking

READING

I. Read the passage given below.

I. I got posted in Srinagar in the 1980s. Its rugged mountains, gushing rivers and vast meadows reminded me of the landscapes of my native place — the Jibhi Valley in Himachal Pradesh. Unlike Srinagar that saw numerous tourists, Jibhi Valley remained clouded in anonymity. That's when the seed of starting tourism in Jibhi was planted. I decided to leave my service in the Indian Army and follow the urge to return home.

II. We had two houses — a family house and a traditional house, which we often rented out. I pleaded with my father to ask the tenant to vacate the house so that I could convert it into a guesthouse. When my family finally relented, I renovated the house keeping its originality intact, just adding windows for sunlight.

III. I still remember the summer of 1992 when I put a signboard outside my first guesthouse in Jibhi Valley! The village residents, however, were sceptical about my success. My business kept growing but it took years for tourism to take off in Jibhi Valley. Things changed significantly after 2008 when the government launched a homestay scheme. People built homestays and with rapid tourism growth, the region changed rapidly. Villages turned into towns with many concrete buildings. Local businesses and tourists continued putting a burden on nature.

IV. Then, with the 2020-21 pandemic and lockdown, tourism came to a complete standstill in Jibhi Valley. Local people, who were employed at over a hundred homestays and guesthouses, returned to their villages. Some went back to farming; some took up pottery and some got involved in government work schemes. Now, all ardently hope that normalcy and tourism will return to the valley soon. In a way, the pandemic has given us an opportunity to introspect, go back to our roots and look for sustainable solutions.

V. For me, tourism has been my greatest teacher. It brought people from many countries and all states of India to my guesthouse. It gave me exposure to different cultures and countless opportunities to learn new things. Most people who stayed at my guesthouse became my repeat clients and good friends. When I look back, I feel proud, yet humbled at the thought that I was not only able to fulfill my dream despite all the challenges, but also

play a role in establishing tourism in the beautiful valley that I call home. (394 words)

Source: https://www.outlookindia.com/outlooktraveller/explore/story/71458/how-one-mans-conviction-put-jibhi-valley-on-the-world-tourism-map

Based on your understanding of the passage, answer <u>any eight</u> out of the ten questions bychoosing the correct option

Q.1 The scenic beauty of Srinagar makes the writer feel

A. awestruck
B. nostalgic
C. cheerful
D. confused

Q.2 A collocation is a group of words that often occur together.
The writer says that Jibhi valley remained <u>clouded in anonymity</u>.
Select the word from the options that correctly collocates with *clouded in*.

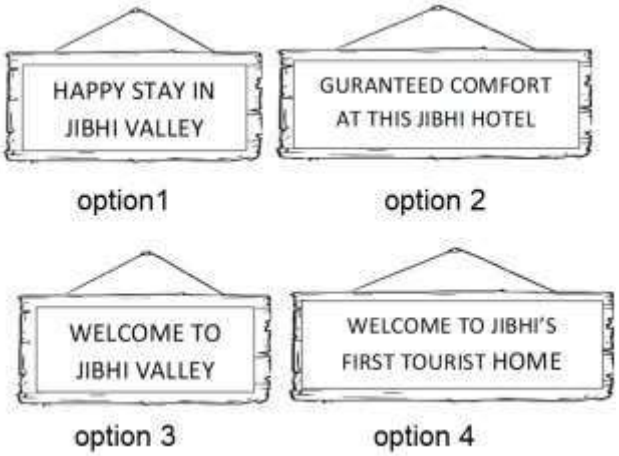
A. disgust
B. anger
C. doubt
D. terror

Q.3 Select the option that suitably completes the given dialogue as per the context in paragraph II.

Father: Are you sure that your plan would work?
Writer: I can't say (1) .....
Father: That's a lot of uncertainty, isn't it?
Writer: (2)....., father. Please let's do this.

A. (1) that I would be able to deal with the funding (2) Well begun is half done
B. (1) anything along those lines, as the competition is tough (2) Think before you leap
C. (1) that, because it's a question of profit and loss (2) All's well that ends well
D. (1) I'm sure, but I can say that I believe in myself (2) Nothing venture nothing win

Q.4 Which signboard would the writer have chosen for his 1992 undertaking, in Jibhi Valley?



A. option 1
B. option 2
C. option 3
D. option 4

Q.5 Select the option that clearly indicates the situation before and after 2008, in Jibhi Valley.

A.	Before 2008	After 2008
	picturesque landscapes	construction sites and commerce

B.	Before 2008	After 2008
	zero tourism in the valley	sceptical villagers

C.	Before 2008	After 2008
	buildings and hotels	profitable ventures

D.	Before 2008	After 2008
	scenic surroundings	zero tourism in the valley

Q.6 What is the relationship between (1) and (2)?

(1) …tourism came to a complete standstill in Jibhi Valley.
(2) … tourism has been my greatest teacher.

A. (2) is the cause for (1).
B. (1) repeats the situation described in (2).
C. (2) elaborates the problem described in (1).
D. (1) sets the stage for (2).

Q.7 The writer mentions looking for sustainable solutions. He refers to the need for sustainable solutions because he realises that

A. even though all natural ecosystems are essential pillars of resilience, we need to focus on using their resources to address the economic needs of mankind, as a priority.
B. the exposures to pandemics are a reality and a big threat to the countries across the world.
C. for an economic recovery to be durable and resilient, a return to 'business as usual' and environmentally destructive investment patterns and activities must be avoided.
D. there is an increasing urgency in the climate movement and the need for collaborative action for the future.

Q.8 Select the option that lists the customer review for the writer's project.

A. Beautiful accommodation in the lap of nature. Luxurious cottage with indoor pool and garden.
B. Comfortable and peaceful. Neat room with ample sunlight. Pleasant and warm host.
C. Enjoyed the sprawling suite on the fifth floor. Great view. Professional service.
D. Remote locale, good food and clean room. Would have loved more natural light, though.

Q.9 Which quote summarises the writer's feelings about the pace of growth of tourism in JibhiValley?

A. We kill all the caterpillars, then complain there are no butterflies. - John Marsden
B. Nature will give you the best example of life lessons, just open your eyes and see. – Kate Smith

C. We do not see nature with our eyes, but with our understanding and our hearts. - William Hazlett

D. I'd rather be in the mountains thinking of God than in church thinking of the mountains. - John Muir

Q.10 Select the option that lists what we can conclude from the text.

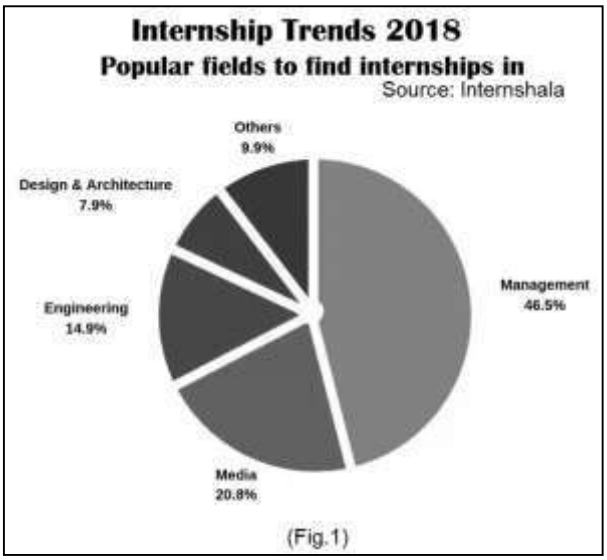
(1) people of Jibhi Valley practiced sustainable tourism.
(2) the people of Jibhi valley gradually embraced tourism.
(3) tourists never revisited Jibhi Valley.
(4) the writer was an enterprising person.

A. (1) and (2) are true.
B. (2), (3) and (4) are true.
C. (2) and (4) are true.
D. (1), (3) and (4) are true.

II. Read the passage given below.

I. Over the last five years, more companies have been actively looking for intern profiles, according to a 2018-19 survey by an online internship and training platform. This survey reveals that India had 80% more internship applications — with 2.2 million applications received in 2018 compared to 1.27 million in the year before. The trend was partly due to more industries looking to have fresh minds and ideas on existing projects for better productivity. What was originally seen as a western concept, getting an internship before plunging into the job market, is fast gaining momentum at Indian workplaces.

II. According to the survey data, India's National Capital Region has been the top provider of internships, with a total of 35% internship opportunities, followed by Mumbai and Bengaluru at 20% and 15%, respectively. This includes opportunities in startups, MNCs and even government entities. The survey also revealed popular fields to find internships in (Fig 1). There has been growing awareness among the students about the intern profiles sought by hiring companies that often look for people with real-time experience in management than B- school masters.



(Fig.1)

III. The stipend has been an important factor influencing the choice of internships. The survey data reveals that the average stipend offered to interns was recorded as ₹7000 while the maximum stipend went up to ₹85,000. According to statistics, a greater number of people considered virtual internships than in-office internships. Virtual internships got three times more applications than in-office, since a large chunk of students were the ones already enrolled in various courses, or preferred working from home.

IV. Internship portals have sprung up in the last three to four years and many of them

alreadyreport healthy traffic per month. Reports suggest that on an average, an internship portalcompany has around 200,000-plus students and some 8,000 companies registered on it. It gets around two lakh visits online every month. The Managing Director of a leading executive search firm says that though these web platforms are working as an effective bridge between the industry and students, most established companies are still reluctant totake too many interns on board for obvious reasons. (355 words)

Source:
(1) https://www.businessinsider.in/internships-in-india-on-the-rise-with-startups-leading- the-way/articleshow/67655265.cms
(2) https://www.businesstoday.in/magazine/features/story/online-portals-helping-college-students-paid-internships-46215-2014-06-03

Based on your understanding of the passage, answer any six out of the eight questions by choosing the correct option.

Q.11 Select the correct inference with reference to the following:
Over the last five years, more companies have been actively looking for intern profiles…

A. The past five years have seen active applications by interns to several companies.
B. The activity for intern profiling by the companies has reached a gradual downslide over the past five years.
C. There were lesser companies searching for intern profiles earlier, as compared to those in the recent five years.
D. Several companies have initiated intern profiling five times a year in the recent past.

Q.12 Select the central idea of the paragraph likely to precede paragraph I.

A. Process of registering for internships
B. Knowing more about internships
C. Dos and Don'ts for an internship interview
D. Startups and internships

Q.13 Select the option that displays the true statement with reference to Fig 1.

A. Internships for Engineering and Management are the top two favourites.
B. Design & Architecture internships are significantly more popular than Others.
C. Internships for Media and Others have nearly equal popularity percentage.
D. Management internships' popularity is more than twice that for Media.

For the Visually Impaired Candidates

The survey states that internship opportunities

A. are the most in Mumbai.
B. can be available in MNCs.
C. are limited to the National Capital Region.
D. Can be pursued only after a B-school degree.

Q.14 Based on your reading of paragraphs II-III, select the appropriate counter- argument to the given argument.

Argument: I don't think you'll be considered for an internship just because you've been the student editor and Head of Student Council.

A. I think I have a fair chance because I'm applying for a virtual position than an in-office one.
B. I have real-time experience in managing a team and many companies consider it more meritorious than a degree in Management.
C. I know that my stipend might be on the lower side but I think that it's a good 'earn while you learn' opportunity.
D. Lot of metro-cities have a good percentage of positions open and I think I should definitely take a chance.

Q.15 Select the option that displays the correct cause-effect relationship.

A.

cause	effect
Several students had academic courses to complete	Students applied for online internship

B.

cause	effect
A large chunk of students preferred in-office internships	Applications were three times more than for virtual internships

C.

cause	effect
A greater number of students wanted to work from home	Several students had courses to complete

D.

cause	effect
Students applied for online internship	An equal number of students applied for work-from-home

Q.16 The survey statistics mention the average stipend, indicating that

A. 50% interns were offered ₹85,000.
B. ₹7,000 was the lowest and ₹85,000 was the highest.
C. most interns were offered around ₹7,000.
D. No intern was offered more than ₹7,000.

Q.17 The phrase 'healthy traffic' refers to the

A. updates from portals about health and road safety.
B. statistics about adherence to traffic rules by the portals.
C. sizeable number of visitors to the portal per month.
D. monthly data about the health of internship applicants.

Q.18 Read the two statements given below and select the option that suitably explains them.

(1) Established companies are reluctant to take too many interns on board.
(2) Probability of interns leaving the company for a variety of reasons, is high.

A. (1) is the problem and (2) is the solution for (1).
B. (1) is false but (2) correctly explains (1).
C. (1) summarises (2).
D. (1) is true and (2) is the reason for (1).

WRITING

III. Answer <u>any four</u> out of the five questions given, with reference to the context below.

The President of R.W.A. Chelavoor Heights, Kozhikode, has to put up a notice to inform residents about a power-cut for their residential area.

Q.19 Select the appropriate title for the notice.

A. Choosing Own Power Cuts
B. Scheduled Power Cut
C. The Need to Save Power
D. Power and Resident Safety

Q.20 Select the option that lists the most accurate opening for this notice.

A. Greetings and attention please, to one and all in Chelavoor Heights.
B. This notice is written to share some news with you all about…
C. This is to inform all the residents of Chelavoor Heights about…
D. I wish to share with all officials of R.W.A. Chelavoor Heights that…

Q.21 Select the option with the information points to be included in the body of the notice.

(1) Opinion about regular power cuts
(2) Resolution for power cuts
(3) Reason for the power cut
(4) Timings of the power cut
(5) Complaint against regular power cuts
(6) Date of the power cut

A. (1) and (4)
B. (2), (3) and (5)
C. (2) and (6)
D. (3), (4) and (6)

Q.22 Would this notice reflect the name of the R.W.A?

A. Yes, because it is the issuing body.
B. No, because it is understood through the signature.
C. Yes, because it makes it informal.
D. No, because the title makes it clear.

Q.23 Select the appropriate conclusion for this notice.

A. Stay informed.
B. Collaboration solicited.
C. Stay prepared.
D. Inconvenience regretted.

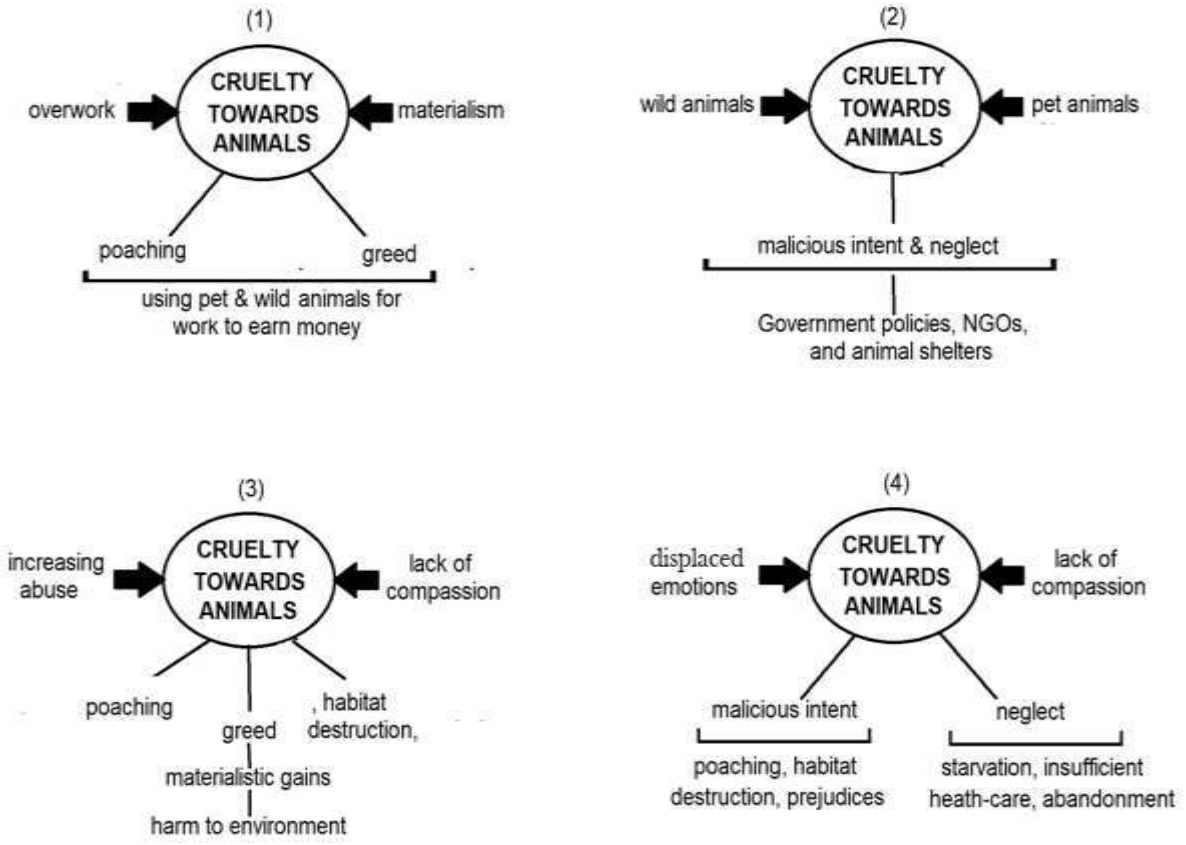
IV. Answer <u>any six</u> of the seven questions given, with reference to the context below.

Venu is a member of *Co-existence*, a school club that actively promotes animal rights and care. He has to write an article emphasising the need for prevention of cruelty to animals and peaceful co-existence between animals and human beings.

Q.24 Select the option that lists an appropriate title for Venu's article.

A. Man and Animal-A Struggle to Co-exist
B. The Rehabilitation and Conservation of Species
C. Remodelling the Future by Peaceful Co-existence
D. Smart Moves- Survival of the Fittest

Q.25 Which option (1-4), should Venu choose to elaborate on reasons for cruelty to animals?



A. Option (1)
B. Option (2)
C. Option (3)
D. Option (4)

For the Visually Impaired Candidates

While elaborating on the causes for cruelty, which is the cause Venu SHOULD NOT include?

A. Habitual poaching
B. Animal activists
C. Deliberate neglect
D. Animal abuse

Q.26 Which option would help Venu with the appropriate organisation of relevant ideas for this article?

A. Expressing concern about several cases of cruelty to animals—Exploring the reasons—Stating the effects—Providing suggestions for peaceful co-existence—Presenting a conclusive outlook
B. Stating the effects of cruelty to animals— Presenting a concluding viewpoint—Providing suggestions for peaceful co-existence—Expressing concern for animal cruelty— Exploring the reasons for cruelty to animals
C. Introducing the purpose of the article—Information about policies and laws for animal protection—Exploring the reasons for the laws— Providing suggestions for peaceful co-existence —Presenting a pledge for awareness
D. Exploring the laws for animal protection—Questioning the efficacy of the laws—Providing suggestions for improvements in the behaviour towards animals— Introducing the purposeof the article—Appeal for joining *Co-Existence*

Q.27 Which suggestions, from those given below, would be appropriate for Venu's article?

A. reducing human-wildlife conflict, banning habitat destruction, creating more wildlife sanctuaries
B. protecting the environment, penalising poachers
C. strengthening execution of animal rights' laws, increasing awareness, reducing human-wildlife conflict
D. creation of more wildlife sanctuaries and promotion of research on animals.

Q.28 Read a sentence from Venu's article draft and help him complete it by selecting the most appropriate option.

As animals find their natural habitat shrinking daily, their interactions with humans keep rising, often to the (i)_____*of the humans and with* (ii)_____*for the animals.*

A. (i) joy (ii) dangerous outcomes
B. (i) thrill (ii) lethal consequences
C. (i) irritation (ii) minimal effects
D. (i) fear (ii) disastrous results

Q.29 Which quote should Venu use to summarise the central idea of his article?

A. "Animals are such agreeable friends—they ask no questions; they pass no criticisms." — George Eliot

B. "The greatness of a nation and its moral progress can be judged by the way its animals are treated." – Mahatma Gandhi

C. A tiger may pray, "O Lord, how wicked are these men who do not come and place themselves before me to be eaten; they are breaking Your law." – Swami Vivekananda

D. "Clearly, animals know more than we think, and think a great deal more than we know." - Irene M. Pepperberg

Q.30 Read the following options for the self-checklist for this article and select the option that includes the most appropriate self-checklist for this article.

(1)

MY ARTICLE CONTAINS	☑ ☒
1. first person address to the audience as title	
2. content that lists the topical points	
3. opinions of stakeholders as by-line	
4. personal observations	
5. designation and date at the end	

(2)

MY ARTICLE CONTAINS	☑ ☒
1. an eye-catching title that is thematically related	
2. content that offers a balanced view of the issue	
3. input for the cause-effect & suggestions	
4. a conclusion including personal observations	
5. a by-line	

(3)

MY ARTICLE CONTAINS	☑ ☒
1. a thoughtful quote as title	
2. content that analyses pros and cons	
3. address of the writer	
4. a conclusion including published evidence	
5. expression of gratitude by-line	

(4)

MY ARTICLE CONTAINS	☑ ☒
1. relevant data & by-line as title	
2. content that offers a balanced view of the issue	
3. name of the publishing body	
4. a conclusion including personal observations	
5. designation and date at the end	

A. Option (1)
B. Option (2)
C. Option (3)
D. Option (4)

LITERATURE

This section has sub-sections: V, VI, VII, VIII, IX. There are a total of 30 questions in the section. Attempt any 26 questions from the sub-sections V to IX.

V. Read the given extract to attempt questions that follow:

"I have nothing else to do," he mutters, looking away. "Go to school," I say glibly, realising immediately how hollow the advice must sound.
"There is no school in my neighbourhood. When they build one, I will go."
"If I start a school, will you come?" I ask, half-joking. "Yes," he says, smiling broadly.
A few days later I see him running up to me. "Is your school ready?"
"It takes longer to build a school," I say, embarrassed at having made a promise that was not meant. But promises like mine abound in every corner of his bleak world.

Q.31 Saheb's muttering and 'looking away' suggests his

A. anger
B. shyness
C. embarrassment
D. anxiety

Q.32 Of the four meanings of 'glibly', select the option that matches in meaning with its usage in theextract.

A. showing a degree of informality
B. lacking depth and substance
C. being insincere and deceitful
D. speaking with fluency

Q.33 Who do you think Saheb is referring to as 'they', in the given sentence?
"When they build one, I will go"

A. The officials
B. The inhabitants
C. The teachers
D. The journalists

Q.34 Select the option that lists the feelings and attitudes corresponding to the following:
(1) I ask half-joking
(2) ...he says, smiling broadly

A.	(1) part arrogance, part seriousness
	(2) hesitation

B.	(1) part amusement, part irritation
	(2) submissiveness

C.	(1) part concern, part hurt
	(2) pride

D.	(1) part humour, part earnestness
	(2) self-belief

Q.35 Select the option that lists reasons why Saheb's world has been called 'bleak'.

(1) The absence of parental presence
(2) The poor socio-economic conditions
(3) His inability to address problems
(4) His lack of life-skills
(5) The denied opportunities of schooling

A. (1) and (4)
B. (2) and (5)
C. (3) and (5)
D. (2) and (4)

VI. **Read the given extract to attempt questions that follow:**

Tiny vestiges of the old terror would return. But now I could frown and say to that terror, "Trying to scare me, eh? Well, here's to you! Look!" And off I'd go for another length of the pool. This went on until July. But I was still not satisfied. I was not sure that all the terror had left. So, I went to Lake Wentworth in New Hampshire, dived off a dock at Triggs Island, and swam two miles across the lake to Stamp Act Island. I swam the crawl, breast stroke, side stroke, and back stroke. Only once did the terror return. When I was in the middle of the lake, I put my face under and saw nothing but bottomless water. The old sensation returned in miniature.

Q36. Why did Douglas go to swim at Lake Wentworth?

A. To showcase his skills for all who had doubted him.
B. To honour the efforts of his swimming instructor.
C. To build on his ability of swimming in a natural water body.
D. To know for sure that he had overcome his fear of drowning in water.

Q37. Select the option that lists the correct inference based on the information in the extract.

A. Triggs Island and Stamp Act Island are both located in Lake Wentworth.
B. Lake Wentworth is a part of Triggs Island.
C. Stamp Act Island is two miles away from New Hampshire.
D. Lake Wentworth is connected via docks to New Hampshire.

Q38. What was the reason for the 'return' of terror?

A. Superstitions about the dock at Triggs Islands
B. Recent reports about drowning incidents
C. Prior drowning experiences
D. Warnings by experienced swimmers

Q39. Douglas mentions that the *old sensation returned in miniature.*
He means that he felt the familiar feeling of fear …….

A. at irregular intervals.
B. on a small scale.
C. repeatedly.
D. without notice.

Q40. How did Douglas handle the 'old sensation'?

A. Addressed it.
B. Avoided it.
C. Submitted to it.
D. Stayed indifferent to it.

VII. **Read the given extract to attempt questions that follow:**

The tall girl with her weighed-down head. The paper-
seeming boy, with rat's eyes. The stunted, unlucky heir
Of twisted bones, reciting a father's gnarled disease,
His lesson, from his desk. At back of the dim class
One unnoted, sweet and young. His eyes live in a dream…

Q41. The poet draws attention to the problem of_____while describing the boy as *paper-seeming.*

A. malnutrition
B. untidiness
C. isolation

D. abandonment

Q42. Which option has the underlined phrase that applies the poetic device used for 'rat's eyes'?

A. He shut up <u>like a clam</u> when interrogated.
B. She runs <u>as swift as a gazelle</u>.
C. He is considered the <u>black sheep</u> of the family.
D. She ran away <u>chattering with fear</u>.

Q43. Select the correct option to fill the blank.
The tall girl's head is weighed down due to the_____.

A. effect of diseases
B. need for concentration
C. desire to remain unnoticed
D. burdens of poverty

Q44. The literal meaning of 'reciting' refers to delivering the lesson aloud. What does its figurativemeaning refer to?

A. Showing extra interest in the lesson.
B. Carrying his father's disease.
C. Resigning to his disease and condition.
D. Voicing the poor conditions, he lives in.

Q45. How does the 'unnoted' pupil present a contrast to others?

A. He appears to be in a world of dreams.
B. He struggles with the fulfilment of dreams.
C. He seems taller than most.
D. He sits in the dimmest part of the classroom.

VIII. **Read the given extract to attempt questions that follow:**

He said I was unhappy. That made my wife kind of mad, but he explained that he meant the modern world is full of insecurity, fear, war, worry and all the rest of it, and that I just want to escape. Well, who doesn't? Everybody I know wants to escape, but they don't wander down into any third level at Grand Central Station. But that's the reason, he said, and my friends all agreed. Everything points to it, they claimed.
My stamp collecting, for example; that's a 'temporary refuge from reality.' Well, maybe, but my grandfather didn't need any refuge from reality.

Q46. Why did Sam's verdict make Charley's wife 'mad'?

A. It made it difficult for her to accept that Charley would consult a psychiatrist.
B. It seemed to suggest to her that she was the cause of Charley's unhappiness.
C. It made her aware of Charley's delicate state of mind.
D. It offended her that Charley and Sam collectively accused her.

Q47. Sam's explanation to the reaction of Charley's wife was_____in nat

A. critical
B. aggressive
C. clarifying
D. accusatory

Q48. Select the option that signifies the condition of people of the 'modern world' mentioned inthe extract.

(1) unsure
(2) lazy
(3) offensive
(4) anxious
(5) afraid

A. (1) and (3)
B. (2) and (5)
C. (2), (3) and (4)
D. (1), (4) and (5)

Q49. Select the option that displays a cause-effect set.

	cause	effect
A.	Charley's stamp collecting	Wandering into the third level

	cause	effect
B.	Everybody wants to escape	Modern world full of insecurity

	cause	effect
C.	Charley's wandering into the third level	Charley's stamp collecting

	cause	effect
D.	Modern world full of insecurity	Everybody wants to escape

Q50. Why didn't Charley's grandfather need refuge from reality?

A. He was too busy to bother.
B. He had chosen to deny his reality.
C. He lived in peaceful times.
D. He was a very secure person.

IX. Attempt the following.

Q51. In 'Keeping Quiet' the poet does not want the reader to confuse his advice for_____with total inactivity.

A. experimentation
B. relaxation
C. isolation

D. introspection

Q52. On his way to school, Franz says that he had the *strength to resist* and chose to hurry off to school.
The underlined phrase suggests that Franz was

A. hesitant.
B. threatened.
C. tempted.
D. repentant.

Q53. Select the suitable option for the given statements, based on your reading of *Lost Spring*.
(1) The writer notices that Saheb has lost his carefree look.
(2) Saheb has had to surrender his freedom for ₹800 per month.

A. (1) is false but (2) is true.
B. Both (1) and (2) are false.
C. (2) is a fact but unrelated to (1).
D. (1) is the cause for (2).

Q54. Select the option that lists the qualities of Douglas' trainer.

(1) adventurous
(2) generous
(3) patient
(4) methodical
(5) encouraging
(6) courageous

A. (1) and (6)
B. (3), (4) and (5)
C. (2) and (5)
D. (1), (4) and (6)

Q55. The metaphor 'lead sky', is used by Stephen Spender to bring out

A. the image of sky-high constructions in the slum.
B. a response to death and destruction.
C. the strong dreams and aspirations of the children.
D. a sense of hopelessness and despair.

Q56. Sadao's servants leave his house, but none of them betrays the secret of the American P.O.W. Select the option that explains this.

A. The servants truly believed that they must not be a part of the household which sheltered aprisoner of war, but their love and loyalty to Sadao made them keep the secret safe.

B. The servants knew that any information about the P.O.W would result in punishment for them and their families which is why they revealed nothing.
C. The servants were superstitious and scared with a white man on the premises and consequently, chose to remove themselves and stay silent about the situation.
D. The servants did not want to incur the wrath of Dr. Sadao and lose their jobs, therefore theychose to exit instead, and return later.

Q57. Classify (1) to (4) as fact (F) or opinion (O), based on your reading of *The Third Level*.

(1) First day covers are never opened.
(2) Grand Central is growing like a tree.
(3) President Roosevelt collected stamps.
(4) Sam was Charley's psychiatrist.

A. F-1,3,4; O-2
B. F-2, 3; O-1,4
C. F-2; O-1,3,4
D. F-3,4; O-1,2

Q58. Identify the tone of Pablo Neruda in the following line:
Perhaps the Earth can teach us….

A. Confident and clear about the future events.
B. Dramatic about the prediction he made.
C. Convinced about the sequence of events to follow.
D. Uncertain, yet hopeful about the possibility.

Q59. Dr. Sadao mutters the word 'my friend' while treating the American P.O.W. in the light of the circumstances, we can say that this was

A. humourous.
B. climactic.
C. ironical.
D. ominous.

Q60. The sight of young trees and merry children, on the way to Cochin, is _____the poet's aging mother.

A. like a divine assurance for
B. in sharp contrast to
C. a distraction from pain for
D. the bridge between the poet and

Sample Question Paper
CLASS: XII
Session: 2021-22
Mathematics (Code-041)
Term - 1

Time Allowed: 90 minutes **Maximum Marks: 40**

General Instructions:

1. This question paper contains **three sections – A, B and C**. Each part is compulsory.
2. **Section - A** has 20 MCQs, attempt **any 16 out of 20**.
3. **Section - B** has 20 MCQs, attempt **any 16 out of 20**
4. **Section - C** has 10 MCQs, attempt **any 8 out of 10**.
5. There is no negative marking.
6. All questions carry equal marks.

SECTION – A

In this section, attempt any 16 questions out of Questions 1 – 20.
Each Question is of 1 mark weightage.

1. sin [$\frac{\pi}{3}$ −sin^{-1} $(-\frac{1}{2})$] is equal to: 1

a) $\frac{1}{2}$	b) $\frac{1}{3}$
c) -1	d) 1

2. The value of k (k < 0) for which the function f defined as 1

$$f(x) = \begin{cases} \frac{1-coskx}{xsinx}, x \neq 0 \\ \frac{1}{2} \quad , x = 0 \end{cases}$$

is continuous at $x = 0$ is:

a) ± 1	b) -1
c) $\pm\frac{1}{2}$	d) $\frac{1}{2}$

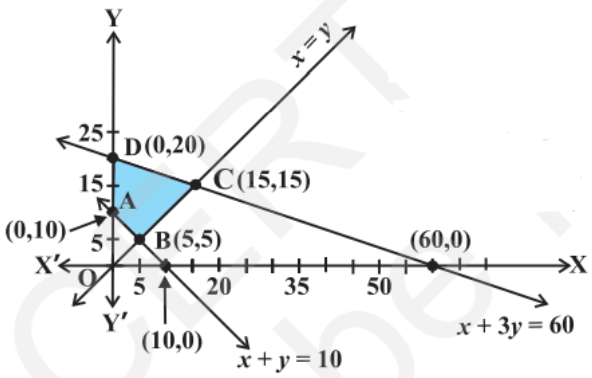
3. If A = [a_{ij}] is a square matrix of order 2 such that $a_{ij} = \begin{cases} 1, \ when\ i \neq j \\ 0, when\ i = j \end{cases}$, then A^2 is: 1

a) $\begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix}$	b) $\begin{vmatrix} 1 & 1 \\ 0 & 0 \end{vmatrix}$
c) $\begin{vmatrix} 1 & 1 \\ 1 & 0 \end{vmatrix}$	d) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

4. Value of k, for which A = $\begin{bmatrix} k & 8 \\ 4 & 2k \end{bmatrix}$ is a singular matrix is: 1

a) 4	b) -4
c) ±4	d) 0

5.	Find the intervals in which the function f given by f (x) = $x^2 - 4x + 6$ is strictly increasing: a) $(-\infty, 2) \cup (2, \infty)$ b) $(2, \infty)$ c) $(-\infty, 2)$ d) $(-\infty, 2] \cup (2, \infty)$	1
6.	Given that A is a square matrix of order 3 and | A | = - 4, then | adj A | is equal to: a) -4 b) 4 c) -16 d) 16	1
7.	A relation R in set A = {1,2,3} is defined as R = {(1, 1), (1, 2), (2, 2), (3, 3)}. Which of the following ordered pair in R shall be removed to make it an equivalence relation in A? a) (1, 1) b) (1, 2) c) (2, 2) d) (3, 3)	1
8.	If $\begin{bmatrix} 2a+b & a-2b \\ 5c-d & 4c+3d \end{bmatrix} = \begin{bmatrix} 4 & -3 \\ 11 & 24 \end{bmatrix}$, then value of a + b – c + 2d is: a) 8 b) 10 c) 4 d) –8	1
9.	The point at which the normal to the curve y = $x + \frac{1}{x}$, x > 0 is perpendicular to the line 3x – 4y – 7 = 0 is: a) (2, 5/2) b) (±2, 5/2) c) (- 1/2, 5/2) d) (1/2, 5/2)	1
10.	sin ($\tan^{-1}x$), where |x| < 1, is equal to: a) $\frac{x}{\sqrt{1-x^2}}$ b) $\frac{1}{\sqrt{1-x^2}}$ c) $\frac{1}{\sqrt{1+x^2}}$ d) $\frac{x}{\sqrt{1+x^2}}$	1
11.	Let the relation R in the set A = {x ∈ Z : 0 ≤ x ≤ 12}, given by R = {(a, b) : |a – b| is a multiple of 4}. Then [1], the equivalence class containing 1, is: a) {1, 5, 9} b) {0, 1, 2, 5} c) ϕ d) A	1
12.	If $e^x + e^y = e^{x+y}$, then $\frac{dy}{dx}$ is: a) e^{y-x} b) e^{x+y} c) $-e^{y-x}$ d) $2e^{x-y}$	1

13.	Given that matrices A and B are of order 3×n and m×5 respectively, then the order of matrix C = 5A +3B is: a) 3×5 and m = n b) 3×5 c) 3×3 d) 5×5	1
14.	If y = 5 cos x – 3 sin x, then $\frac{d^2y}{dx^2}$ is equal to: a) - y b) y c) 25y d) 9y	1
15.	For matrix A =$\begin{bmatrix} 2 & 5 \\ -11 & 7 \end{bmatrix}$, $(adjA)'$ is equal to: a) $\begin{bmatrix} -2 & -5 \\ 11 & -7 \end{bmatrix}$ b) $\begin{bmatrix} 7 & 5 \\ 11 & 2 \end{bmatrix}$ c) $\begin{bmatrix} 7 & 11 \\ -5 & 2 \end{bmatrix}$ d) $\begin{bmatrix} 7 & -5 \\ 11 & 2 \end{bmatrix}$	1
16.	The points on the curve $\frac{x^2}{9}+\frac{y^2}{16}=1$ at which the tangents are parallel to y-axis are: a) (0,$\pm$4) b) ($\pm$4,0) c) ($\pm$3,0) d) (0, $\pm$3)	1
17.	Given that A = $[a_{ij}]$ is a square matrix of order 3×3 and |A| = -7, then the value of $\sum_{i=1}^{3} a_{i2}A_{i2}$, where A_{ij} denotes the cofactor of element a_{ij} is: a) 7 b) -7 c) 0 d) 49	1
18.	If y = log($\cos e^x$), then $\frac{dy}{dx}$ is: a) $\cos e^{x-1}$ b) $e^{-x}\cos e^x$ c) $e^x \sin e^x$ d) $-e^x \tan e^x$	1
19.	Based on the given shaded region as the feasible region in the graph, at which point(s) is the objective function Z = 3x + 9y maximum?  a) Point B b) Point C c) Point D d) every point on the line segment CD	1

20. The least value of the function $f(x) = 2cosx + x$ in the closed interval $[0, \frac{\pi}{2}]$ is: 1

a) 2	b) $\frac{\pi}{6} + \sqrt{3}$
c) $\frac{\pi}{2}$	d) The least value does not exist.

SECTION – B

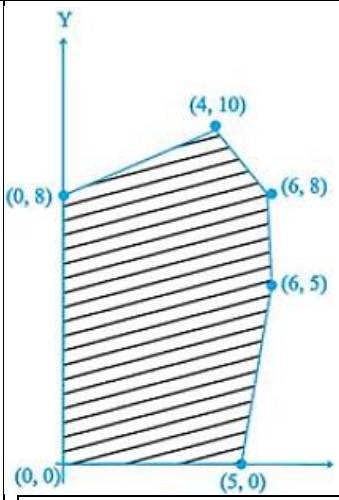
In this section, attempt any 16 questions out of the Questions 21 - 40.
Each Question is of 1 mark weightage.

21. The function f: R⟶R defined as $f(x) = x^3$ is: 1

a) One-on but not onto	b) Not one-one but onto
c) Neither one-one nor onto	d) One-one and onto

22. If x = a sec θ, y = b tan θ, then $\frac{d^2y}{dx^2}$ at $\theta = \frac{\pi}{6}$ is: 1

a) $\frac{-3\sqrt{3}b}{a^2}$	b) $\frac{-2\sqrt{3}b}{a}$
c) $\frac{-3\sqrt{3}b}{a}$	d) $\frac{-b}{3\sqrt{3}a^2}$

23. 

In the given graph, the feasible region for a LPP is shaded.
The objective function Z = 2x – 3y, will be minimum at: 1

a) (4, 10)	b) (6, 8)
c) (0, 8)	d) (6, 5)

24. The derivative of $\sin^{-1}(2x\sqrt{1-x^2})$ w.r.t $\sin^{-1}x$, $\frac{1}{\sqrt{2}} < x < 1$, is: 1

a) 2	b) $\frac{\pi}{2} - 2$
c) $\frac{\pi}{2}$	d) -2

25. 1

If A = $\begin{bmatrix} 1 & -1 & 0 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}$ and B = $\begin{bmatrix} 2 & 2 & -4 \\ -4 & 2 & -4 \\ 2 & -1 & 5 \end{bmatrix}$, then:

a) $A^{-1} = B$	b) $A^{-1} = 6B$
c) $B^{-1} = B$	d) $B^{-1} = \frac{1}{6}A$

26.	The real function f(x) = $2x^3 - 3x^2 - 36x + 7$ is: a) Strictly increasing in $(-\infty, -2)$ and strictly decreasing in $(-2, \infty)$ b) Strictly decreasing in $(-2, 3)$ c) Strictly decreasing in $(-\infty, 3)$ and strictly increasing in $(3, \infty)$ d) Strictly decreasing in $(-\infty, -2) \cup (3, \infty)$	1
27.	Simplest form of $\tan^{-1}\left(\frac{\sqrt{1+cosx}+\sqrt{1-cosx}}{\sqrt{1+cosx}-\sqrt{1-cosx}}\right), \pi < x < \frac{3\pi}{2}$ is: a) $\frac{\pi}{4} - \frac{x}{2}$ b) $\frac{3\pi}{2} - \frac{x}{2}$ c) $-\frac{x}{2}$ d) $\pi - \frac{x}{2}$	1
28.	Given that A is a non-singular matrix of order 3 such that $A^2 = 2A$, then value of |2A| is: a) 4 b) 8 c) 64 d) 16	1
29.	The value of b for which the function $f(x) = x + cosx + b$ is strictly decreasing over **R** is: a) $b < 1$ b) No value of b exists c) $b \leq 1$ d) $b \geq 1$	1
30.	Let R be the relation in the set N given by R = {(a, b) : a = b – 2, b > 6}, then: a) (2,4) ∈ R b) (3,8) ∈ R c) (6,8) ∈ R d) (8,7) ∈ R	1
31.	The point(s), at which the function f given by $f(x) = \begin{cases} \frac{x}{\|x\|}, x < 0 \\ -1, x \geq 0 \end{cases}$ is continuous, is/are: a) $x \epsilon$ R b) $x = 0$ c) $x \epsilon$ R –{0} d) $x = -1$ and 1	1
32.	If A = $\begin{bmatrix} 0 & 2 \\ 3 & -4 \end{bmatrix}$ and kA = $\begin{bmatrix} 0 & 3a \\ 2b & 24 \end{bmatrix}$, then the values of k, a and b respectively are:	1

	a) $-6, -12, -18$ b) $-6, -4, -9$ c) $-6, 4, 9$ d) $-6, 12, 18$	
33.	A linear programming problem is as follows: $Minimize\ Z = 30x + 50y$ subject to the constraints, $3x + 5y \geq 15$ $2x + 3y \leq 18$ $x \geq 0, y \geq 0$ In the feasible region, the minimum value of Z occurs at a) a unique point b) no point c) infinitely many points d) two points only	1
34.	The area of a trapezium is defined by function f and given by $f(x) = (10 + x)\sqrt{100 - x^2}$, then the area when it is maximised is: a) $75cm^2$ b) $7\sqrt{3}cm^2$ c) $75\sqrt{3}cm^2$ d) $5cm^2$	1
35.	If A is square matrix such that $A^2 = A$, then $(I + A)^3 - 7A$ is equal to: a) A b) I + A c) I – A d) I	1
36.	If $\tan^{-1} x = y$, then: a) $-1 < y < 1$ b) $\frac{-\pi}{2} \leq y \leq \frac{\pi}{2}$ c) $\frac{-\pi}{2} < y < \frac{\pi}{2}$ d) $y \in \{\frac{-\pi}{2}, \frac{\pi}{2}\}$	1
37.	Let A = {1, 2, 3}, B = {4, 5, 6, 7} and let f = {(1, 4), (2, 5), (3, 6)} be a function from A to B. Based on the given information, f is best defined as: a) Surjective function b) Injective function c) Bijective function d) function	1
38.	For A = $\begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, then $14A^{-1}$ is given by: a) $14\begin{bmatrix} 2 & -1 \\ 1 & 3 \end{bmatrix}$ b) $\begin{bmatrix} 4 & -2 \\ 2 & 6 \end{bmatrix}$ c) $2\begin{bmatrix} 2 & -1 \\ 1 & -3 \end{bmatrix}$ d) $2\begin{bmatrix} -3 & -1 \\ 1 & -2 \end{bmatrix}$	1
39.	The point(s) on the curve $y = x^3 - 11x + 5$ at which the tangent is $y = x - 11$ is/are: a) (-2,19) b) (2, - 9) c) $(\pm 2, 19)$ d) (-2, 19) and (2, -9)	1
40.	Given that A = $\begin{bmatrix} \alpha & \beta \\ \gamma & -\alpha \end{bmatrix}$ and $A^2 = 3I$, then:	1

a) $1+\alpha^2+\beta\gamma=0$	b) $1-\alpha^2-\beta\gamma=0$	
c) $3-\alpha^2-\beta\gamma=0$	d) $3+\alpha^2+\beta\gamma=0$	

SECTION – C

In this section, attempt any 8 questions.
Each question is of 1-mark weightage.
Questions 46-50 are based on a Case-Study.

41. For an objective function $Z = ax + by$, where $a, b > 0$; the corner points of the feasible region determined by a set of constraints (linear inequalities) are (0, 20), (10, 10), (30, 30) and (0, 40). The condition on *a* and *b* such that the maximum Z occurs at both the points (30, 30) and (0, 40) is: **1**

a) $b-3a=0$	b) $a=3b$
c) $a+2b=0$	d) $2a-b=0$

42. For which value of m is the line y = mx + 1 a tangent to the curve $y^2 = 4x$? **1**

a) $\frac{1}{2}$	b) 1
c) 2	d) 3

43. The maximum value of $[x(x-1)+1]^{\frac{1}{3}}$, $0 \le x \le 1$ is: **1**

a) 0	b) $\frac{1}{2}$
c) 1	d) $\sqrt[3]{\frac{1}{3}}$

44. In a linear programming problem, the constraints on the decision variables x and y are $x-3y \ge 0, y \ge 0, 0 \le x \le 3$. The feasible region **1**

a) is not in the first quadrant	b) is bounded in the first quadrant
c) is unbounded in the first quadrant	d) does not exist

45. Let A = $\begin{bmatrix} 1 & \sin\alpha & 1 \\ -\sin\alpha & 1 & \sin\alpha \\ -1 & -\sin\alpha & 1 \end{bmatrix}$, where $0 \le \alpha \le 2\pi$, then: **1**

a) |A|=0	b) |A| $\epsilon(2,\infty)$
c) |A| $\epsilon(2,4)$	d) |A| $\epsilon[2,4]$

CASE STUDY

The fuel cost per hour for running a train is proportional to the square of the speed it generates in km per hour. If the fuel costs ₹ 48 per hour at speed 16 km per hour and the fixed charges to run the train amount to ₹ 1200 per hour.

Assume the speed of the train as v km/h.

	Based on the given information, answer the following questions.	
46.	Given that the fuel cost per hour is k times the square of the speed the train generates in km/h, the value of k is: a) $\frac{16}{3}$ b) $\frac{1}{3}$ c) 3 d) $\frac{3}{16}$	1
47.	If the train has travelled a distance of 500km, then the total cost of running the train is given by function: a) $\frac{15}{16}v + \frac{600000}{v}$ b) $\frac{375}{4}v + \frac{600000}{v}$ c) $\frac{5}{16}v^2 + \frac{150000}{v}$ d) $\frac{3}{16}v + \frac{6000}{v}$	1
48.	The most economical speed to run the train is: a) 18km/h b) 5km/h c) 80km/h d) 40km/h	1
49.	The fuel cost for the train to travel 500km at the most economical speed is: a) ₹ 3750 b) ₹ 750 c) ₹ 7500 d) ₹ 75000	1
50.	The total cost of the train to travel 500km at the most economical speed is: a) ₹ 3750 b) ₹ 75000 c) ₹ 7500 d) ₹ 15000	1
