 (i) Egypt

(ii) Port Said and Port Suez

(iii)Economic Significance:

4. It gives Europe a new gateway to the Indian Ocean and reduces the distance between Europe and Asia.
5. It gives direct sea route distance between Liverpool and Colombo compared to Cape of Good Hope route.
6. It saves time and fuel.

- 17.''Gathering and hunting are the primitive economic activities meant for the subsistence of tribal societies, but in modern times gathering is market oriented and has become commercial.'' Examine the statement.

Chapter: [Primary Activities]

[Marks: 5]

-
- **Answer**

Gathering is practised in:

(i) High latitude zones which include northern Canada, northern Eurasia and southern Chile;

(ii) Low latitude zones such as the Amazon Basin, tropical Africa, Northern fringe of Australia and the interior parts of Southeast Asia

In modern times some gathering is market oriented and has become commercial:

1. Gatherers collect valuable plants such as leaves, barks of trees and medicinal plants and sell the products in the market.
2. They use various parts of the plants, for example, the bark is used for quinine; leaves supply materials for beverages, drugs; nuts for food and oils, etc.

Tree trunks for latex, balata, gums and resins are used as raw materials in various industries.

- 18.Define the term 'density of population'. Explain four geographical factors affecting the distribution of population in the world, with examples.

Chapter: [The World Population Distribution, Density and Growth]

[Marks: 5]

- **Answer**

Population density is the number of people per unit of area, usually quoted per square kilometer or square mile.

Density of Population = Population/Area

Geographical factors:
i. Availability of water - Water is the basic necessity for several purposes including irrigation, industries, transport and domestic affairs.Therefore, the Ganga River valleys is densely populated.
ii. Landforms - Plain areas encourage higher density of population as compared to mountain regions. The plain areas are more suitable for agriculture, development of transport, industries and other economic activities.

iii. Climate - A moderate climate is favourable for population. Extremes of climate discourage the concentration of population in Himalayas, and in the Thar Desert.

iv. Fertile soil supports higher population density while infertile soil leads to low density. In the northern plain of India, the soil is regularly enriched. Therefore, this is an area of high population density.

o 19. Describe any five characteristics of National Highways of India.

   Chapter: [Transport and Communication (Part-B)]

   [Marks: 5]

o 20. ''The decadal and annual growth rates of population in India are both very high and steadily increasing over time.'' Substantiate the statement.

   Chapter: [Population : Distribution, Density, Growth and Composition]

   [Marks: 5]

o **Answer**

   The growth of population in India can be divided into four phases as under:
   i. Phase of Stagnant Population: 1901-21: During this period, population increased by 1.29 crore only. In the decade (1910-21), the growth rate of population declined to (-) 0.3 per cent.

   ii. The decades between 1921 and 1951 recorded steady growth of population.Overall improvement in health and sanitation minimized the mortalityrate but the birth rate remained high.

   iii. In the next three decades 1951-81 are known as the period ofpopulation explosion. It was caused by a rapid fall in the mortalityrate but birth rate remained high.

   iv. Since 1981 till date, population growth rate has been high although adownward trend of crude birth rate has started.According to the provisional reports released on 31 March 2011, the Indian population increased to 121 crore with a decadal growth of 17.64%.

21. Identify the five geographical features shown on the given political outline map of the World as A, B, C, D and E and write their correct names on the lines marked near them with the help of the following information :

1. A major sea-port
2. An international airport
3. A major industrial region
4. An important area of nomadic herding
5. A mega city

Political outline map of the World   संसार का राजनीतिक रेखा-मानचित्र
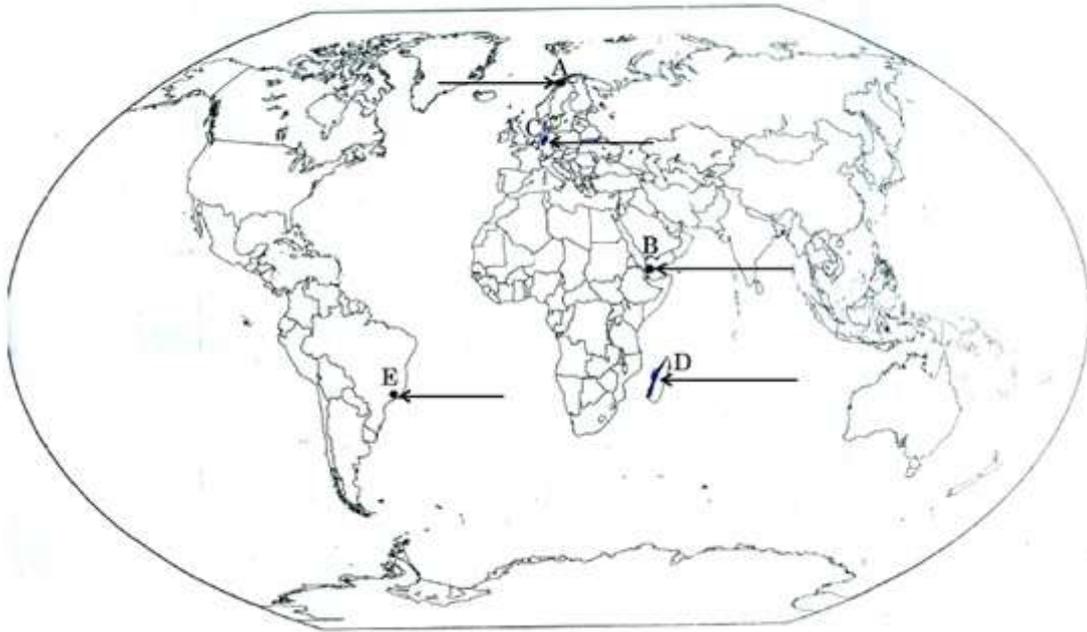
0r

6. Name any major sea-port of Norway.
7. Name any international airport of Yemen.
8. Mention an important industrial region of Eastern United States of America.
9. Name an important area of nomadic herding in east Africa.
10. Name any one mega city of Brazil.

[Marks: 5]

o **Answer**

0r

1. North Cape
2. Aden
3. North Appalachians / Great Lake Region / Atlantic Coast
4. Madagascar / Somalia / Ethiopia
5. Rio de Janeiro/Sao Paulo

o 22
o Locate and label the following features with appropriate symbols on the given political outline map of India:
   1. A major tea growing state
   2. Mayurbhanj. An area of iron ore mining
   3. An important steel plant in Karnataka
   4. An international southernmost airport in Kerala
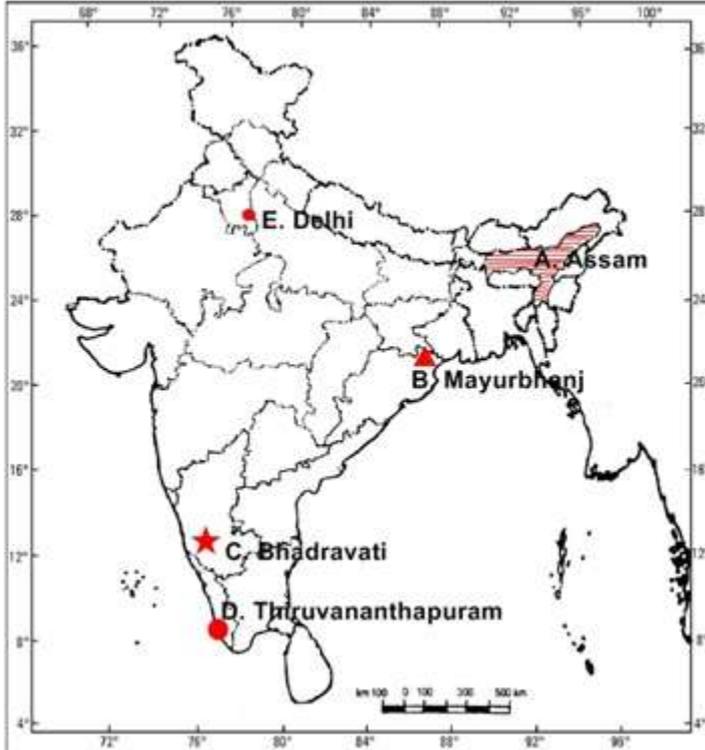   5. A city with a population of more than ten million in North India

   6.

   7. Which is the major tea producing state in India?
   8. Mention any one iron ore mining area in Odisha.
   9. Name an important steel plant located in Karnataka.

10. Name any one international airport in Kerala.
11. Which state of India has the lowest level of urbanisation?

[Marks: 5]

-
  o **Answer**

1. Assam
2. Mayurbhanj / Kendujhar (Any One)
3. Bhadravati / Vishweshvariya / Vijaynagar (Any One)
4. Thiruvananthapuram / Kochi (Any One)
5. Himachal Pradesh

SATISH CHANDRA MEMORIAL SCHOOL

Class 12 Hindi Core (302)

Model Question Paper

Max. Marks : 80   **Time : 3 hrs.**

सामान्य निर्देश

- इस प्रश्न-पत्र के तीन खंड हैं-क, ख और ग।
- तीनों खंडों के प्रश्नों के उत्तर देना अनिवार्य है।
- यथासंभव प्रत्येक खंड के उत्तर क्रमशः दीजिए।

प्रश्न 1. निम्नलिखित गद्यांश को ध्यानपूर्वक पढ़कर पूछे गए प्रश्नों के उत्तर दीजिए : **(12)**

ईश्वर सच्चिदानंद स्वरूप है तथा उसकी सर्वोत्कृष्ट रचना है-मानव। कण-कण में व्याप्त होने के साथ ही वह सर्वाधिक निकट हमारे अंदर स्थित है, फिर भी मानव हताश, निराश, दुःखी तथा अशांत है। कारण है ईश्वरीय ज्ञान का अभाव। प्रश्न है उसे कैसे जाना जाए? ईश्वर से मिलन का सीधा-सरल तरीका है—ध्यान। ध्यान है देखना, पर इन बाहरी आँखों से नहीं अंतर्दृष्टि से देखना। ध्यान के द्वारा मन को एकाग्र कर प्राण में, आत्मा में स्थिर किया जाता है। जैसे सूर्य की बिखरी किरणों को सूक्ष्मदर्शी यंत्र द्वारा एक बिंदु पर केंद्रित करने से अग्नि उत्पन्न होती है, वैसे ही ध्यान द्वारा चित्त की वृत्तियों के घनीभूत होने पर चैतन्य शक्ति का दिव्य प्रकाश, अमृतरस तथा अनुहद संगीत के रूप में प्रकटीकरण होता है, जिसे आत्म-साक्षात्कार कहते हैं। ध्यान आत्मा का भोजन तथा मुक्ति का मार्ग है, जिससे पुरम तत्त्व परमात्मा के रहस्यों का उद्घाटन अंतरात्मा में होता है। ध्यान सभी धर्मों का सार तथा सभी संतों एवं महापुरुषों द्वारा अपनाया गया मार्ग है। ध्यान के महत्व को समझे तथा किए बिना कोई भी व्यक्ति धार्मिक तथा अध्यात्मवादी नहीं हो सकता, क्योंकि ध्यान से चित्त का रूपांतरण होता है। पारलौकिक के साथ-साथ लौकिक रूप से भी ध्यान मानवोपयोगी है, क्योंकि शारीरिक व्याधियों के मूल हैं-मन के विकार। इस साधना से श्वासों की गति नियमित होती है, जिससे व्याधिकारक चंचल मन शांत होता है और अनेक प्रकार की व्याधियों का शमन होता है। ध्यान से मस्तिष्क की क्रियाशीलता बढ़ती है, बुद्धि कुशाग्र होती है तथा समय-समय पर आने वाले प्रश्नों की समस्याओं का समाधान आंतरिक शक्ति से होता है। साधना से निष्क्रिय दायाँ मस्तिष्क सक्रिय हो जाता है तथा मस्तिष्क की कार्यकुशलता और शक्ति दस गुना बढ़ जाती है। ध्यान परमानंद का झरना है। इस प्रक्रिया में आनंद की रिमझिम वर्षा होती है, क्योंकि साधक के ध्यानस्थ होने पर मस्तिष्क में तुरंगें उत्पन्न होती हैं, जो शांति तथा आनंद का कारण हैं, किंतु इस हेतु मन का शांत होना आवश्यक है। प्रसन्नता की प्राप्ति हेतु आनंद केंद्र पर ध्यान कर उसे जगाया जाता है, जिससे व्यक्ति कठिन से कठिन परिस्थिति में भी खिन्न व विचलित नहीं होता तथा सदैव प्रसन्न व तनावमुक्त जीवन व्यतीत करता है। ध्यान की प्रक्रिया सरल है, किंतु आवश्यकता है इसे जानने की। तत्त्वदृष्टा सद्गुरु से जानकर इसका नित्य प्रति अभ्यास करना चाहिए। यह साधना शारीरिक, मानसिक एवं बौद्धिक विकारों को दूर कर सुख, समृद्धि, दीर्घायु तथा आनंद प्रदायक है। स्वयं के अलावा परिवार एवं विश्व में शांति व मंगल-भावना हेतु भी साधना आवश्यक है।

(क) आशय स्पष्ट कीजिए-'"ध्यान परमानंद का झरना है।" **(2)**

(ख) गद्यांश के अनुसार मानव हताश, निराश एवं दुःखी क्यों है? **(1)**

(ग) आत्म-साक्षात्कार से क्या अभिप्राय है? **(2)**

(घ) मानव के लिए किसे उपयोगी माना गया है और क्यों? **(2)**

(ङ) प्रसन्नता ध्यान से किस प्रकार संबंधित है? **(2)**

(च) ध्यान करने से मनुष्य को कौन-कौन-से लाभ प्राप्त होते हैं? **(1)**

(छ) गद्यांश के केंद्रीय भाव को लगभग 20 शब्दों में लिखिए। **(2)**

प्रश्न 2.

निम्नलिखित काव्यांश को ध्यानपूर्वक पढ़कर पूछे गए प्रश्नों के उत्तर दीजिए **(1 × 4= 4)**

हम नए-नए धानों के बच्चे तुम्हें पुकार रहे हैं –

बादल ओ! बादल ओ! बादल ओ!

हम बच्चे हैं,

(चिड़ियों की परछाईं पकड़ रहे हैं उड़-उड़।)

हम बच्चे हैं,

हमें याद आई है जाने किन जन्मों की

आज हो गया है जी उन्मन!

तुम कि पिता हो

इंद्रधनुष बरसो!

कि फूल बरसो,

कि नींद बरसो

बादल ओ!

हम कि नदी को नहीं जानते,

हम कि दूर सागर की लहरें नहीं माँगते।

हमने सिर्फ तुम्हें जाना है,

तुम्हें माँगते हैं।

आर्द्रा के पहले झोंके में तुमको सँघा है

पहला पत्ता बढ़ा दिया है।

लिए हाथ में हाथ हवा का–

खेतों की मेड़ों पर घिरते तुमको देखा है,

ओठों से विवश छू लिया है।

ओ सुनो, अन्न-वर्षी बादल
ओ सुनो, बीज-वर्षी बादल
हम पंख माँगते हैं,
हम नए फेन के उजले-उजुले
शंख माँगते हैं,
हम बस कि माँगते हैं।
बादल! बादल।

(क) प्रस्तुत काव्यांश में कौन, किसे और क्यों पुकार रहा है?

(ख) धानों के नन्हे-नन्हे बच्चे बादलों को किस संबोधन से पुकारते हैं?

(ग) अपने जीवन की रक्षा के लिए धानों के बच्चे किनकी सहायता नहीं पाना चाहते?

(घ) आर्द्रे के प्रथम झोंके ने धानों के बच्चों को किस तरह प्रभावित किया है?

प्रश्न 3.
निम्नलिखित में से किसी एक विषय पर अनुच्छेद लिखिए   (5)

(क) पुस्तकों का महत्त्व

(ख) आधुनिक जनसंचार माध्यम

प्रश्न 4. किसी प्रतिष्ठित दैनिक समाचार-पत्र के संपादक को पत्र लिखकर अस्पताल के प्रबंधन पर असंतोष व्यक्त करते हुए अस्पताल के चिकित्सा से लोगों को होने वाली असुविधा की ओर ध्यान आकृष्ट कीजिए।

                                                                    (5)

प्रश्न 5. निम्नलिखित प्रश्नों के उत्तर संक्षेप में दीजिए   (1 × 4=4)

(क) संयुक्त क्रांति से आप क्या समझते हैं?

(ख) खोजपरक पत्रकारिता से क्या अभिप्राय है?

(ग) एंकर बाइट किसे कहते हैं?

(घ) समाचार संक्षेपण में किन बातों का ध्यान रखना आवश्यक है?

प्रश्न 6. 'सबक सिखातीं आपदाएँ' विषय पर एक आलेख लिखिए।   (3)

प्रश्न 7. ''बढ़ती उपभोक्तावादी संस्कृति - विषय पर फ़ीचर लेखन तैयार कीजिए।   (3)

प्रश्न 8.
निम्नलिखित काव्यांश को ध्यानपूर्वक पढ़कर पूछे गए प्रश्नों के उत्तर दीजिए :   (2 × 3=6)

बच्चे प्रत्याशा में होंगे,
नीड़ों से झाँक रहे होंगे
यह ध्यान परों में चिड़ियों के

भरता कितनी चंचलता है!
दिन जल्दी-जल्दी ढलता है!

(क) काव्यांश में ममता की शक्ति किस प्रकार उजागर हुई है?
(ख) चिड़िया के घोंसले में किस दृश्य की कल्पना की गई है?
(ग) चिड़िया के परों में आई चंचलता का क्या कारण है?

प्रश्न 9. निम्नलिखित काव्यांश को ध्यानपूर्वक पढ़कर पूछे गए प्रश्नों के उत्तर दीजिए : **(2 × 2 = 4)**

हम दूरदर्शन पर बोलेंगे।
हम समर्थ शक्तिवान्
हम एक दुर्बल को लाएँगे
एक बंद कमरे में।
उससे पूछेगे तो आप क्या अपाहिज हैं?
तो आप क्यों अपाहिज हैं?

आपका अपाहिजपन तो दुःख देता होगा, देता है?
(कैमरा दिखाओ इसे बड़ा-बड़ा)
हाँ तो बताइए आपका दुःख क्या है।
जुल्दी बताइए वह दुःख बताइए
बता नहीं पाएगा।

(क) प्रस्तुत काव्यांश में प्रयुक्त छंद को स्पष्ट कीजिए।
(ख) प्रस्तुत काव्यांश की भाषा-शैली पर प्रकाश डालिए।

प्रश्न 10. निम्नलिखित प्रश्नों के उत्तर दीजिए **(3 × 2= 6)**

(क) कवि को संसार क्यों अच्छा नहीं लगता? 'आत्म-परिचय' कविता के आधार पर स्पष्ट कीजिए।

(ख) कवि ने सूर्योदय से पहले आकाश की भंगिमा में आए परिवर्तनों को किस रूप में देखा है?

प्रश्न 11. निम्नलिखित गद्यांश को ध्यानपूर्वक पढ़कर पूछे गए प्रश्नों के उत्तर दीजिए **(2 × 3 = 6)**

भक्तिन अच्छी है, यह कहना कठिन होगा, क्योंकि उसमें दुर्गुणों का अभाव नहीं। वह सत्यवादी हरिश्चंद्र नहीं बन सकती, पर 'नरो वा कुंजरो वा' कहने में भी विश्वास नहीं करती। मेरे इधर-उधूर पड़े रुपये-पैसे, भंडार-घर की किसी मुटकी में कैसे अंतुरहित हो जाते हैं, यह रहस्य भी भक्तिनु जानती है। पर, उस संबंध में किसी के संकेत करते ही वह उसे शास्त्रार्थ के लिए चुनौती दे डालती है, जिसको स्वीकार कर लेना किसी तर्क-शिरोमणि के लिए संभव नहीं। यह उसका अपना घर ठहरा, रुपया-पैसा जो इधर-उधर पड़ा देखा, सँभालकर रख लिया। यह क्या चोरी है। उसके जीवन का परम कर्तव्य मुझे प्रसन्न रखना है। जिस बात से मुझे क्रोध आ सकता है, उसे बदलकर इधर-उधर करके बताना, क्या झूठ है। इतनी चोरी और इतना झूठ तो धुर्मराज महाराज में भी होगा, नहीं तो वे भगवान जी को कैसे प्रसन्न रख सकते और संसार को कैसे चला सकते।

(क) लेखिका ने 'नरो वा कुंजरो वा' वाक्यांश किस संदर्भ में कहा था?

(ख) भक्तिन भंडार-घर की मटकी में छिपाकर रखे रुपयों को चोरी क्यों नहीं मानती?

(ग) लेखिका के क्रोध से बचने के लिए भक्तिन क्या करती थी?

प्रश्न 12. निम्नलिखित प्रश्नों के उत्तर दीजिए   **(3 × 3=9, 1x1=1)= 10**

(क) बाज़ार का जादू चढ़ने और उतरने पर मनुष्य पर क्या-क्या असर पड़ता है?

(ख) नमक ले जाने के बारे में सफ़िया के मन में उठे द्वंद्वों के आधार पर उसकी चारित्रिक

    विशेषताओं को स्पष्ट कीजिए।

(ग) दंगल में विजयी होने के पश्चात् लुट्टन सिंह की जीवन-शैली में क्या परिवर्तन आ गया था?

(घ) लेखिका को कब लगा कि भक्तिन उसका साथ नहीं छोड़ना चाहती?

प्रश्न 13. निम्नलिखित प्रश्न के उत्तर दीजिए :

आज के युग के संदर्भ में यशोधर बाबू के स्वभाव पर टिप्पणी करते हुए बताइए कि आप इसमें क्या-क्या बदलाव चाहते हैं?   **(4)**

प्रश्न 14. निम्नलिखित प्रश्नों के उत्तर दीजिए :   **(2 × 4 = 8)**

(क) 'अतीत में दबे पाँव' पाठ के आधार पर बताइए कि पर्यटक मुअनजो-दड़ो में कौन-कौन से तीन महत्त्वपूर्ण स्थल देख सकते हैं?

(ख) 'जूझ' कहानी के लेखक के पिता ने किन-किन शर्तों के आधार पर लेखक को पढ़ने की आज्ञा दी?

<div align="center"><u>XXXXXXXX</u></div>

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SATISH CHANDRA MEMORIAL SCHOOL
PHYSICAL EDUCATION
MODEL QUESTION PAPER
CLASS – XII
SESSION – 2019-2020

</div>

GROUP- A   **1Mark**
1. What is bye?
2. Define nutrition.
3. Define Gomukhasana.
4. What do you mean by disorder?
5. Define scoliosis.
6. What is the full form of BFP?
7. What is tournament?
8. What is food intolerance?
9. What is the formula of measuring BMI?
10. What is cognitive disability?

GROUP – B   **3Marks**
11. Write briefly about the objectives of intramural.
12. Explain the role of fibre in diet.
13. Discuss the impact of asanas on health.
14. What are the major causes of disorder?
15. Briefly explain knock knee, its causes and remedial measures.
16. Explain the causes of Anorexia Nervosa.
17. Briefly explain female athletes triad.
18. Describe the functions of any three major committees in tournament.
19. Discuss any three macro-minerals and their importance.
20. Describe the principles of weight training.

GROUP – C   **5Marks**
21. Discuss the psychological and sociological aspects of female athletes.
22. Explain the disability etiquette.

23. Discuss the procedure, benefits and contradictions of Paschimottanasana.
24. Write a note on the nutritive components of diet.
25. Draw a knock-out fixture of 20 teams.
26. What are the various pitfalls of dieting?

<u>EXTRA</u>   **1Mark**

27. Which formula is used to find out the number of matches in a double league tournament?
    a. NxN   b. N(N-1)   c. (N-1)   d. NxNxN
28. Which sports competition is organized within the school itself?
    a. Extramural   b. Intramural   c. Inter –state   d. None of these
29. Deficiency of which of the following leads to ricket?
    a. Iron   b. Iodine   c. Calcium   d. Chromium
30. Which of the following vitamins is insoluble in fats?
    a. (A)   b. (E)   c. (K)   d. (C)
31. Which asana is also known as the upward facing bow pose?
    a. Dhanurasana   b. Tadasana   c. chakrasana   d. Vakrasana
32. In which disorder its difficult to pay attention to things?
    a. SPD   b. ADHD   c. OCD   d. ODD
33. In which condition a person has difficulty in comprehending written text and spelling?
    a. Spina Bifida   b. Epilepsy   c. Dyslexia   d. Arthritis
34. Which of these asanas is remedial for lordosis?
    a. Chakrasana   b. Vajrasana   c. Halasana   d. Matsyasana
35. Which is the abnormal lateral curvature of the spine?
    a. Kyphosis   b. Lordosis   c. Fibrosis   d. Scoliosis
36. Zigzag Run stands for-
    a. Power   b. Agility   c. Strength   d. Endurance
37. Which of these following is not a major game?
    a. Cricket   b. Football   c. Badminton   d. Karate

38. Which of these is not one of the methods in League Tournament?
    a. Cyclic Method   b. Spiral Method   c. Staircase Method   d. Tabular Method
39. What is another name of Riboflavin?
    a. Vit B   b. Vit B_5 c. Vit B_2 d. Vit C
40. Which of these is not the test item in AAPHERD?
    a. Shuttle Run   b. 50 yrd run   c. Sit up   d. 50 mt run

…………………………………………………

SATISH CHANDRA MEMORIAL SCHOOL

MODEL QUESTION PAPER 2019-20

PHYSICS-XII

MCQ QUESTIONS

Question 1

A charge of magnitude q is divided into two parts such that force between resulting two charges is maximum when separated through some distance r. The division of charges would be
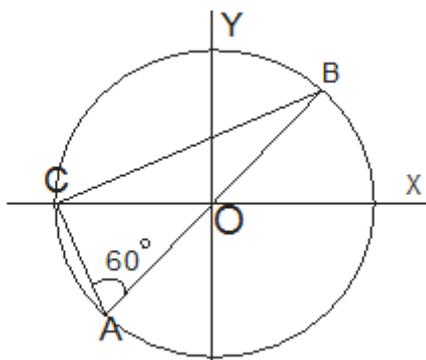
(a) 3q/8 , 5q/8　　　　　　　　　**(b) 2q/4 , 2q/4**

(c) q/2 , q/2　　　　　　　　　　**(d) 3q/6 , 3q/6**

Question 2

Consider a system of three charges q/3, q/3 and –2q/3 placed at points A, B and C respectively as shown in the figure. Take O to be the centre of the circle of radius R and angle CAB = 60⁰

(a) The electric field at point O is $q/8\pi\varepsilon_0 R^2$　　　　　　**(b) The magnitude of the force between the charges at C and B is $q^2/54\pi\varepsilon_0 R^2$**

(c) The potential energy of the system is zero　　　　**(d) The potential at point O is $q/12\pi\varepsilon_0 R$**

Question 3
Four charges q, 2q, 3q, 4q are placed at corners A, B, C and D of a square as shown below in the figure. The field at centre O of square has the direction along
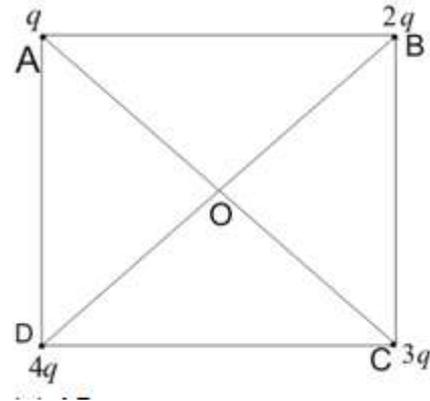
(a) AB   (b) CB
(c) AC   (d) DB

Question 4

The dimension of magnetic field in M, L, T and C (Coulomb) is given as
(a) $MLT^{-1}C^{-1}$
(b) MT^2C^{-2}
(c) $MT^{-1}C^{-1}$
(d) $MT^{-2}C^{-1}$

Question 5

In a region, steady and uniform electric and magnetic fields are present. These two fields are parallel to each other. A charged particle is released from rest in this region. The path of the particle will be a

(a) circle
(b) helix
(c) straight line
(d) ellipse

Question 6

Needles N1, N2 and N3 are made of a ferromagnetic, a paramagnetic and a diamagnetic substance respectively. A magnet when brought close to them will
(a) attract all three of them
(b) attract N1 and N2 strongly but repel N3
(c) attract N1 strongly, N2 weakly and repel N3 weakly
(d) attract N1 strongly, but repel N2 and N3 weakly

Question 7

A electric dipole is placed at an angle of 30° to a non-uniform electric field. The dipole will experience
(a) a torque only
(b) a translational force only in the direction of the field
(c) a translational force only in a direction normal to the direction of the field
(d) a torque as well as a translational force

Question 8

Find focal length of mirror that forms an image 6.2 cm behind mirror of an object placed at 26 cm in front of mirror?

    (a)   −6.58 cm

    (b)   −8.41 cm

    (c)   −7.8 cm

(d)   −9.6 cm

Question 9

If critical angle for total internal reflection from a medium to free space is 30^0. Then velocity of light in medium:

(a) 1.5×10^8 m/s
(b) 3×10^8 m/s
(c) 0.5×10^8 m/s
(d) 0.75×10^8 m/s

Question 10

The dia. of objective lens of a telescope is 5m and wavelength of light is $6000A^0$. Limit of resoluition of telescope is:

(a) 0.3sec
(b) 0.03sec
(c) 0.6sec
(d) 1.5sec

VERY SHORT ANSWER TYPE QUESTIONS

1. A charge 'q' is moved from a point A above a dipole of dipole moment 'p' to a point B below the dipole in equatorial plane without acceleration. Find the work done in the process. [1]

```
              A |
                |
                |
                |
                |
                |
  - - - - - - - -+- - - - - - - -
   -q           |          +q
                |
                |
                |
              B |
```
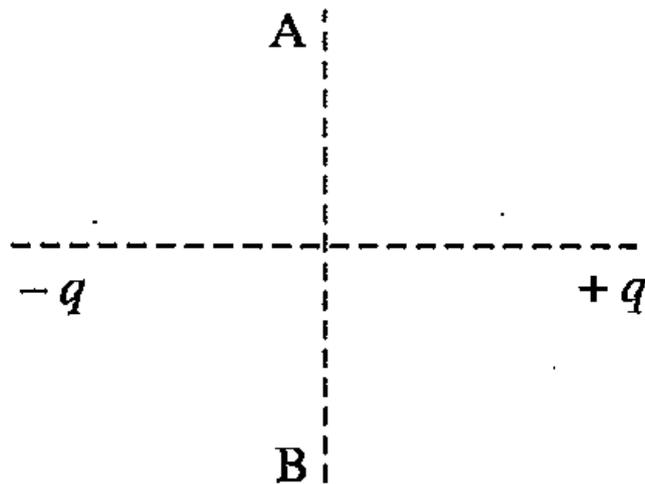
Answer : Work done, $W = q(V_B - V_A) = q \times 0 = 0$

2. In what way is the behaviour of a diamagnetic material different from that of a paramagnetic, when kept in an external magnetic field ? [1]

Answer : The magnetic field lines pass through the paramagnetic material while the magnetic field lines move away from the diamagnetic material.

or paramagnetic material get aligned along B and dianegnetic aliqied perpendicular to B.

3. **Write the underlying principle of a moving coil galvanometer.** [1]

Answer : When a current carrying coil is placed in magnetic field then it experiences a torque.

$$NIAB = k\alpha$$

$$\Rightarrow \qquad I = \frac{k}{NAB}\alpha$$

where N = The number of turns.

  I = Current.

  A = Area of the loop.

  B = Magnetic field.

  k = Torsional constant of the wire

  α = Angle of deflection

4. **Why does sun appear red at sunrise and sunset?** [1]

Answer : Sun appears red at sunrise and sunset due to the least scattering of red light as it has the longest wavelength.

5. The plot of the variation of potential difference across a combination of three identical cells in series, versus current is shown below. What is the emf and internal resistance of each cell ?

[1]
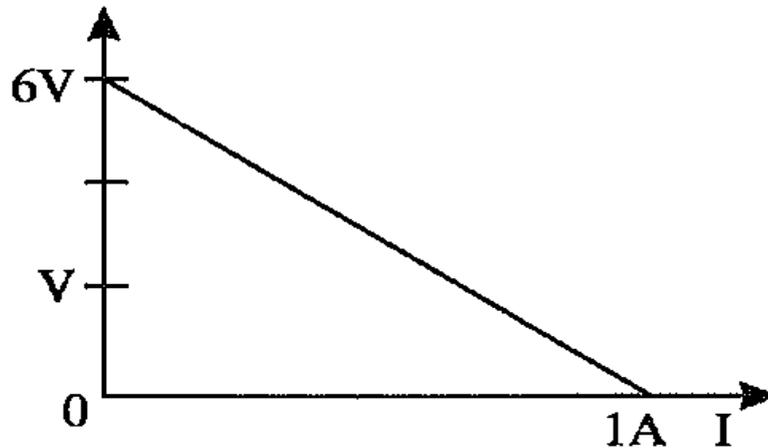
Answer :

We know that,

$$V = E - Ir$$

Where E is the e.m.f. and r is the total internal resistance.

When $I = 0$,

Total emf = Terminal voltage

$$3E = 6V$$

emf. of each cell $E = 2$ V

When $V = 0$

$$E = Ir$$

$$r = \frac{\text{Total E.m.f}}{I} = \frac{6}{1} = 6\,\Omega$$

As the cells are connected in series. So, the internal resistance of each cell $= 2\,\Omega$.

7. **A ray PQ incident normally on the refracting face BA is refracted in the prism BAC made of material of refractive index 1.5. Complete the path of ray through the prism. From which face will the ray emerge ? Justify your answer.** [2]
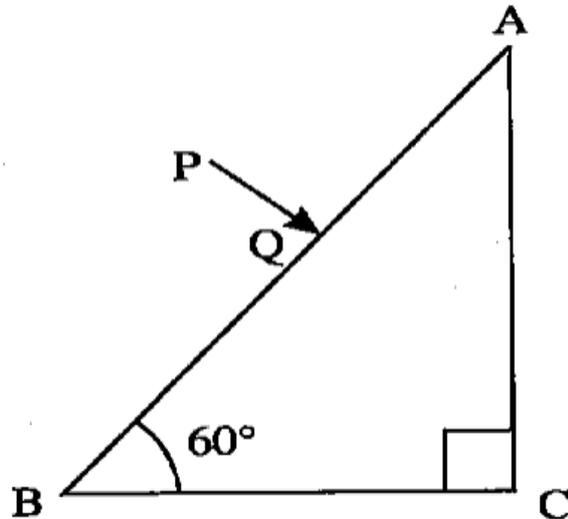
Answer :

We know that,

$$n = \frac{1}{\sin C}$$

Where, n = Refractive index

C = Critical angle.

So, $\sin C = 1/n = 1/1.5 = 0.667$

$\sin C = \sin 41° 49'$

$C = 41° 49'$

$C > 30°$

Angle on face AC. which as greater than incident
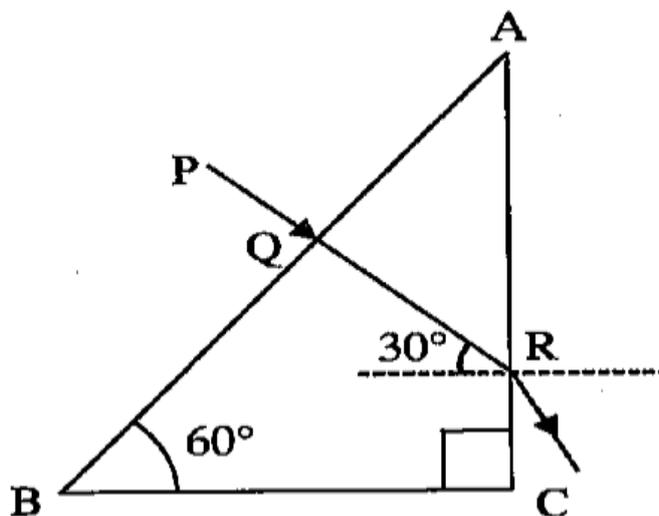
8. A biconvex lens made of a transparent material of refractive index 1.25 is immersed in water of refractive index 1.33. Will the lens behave as a converging or a diverging lens ? Give reason.[1]
Answer : In this case the biconvex lens will behave as a diverging lens because the refractive index of water (1.33) is more than that of the material (1.25) of the lens.

OR

Two bar magnets are quickly moved towards a metallic loop connected across a capacitor 'C' as shown in the figure. Predict the polarity of the capacitor. [1]

ANS: A = (+) , B = (-)

9. **Two cells of emfs 1.5 V and 2.0 V having internal resistances 0.2 Ω and 0.3 Ω respectively are connected in parallel. Calculate the emf and internal resistance of the equivalent cell.** [2]

Answer : Given, $E_1 = 1.5$ V, $r_1 = 0.2$ Ω,

$$E_2 = 2 \text{ V}, r_2 = 0.3 \text{ } \Omega$$
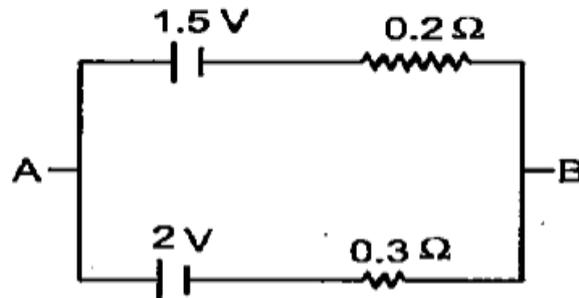
Equivalent emf, $E = \dfrac{\dfrac{E_1}{r_1} + \dfrac{E_2}{r_2}}{\dfrac{1}{r_1} + \dfrac{1}{r_2}}$

$$= \dfrac{(1.5 \times 0.3) + (2 \times 0.2)}{0.2 + 0.3}$$

$$= \dfrac{0.45 + 0.4}{0.5}$$

$$= \dfrac{0.85}{0.5} = 1.7 \text{ volt}$$

Equivalent internal resistance

$$= \dfrac{r_1 r_2}{r_1 + r_2}$$

$$= \dfrac{0.2 \times 0.3}{0.2 + 0.3}$$

$$= \dfrac{0.06}{0.5}$$

$$r_{eq} = 0.12 \text{ } \Omega$$

10. A battery of emf 12 V and internal resistance 2 Ω is connected to a 4 Ω resistor as shown in the figure.   [2]

(a) Show that a voltmeter when placed across the cell and across the resistor, in turn, gives the same reading.

(b) To record the voltage and the current in the circuit, why is voltmeter placed in parallel and ammeter in series in the circuit ?
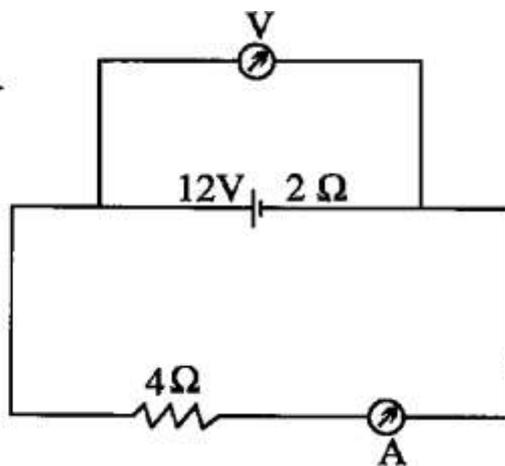
Answer : We know that,

(a) Effective resistance of the circuit $R_E = 6\ \Omega$

$$\therefore I = \frac{12}{6} = 2A$$

Terminal potential difference across the cell can be calculated as,

$$V = E - Ir = 12 - 2 \times 2 = 12 - 4 = 8\ V$$

Also, Potential difference across 4Ω resistor can be calculated as

$$V = IR = 2 \times 4 = 8\ V.$$

So, a voltmeter when placed across the cell and across the resistor, gives the same reading.

(b) An ammeter is connected in series because it has very low resistance. So, when, an ammeter is connected in series, then there is not much increase in the resistance of the circuit and hence the current through the circuit unchanged.

A voltmeter is connected in parallel because it has very high resistance. So, it draws a very small current from the circuit.

SHORT ANSWER TYPE

11. Define an equipotential surface. Draw equipotential surfaces : [3]

    (i)   in the case of a single point charge and

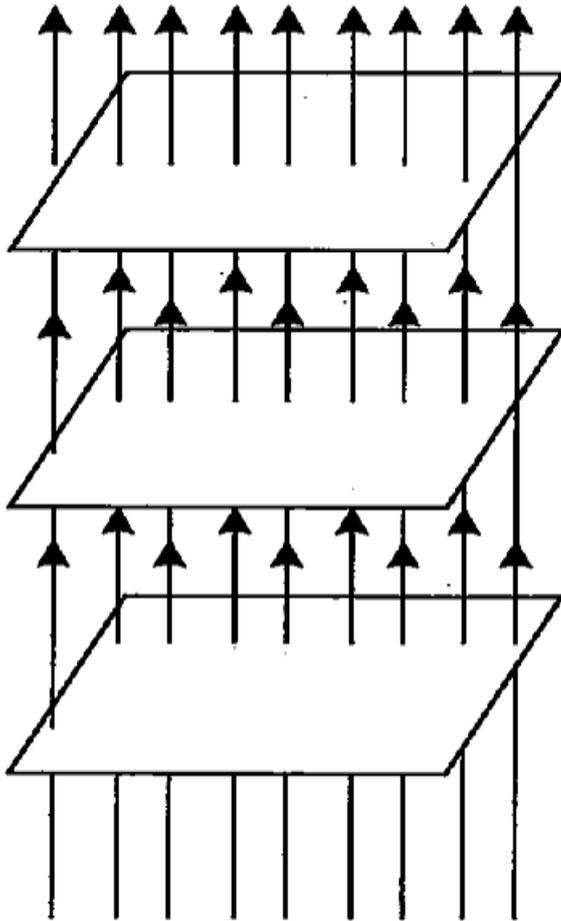   (ii) in a constant electric field in Z-direction.

          Why the equipotential surfaces about a single charge are not equidistant ?

    (iii) Can electric field exist tangential to an equipotential surface ? Give reason.

    Answer : An equipotential surface is the surface which has same potential at its every point.

(i)
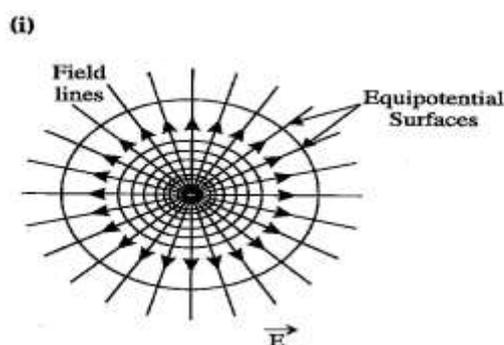
(ii)

The electric field due to single charge is not constant, this is the reason why the equipotential surfaces about a single charge are not equidistant and potential vary inversely with radius i.e., $V \times \dfrac{1}{r}$

(iii) No, electric field cannot exist tangential to an equipotential surface. If it happen then a charged particle will experience a force along the tangential line and can move along it. As a charged particle can move only due to the potential difference *i.e.*, along the direction of charge of potential, this contradicts the concept of an equipotential surface.

OR

A ray of light incident on an equilateral prism ($\mu_g = \sqrt{3}$) moves parallel to the base line of the prism inside it. Find the angle of incidence for this ray. [2]

Answer : It is given that the prism is equilateral in shape. So, all the angles are equal to 60°. Thus, the angle of prism, $A = 60^{\circ}$.

The angle of refraction in case of a prism,

$$r = \frac{A}{2} = 30^{\circ}$$

We can now apply Snell's law

$$\mu_a \sin i = \mu_g \sin r$$

Here, μ_a = refractive index of air = 1

μ_g = refractive index of glass = $\sqrt{3}$

i = angle of incidence

$$\sin i = \left(\frac{\mu_g}{\mu_a}\right) \sin r = \left(\frac{\mu_g}{\mu_a}\right) \sin 30^{\circ}$$

$$\sin i = \frac{\sqrt{3}}{2}$$

So, the angle of incidence is $i = 60^{\circ}$.

12. (i) State law of Malus.

(ii) Draw a graph showing the variation of intensity (I) of polarised light transmitted by an analyser with angle (θ) between polariser and analyser.

(iii) What is the value of refractive index of a medium of polarising angle 60°? [3]

Answer : (i) Malus discovered that when a beam of completely plane polarized light is passed through the analyser, the intensity 'I' of transmitted light changes directly as the square of the cosine of the angle θ between the transmission directions of polarizer and analyzer.
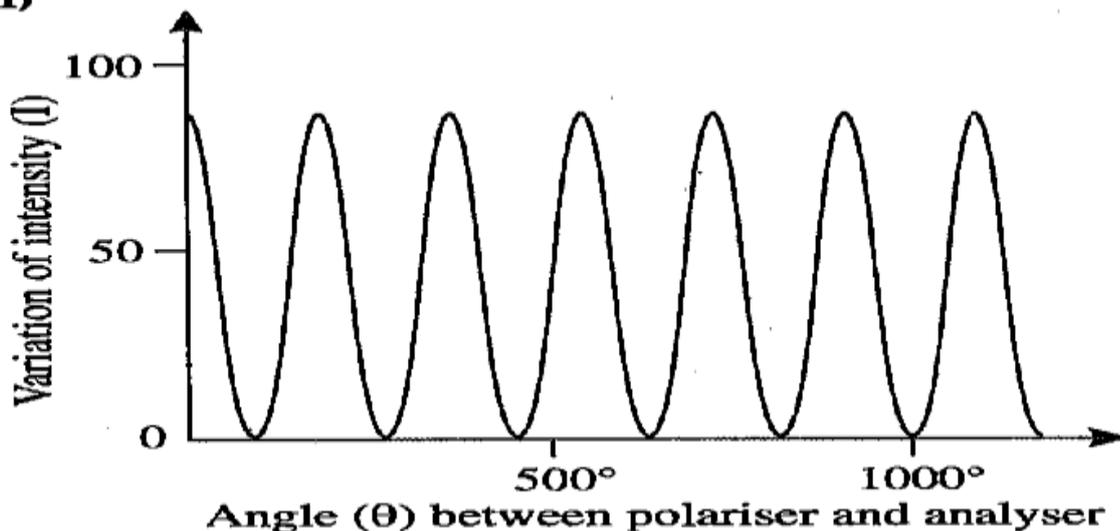
This is known as the law of Malus.

$$I \propto \cos^2 \theta$$

or $$I = I_0 \cos^2 \theta$$

Where, I_0 is the maximum intensity of the transmitted light.

(ii)

Angle (θ) between polariser and analyser

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(iii) From the Brewster's law of polarization :

$$\mu = \tan i_p$$
$$= \tan 60^\circ$$
$$= \sqrt{3}$$
$$= 1.7320$$

Thus, the refractive index of the material is 1.73.

13. **(a)** **Write the expression for the magnetic force acting on a charged particle moving with velocity v in the presence of magnetic field B.**

(b) **A neutron, an electron and an alpha particle moving with equal velocities, enter a uniform magnetic field going into the plane of the paper as shown. Trace their paths in the field and justify your answer.** **[3]**
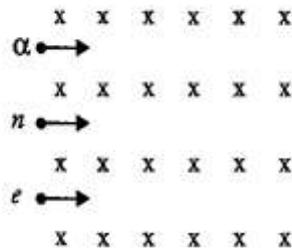
Answer : **(a)** A charge particle having charge q is moving with velocity 'v' in a magnetic field of field strength 'B' then the force acting on it is given by the formula $F = q(\vec{v} \times \vec{B})$ and $F = qv\,B\sin\theta$ (where θ is the angle between velocity vector and magnetic field).

Direction of force is given by the cross product of velocity and magnetic field.

(b)
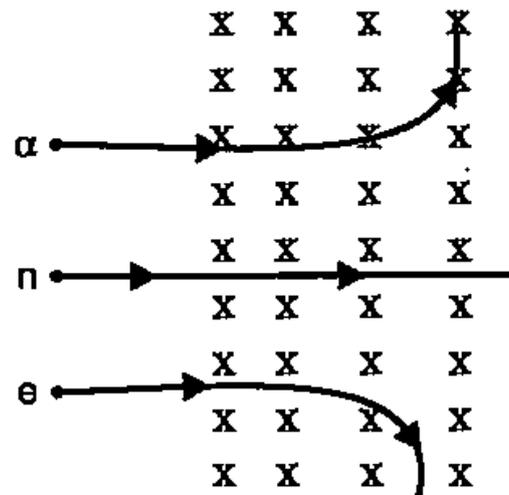
α particle will trace circular path in anticlockwise direction as it's deviation will be in the direction of $(\vec{v} \times \vec{B})$.

Neutron will pass without any deviation as magnetic field does not exert and force on neutral particle.

Electron will trace circular path in clockwise direction as its deviation will be in the direction opposite to $(\vec{v} \times \vec{B})$ with a smaller radius due to large charge/mass ratio as $r = \dfrac{mv}{aB}$.

14. (a) Define mutual inductance. '

(b) A pair of adjacent coils has a mutual inductance of 1.5 H. If the current in one coil changes from 0 to 20 A in 0.5 s, what is the change of flux linkage with the other coil ?

[3]

Answer : **(a)** Mutual induction is the phenomenon of production of induced emf in one coil due to change of current or flux in the neighbouring coil. The coil in which the current changes is called primary coil and the coil in which emf is induced is called the secondary coil.

(b)

$$M = 1.5 \text{ H}$$
$$I_i = 0 \text{ A}$$
$$I_f = 20 \text{ A}$$
$$dI = 20 \text{ A}, \qquad \Delta t = 0.5 \text{ s}$$

$$e = \frac{-MdI}{dt}$$
$$= -1.5 \times \frac{20}{0.5}$$
$$= -60 \text{ V}$$

So the flux linked with the other coil is given by

$$\Delta\phi = -e\Delta t = 60 \times 0.5$$
$$= 30 \text{ Wb.}$$

15. (i) Derive an expression for drift velocity of free electrons.

(ii) How does drift velocity of electrons in a metallic conductor vary with increase in temperature ? Explain. **[3]**

Answer : (i) Consider a conductor in which an electric field E is produced. Let a free electron experience a force (–eE) in this electric field. So, the acceleration of free electron is

$$a = F/m = -eE/m \qquad \text{...(i)}$$
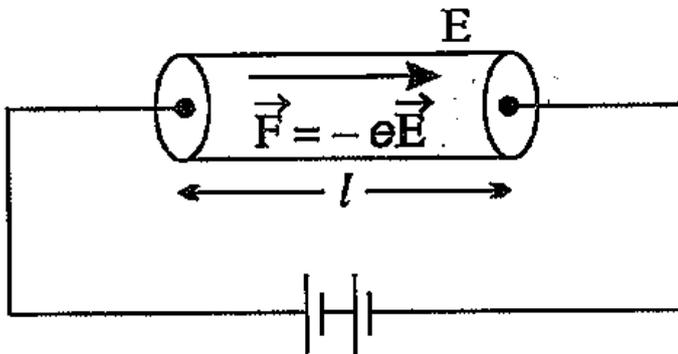
Here, e = Charge on electron.

m = Mass of an electron.

So, the final velocity of the free electron in time interval t_1 is,

$$v_1 = u_1 + at_1$$

For n free electrons, the final velocities be v_2, $v_3, ..., v_n$.

So, the average velocity of the free electrons or the drift velocity

$$v_d = \frac{(v_1 + v_2 + v_3 + ... + v_n)}{n}$$

or $\quad v_d = \frac{(u_1 + at_1 + u_2 + at_2 + ... + u_n + at_n)}{n}$

or $\quad v_d = \frac{[(u_1 + u_2 + ... + u_n) + (at_1 + at_2 + ... + at_n)]}{n}$

or $\quad v_d = \frac{[(u_1 + u_2 + ... + u_n) + a(t_1 + t_2 + ... + t_n)]}{n}$

But, $\dfrac{(u_1 + u_2 + ... + u_n)}{n}$ = average initial velocity of free electrons = 0.

and $\dfrac{(t_1 + t_2 + ... + t_n)}{n}$ = average time taken between two consecutive collision = τ

where τ is relaxation time.

So, $\qquad v_d = a\tau$

or, $\qquad v_d = \frac{-e\vec{E}}{m}\tau$ $\qquad$ [from (i)]

This is the required relation.

(ii) The drift velocity of free electrons in a metallic conductor decreases with increase in temperature. because, if we increase the temperature of the metallic conductor the collision between the electrons and ions increases, which decreases relaxation time. Hence, drift velocity decreases.

16. (i) When an AC source is connected to an ideal inductor show that the average power supplied by the source over a complete cycle is zero.

(ii) A lamp is connected in series with an inductor and an AC source. What happens to the brightness of the lamp when the key is plugged in and an iron rod is inserted inside the inductor ? Explain. [3]
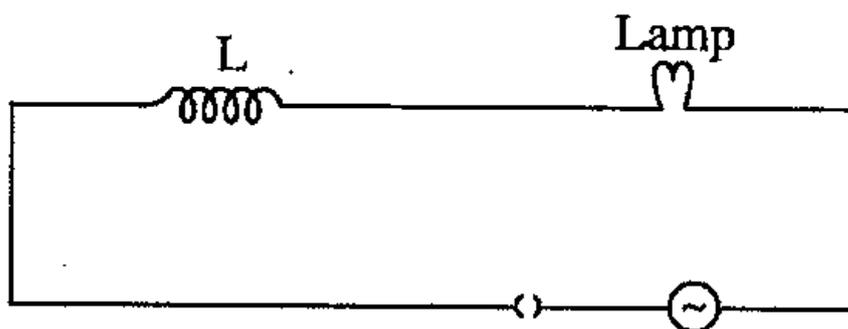
Answer : (i) The average power supplied by the source over a complete cycle is

$$P_{av} = E_{rms}.I_{rms}.\cos \phi$$

When the circuit contains an ideal inductor, then the phase difference between the current and voltage is $\pi/2$.

So, $\phi = \pi/2$. So, $\cos \phi = \cos \pi/2 = 0$.

Hence $P_{av} = 0$.

So, when an ac source is connected to an ideal inductor, the average power supplied by the source over a complete cycle is zero.

(ii) The brightness of the lamp will decrease. When the key is plugged in and the iron rod is inserted inside the inductor, it increases the inductance. Hence, the reactance of the inductor ($X_L = \omega L$) increases. So, the impedance of the circuit ($Z = R + j\omega L$) increases, which decreases the current in the circuit.

17. (i) Explain with the help of a diagram the formation of depletion region and barrier potential in a p-n junction.

(ii) Draw the circuit diagram of a half wave rectifier and explain its working. [3]

Answer : (i) During the formation of p-n junction, the holes diffuse from p-type semiconductor to the n-type, and electrons diffuse from n-type to p-type. This is because of the concentration gradient across p-side and n-side.
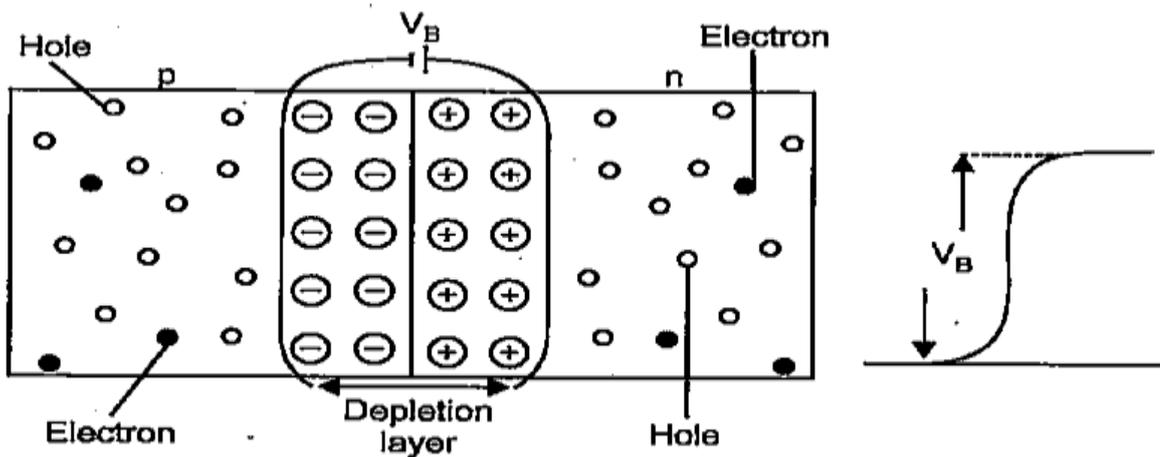
When a hole diffuse from p to n type, it leaves an unmovable negative charge. Similarly, when an electron diffuses from n to p type, it leaves an unmovable positive charge. When the diffusion of holes and electrons takes place continuously across the junction, a layer of unmovable positive and negative charges are developed on either side of the junction. This layer is called the depletion layer or the depletion region and the potential difference across the region is called barrier potential.