# NEW STANDARD ACADEMY

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CLASS 12 (Physics) DPP (Academy) 02/12 /2024

1. A variable frequency 230V alternating voltage source is connected across a series combination of L = 5H, C = 80 $\mu$ F and R = 40 $\Omega$. Calculate

**(a)** Angular frequency of the source which drives the circuit in resonance

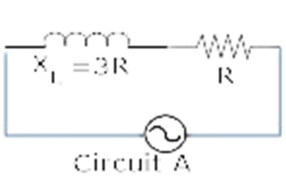
**(b)** Impedance of the circuit

**(c)** Amplitude of current at resonance.

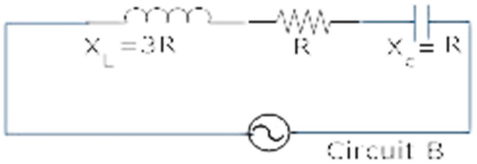
2. Show that in the free oscillations of an LC circuit, the sum of the energies stored in the capacitor and the inductor is constant in time?

3. Define mutual inductance? What is its S.I. unit? Write the expression for the mutual inductance between a pair of circular coils of radius r and R (R > r).

4. Figure shows two electric circuits A and B. calculate the ratio of power factor of the circuit B to the power factor of the circuit A?




Circuit A




Circuit B

5. horizontal straight wire l0 m long is extending along east and west and is fallingwith a speed of 5.0 m/s at right angles to the horizontal component of the earth's magnetic field of strength $0.30\times10^{-4} wb/m^2$.

**(a)** What is the instantaneous value of the emf induced in the wire?

**(b)** What is the direction of the emf?

**(c)** Which end of the wire is at the higher potential?

6. A circular coil of N turns and radius r is kept normal to a magnetic field, given by B = Bo cos wt. Deduce an expression for emf. Induced in the coil. State the rule which helps to detect the direction of induced current.

7. In Exercises 7.3 and 7.4, what is the net power absorbed by each circuit over acomplete cycle. Explain your answer.

8. A series *LCR* circuit with $R = 20\Omega$, $L = 1.5$ H and $C = 35$ $\mu F$ is connected to a variable-frequency 200 V ac supply. When the frequency of the supply equals the natural frequency of the circuit, what is the average power transferred to the circuit inone complete cycle?

9. A radio can tune over the frequency range of a portion of MW broadcast band: (800 kHz to 1200 kHz). If its *LC* circuit has an effective inductance of 200 $\mu$H , what must bethe range of its variable capacitor?

10. Obtain the resonant frequency and Q-factor of a series

LCR circuit with L = 3.0 H, C = 27 $\mu F$ , and R = 7.4 $\Omega$ . It is desired to improve the sharpness of the resonance of the circuit by reducing its 'full width at half maximum' by a factor of 2. Suggest a suitableway.

11. At a hydroelectric power plant, the water pressure head is at a height of 300 m andthe water flow available is $100\ m^3\ s^{-1}$ . If the turbine generator efficiency is $60\%$ estimate the electric power available from the plant (g=$9.8\ m\ s^{-2}$)

12. Suppose the initial charge on the capacitor in Exercise 7.7 is 6 mC. What is the totalenergy stored in the circuit initially? What is the total energy at later time?

13. A charged 30 $\mu F$ capacitor is connected to a 27 mH inductor. What is the angularfrequency of free oscillations of the circuit?

14. Obtain the resonant frequency $\omega r$ of a series *LCR* circuit with $L = 2.0\,H, C = 32\,\mu F$ and $R = 10\,\Omega$ . What is the *Q*-value of this circuit?

15. A 60 $\mu F$ capacitor is connected to a 110 V, 60 Hz ac supply. Determine the rms valueof the current in the circuit.

16. A 44 mH inductor is connected to 220 V, 50 Hz ac supply. Determine the rms value ofthe current in the circuit.

17. The peak voltage of an ac supply is 300 V. What is the rms voltage?

18. A 100 $\Omega$ resistor is connected to a 220 V, 50 Hz ac supply.
**(a)** What is the rms value of current in the circuit?
**(b)** What is the net power consumed over a full cycle?

19. Obtain the resonant frequency $w_r$ of series LCR circuit with = L =2 H, C = 32 $\mu$ F and R= 10 $\Omega$ . What is the $\phi$ – value of this circuit?

20. A coil of inductance L, a capacitor of capacitance C and a resistor of resistance R areall put in series with an alternating source of emf E = (Eo sin wt). Write an expression for the

**(1)** Total impedance of the circuit

**(2)** Frequency of the source emf for which the current carrying circuit will showresonance.

# NEW STANDARD ACADEMY

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**CLASS 12 (Chemistry) DPP (Academy) 02 /12/2024**

1. Giving an appropriate example, explain how the presence of a substituent on aliphatic chain of a carboxylic acid affects its acid strength.
2. How is acetic acid prepared from:
   (a) acetylene,
   (b) ethyl alcohol,
   (c) methyl iodide,
   (d) acetonitrile $CH_3CN$
   (e) $CH_3$ MgBr
   (f) malonic acid ?
3. How is Grignard reagent employed to prepare an acid?
4. How is benzoic acid prepared from:
   (a) benzaldehyde,
   (b) bromobenzene,
   (c) benzonitrile ($C_6H_5CN$)
   (d) toluene ?
5. Explain the following:
   (a) Acetic acid gives $H^+$ while ethanol does not.
   (b) The melting points and boiling points of aromatic acids are higher than the corresponding aliphatic acids.
   (c) The order of m.p. of fatty acids is: $C_7 < C_8 > C_9$
   (d) Ethanoic acid is highly soluble in water but hexanoic acid is not.
6. Write the structure and IUPAC names of:
   (a) Lactic acid,
   (b) isobutyric acid,
   (c) a-hydroxy butyric acid,
   (d) ß-bromopropionic acid.
7. Explain the following about acetic acid :
   (a) It is stronger acid than phenol.
   (b) It is weaker acid than formic acid and chloroacetic acid.
   (c) Its boiling point is higher than the corresponding alcohol of comparable molecular mass.
   (d) Its $pK_a$ value is higher than the $pK_a$ value of chloroacetic acid.
8. How will you distinguish between :
   (a) $C_2H_5OH$ and $C_6H_5OH$
   (b) $CH_3$ COOH and $C_6H_5$ COOH ?
9. How is acetic acid converted into:
   (a) $C_2H_6$
   (b) $C_2H_5OH$
   (c) $CCl_3COOH$ ?
10. How is $CH_3OH$ converted into $CH_3$ COOH in one step ?
11. Give reasons for the following:
   (a) Most of the aromatic acids are solids but acids of acetic acid group are liquids.
   (b) The bond length C = 0 in carboxylic acids is slightly larger than in aldehydes and ketones.
   (c) Chloroacetic acid is stronger than acetic acid.
   (d) Trichloroacetic acid is stronger than dichloroacetic acid.
   (e) Fluoroacetic acid is stronger than chloroacetic acid.
12. How will you distinguish between the following pairs of compounds ?
   (a) Acetic acid and acetaldehyde.
   (b) Phenol and propanoic acid.
13. How is formic acid prepared? Write the reactions in which formic acid differs from acetic acid.
14. What happens when formic acid reacts with following:
   (1) Tollen reagent
   (2) Fehling solution
   (3) $HgCl_2$
   (4) $PCl_5$
15. What happens when acetic acid reacts with the following:
   (1) PCl5

(2) $C_2H_5OH$ / $H_2SO_4$

(3) $Na_2CO_3$

16. Write the products of the following reaction:

$CH_3COOH \xrightarrow{Cl_2/P}$

17. Give simple chemical tests to distinguish between the following pairs of compounds:

Benzaldehyde and Benzoic acid

18. Account for the following:

(a) Carboxylic acid is a stronger acid than phenol.

(b) Cl - $CH_2$ COOH is a stronger acid than $CH_3$ COOH.

19. Which will undergo faster nucelophilic addition reaction?

20. What is the composition of Fehling reagent ?

# NEW STANDARD ACADEMY

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**CLASS 12 (BIOLOGY) DPP (Academy) 02/12 /2024**

1. State a difference between a gene and an allele.
2. Name the respective pattern of inheritance where F1 phenotype (a) does not resemble either of the two parents and is in between the two. (b) resembles only one of the two parents.
3. A garden pea plant produced axial white flowers. Another of the same species produced terminal violet flowers. Identify the dominant traits.
4. A geneticist interested in studying variations and patterns of inheritance in living beings prefers to choose organisms for experiments with shorter life cycle. Provide a reason.
5. How many type of gametes are produced by the individual with genotype AABBCCDD and AaBbCcDd?
6. Name the stage of cell division where segregation of an independent pair of chromosomes occurs.
7. If the frequency of a parental form is higher than 25% in a dihybrid test cross, what does that indicate about the two genes involved?
8. For the expression of traits, genes provide only the potentiality and the environment provides the opportunity. Comment on the veracity of the statement.
9. . Mention the combination(s) of sex chromosomes in a male and a female bird.
10. The egg of an animal contains 10 chromosomes, of which one is X-chromosome. How many autosomes would there be in the karyotype of this animal?
11. How many chromosomes do drones of honeybee possess? Name the type of cell division involved in the production of sperms by them
12. Observe the pedigree chart and answer the following questions:

(a) Identify whether the trait is sex-linked or autosomal.
(b) Give an example of a disease in human beings which shows such a pattern of inheritanc.

13. A haemophilic man marries a normal homozygous woman. What is the probability that their daughter will be haemophilic?
14. A haemophilic son was born to normal parents. Give the genotypes of the parents and son.
15. Name the event, during cell division cycle that results in the gain or loss of chromosome.
16. Name one autosomal dominant and one autosomal recessive Mendelian disorder in humans.
17. A human being suffering from Down's syndrome shows trisomy of 21st chromosome. Mention the cause of this chromosomal abnormality.
18. What are the characteristic features of a true-breeding line?
19. Give an example of a chromosomal disorder caused due to non-disjunction of autosomes.
20. With the help of a Punnett square, find the percentage of homozygous talls in a $F_2$ population involving a true breeding tall and a true breeding dwarf pea plant.