# PHYSICS

# BOOKS - SUNSTAR PHYSICS (KANNADA ENGLISH)

# ANNUAL EXAM QUESTION PAPER MARCH - 2018

## Part A

**1.** What is an equipotential surface ?

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**2.** Define 'drift velocity' of free electrons .

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**3.** Write any one application of the cyclotron.

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**4.** State Faraday's law of electromagnetic induction.

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**5.** If the peak value of a.c. current is $4.24A$, what is its root mean square value ?

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**6.** Mention any one mode of energy transfer.

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**7.** Two lenses of power +2D and -5D are kept in contact. The focal length of the combination is

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**8.** The decay of proton to neutron is possible only inside the nucleus. Why ?

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9. What is 'depletion region' in a semiconductor diode?

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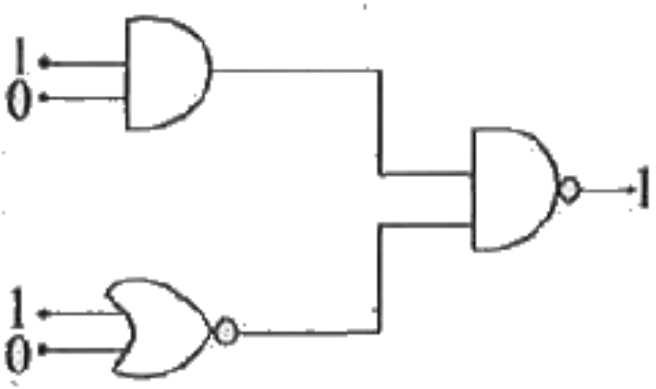
10.




What is the output of this combination?

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## Part B

**1.** Mention any two factors on which the capacitance of a parallel plate capacitor depends.

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**2.** State Kirchhoff's laws of Electrical network.

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**3.** Define:

(a) Magnetic declination (b)Magnetic dip. Mention the S.I. unit of magnetisation.

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**4.** Write an expression for magnetic potential energy of a magnetic dipole kept in a uniform magnetic field and explain the terms.

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**5.** Give any two applications of $X$-rays.

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**6.** What is 'myopia' ? How to rectify it?

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**7.** Draw the diagram respresenting the schematic arrangement of Geiger-Marsdon

experimental set up tor the alpha particle scattering

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**8.** What are the characteristics of nuclear forces?

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## Part C

**1.** Mention any three properties of an electric charge.

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**2.** State Ampere's circuital law . Using it, derive the expression for magnetic field at a point due to a long current carrying conductor .

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**3.** What is hysterisis? Define the terms 'coercivity' and 'retentivity' of a ferromagnetic material.

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**4.** Arrive at Snell's law of refraction, using Huygen's principle for refraction of a plane wave.

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**5.** Writer Bohr's postulates for the hydrogen atom model.

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**6.** Write the expression for the half life of a radioactive element.

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**7.** Distinguish between n-type and p-type semiconductos.

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**8.** Draw the block diagram of generalised communication system.

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## Part D

**1.** How is the electric potential at a point due to a given charge measured? Obtain an expression for the electric potential at a point due to an isolated point charge.

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**2.** Obtain an expression for the equivalent emf and internal resistance of two cells connected in parallel.

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**3.** Derive the expression for magnetic field at a point on the axis of a circular current loop.

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**4.** Derive an expression for the impedance of a series LCR, circuit, when an AC voltage is applied to it.

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**5.** Write the relation between $B_E, B_H \text{and} B_V$ along with an appropriate diagram .

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**6.** What is a rectifier ? With suitable circuit describe the action of a full wave rectifier by drawing input and output waveforms.

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Part E

**1.** Three charges each equal to +4nC are placed at the three comers of a square of side 2 cm. Find the electric field at the fourth corner.

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**2.** 100 mg mass of nichrome metal is drawn into a wire of area of cross-section 0.05 mm. Calculate the resistance of this wire. Given density of nichrome $8.4 \times 10^3 \mathrm{kgm}^{-3}$ and resistivity of the material as $1.2 \times 10^{-6} \Omega$ m.

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**3.** A circular coil of radius $10cm$ and $25$ turns is rotated about its vertical diameter with an angular speed of $40rads^{-1}$, in a uniform horizontal magnetic field of magnitude $5 \times 10^{-2}T$. Calculate the maximum emf induced in the coil. Also find the maximum current in the coil if the resistance of the coil is $15\Omega$.

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**4.** In Young's double slit experiment the slits are separated by $0.28mm$ and the screen is placed at a distance of $1.4m$ away from the slits. The distance between the central bright fringe and the fifth dark fringe is measured to be $1.35cm$. Calculate the wavelength of the light used. Also find the fridge width if the screen is moved towards the slits by $0.4m$, for the same experimental set up.

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**5.** Light of frequency $8.41 \times 10^{14} Hz$ is incident on a metal surface. Electrons with their maximum speed of $7.5 \times 10^{5} ms^{-1}$ are ejected from the surface. Calculate the threshold frequency for photoemission of electrons. Also find the work function of the metal in electron volt $(eV)$. Given Plank's constant $h = 6.625 \times 10^{-34} Js$ and mass of the electron $9.1 \times 10^{-31} kg$.

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