261828

BCA-104

B.C.A. First Year Examination, 2013

Paper – IV

(Basic Physics)

Maximum Marks : 100

SECTION–A

खण्ड–अ

Marks : 50

Time : 1½ Hours

Candidates are required to first answer the Section–A (Multiple Choice Questions) by marking the correct choice on O.M.R. Sheet in prescribed time. All questions are compulsory and carry equal marks. *There is no negative marking for wrong answers.*

निर्देश :

परीक्षार्थी खण्ड–अ के सभी बहुविकल्प प्रश्नों के उत्तर ओ.एम.आर. शीट में प्रतियोगिता को निश्चित समय में देने हैं। सभी प्रश्न अनिवार्य एवं समान अंक के हैं। गलत उत्तर देने के लिए ऋणात्मक मूल्यांकन नहीं है।

SECTION–B

खण्ड–ब

Marks : 50

Time : 1½ Hours

After depositing O.M.R. Sheet of Section–A with invigilator, the candidates are required to answer *five* questions from Section–B (each question in 250 words) in a separate Answer-book provided to them. All questions carry equal marks. Attempt *one* question from each unit.

खण्ड–अ की ओ.एम.आर. शीट वीक्षक को जमा कराने के पश्चात परीक्षार्थियों को खण्ड–ब में पाँच प्रश्नों के उत्तर दी गई उत्तर-पुस्तिका में देने हैं। प्रत्येक प्रश्न का उत्तर लगभग 250 शब्दों में दिया जाना है। सभी प्रश्न के अंक समान हैं। प्रत्येक इकाई से एक प्रश्न करना अनिवार्य है।

SECTION–A
खण्ड–अ

Marks : 50
Time : 1½ Hours

Candidates are required to first answer the Section–A (Multiple Choice Questions) by marking the correct choice on O.M.R. Sheet in prescribed time. All questions are compulsory and carry equal marks. *There is no negative marking* for wrong answers.

सर्वप्रथम खण्ड-अ के सभी वस्तुनिष्ठ प्रश्नों के उत्तर ओ.एम.आर. शीट में परीक्षार्थियों को निश्चित समय में देने हैं। सभी प्रश्न अनिवार्य एवं समान अंक के हैं। गलत उत्तर के लिए **ऋणात्मक मूल्यांकन नहीं किया जायेगा।**

1. Among the following, the unit of Torque and Work is given in
   (A) Newton metre, Newton second
   (B) Newton metre, Newton metre
   (C) Calories, Erg
   (D) None of the above

2. Among the following, the dimension of power is given by
   (A) $M^1L^2T^{-4}$
   (B) $M^1L^2T^{-3}$
   (C) $M^1L^1T^{-3}$
   (D) $M^1L^{-2}T^{-3}$

3. The least count of screw gauge which has 100 lines in circular scale and minimum distance measured by main scale is .1 cm, is
   (A) .01
   (B) .005
   (C) .001
   (D) .0001

4. The least count of Vernier Calliper which has 10 lines on Vernier scale, is
   (A) .001
   (B) .01
   (C) .05
   (D) .0001

5. Which of the following groups of Physical quantities is scalar ?
   (A) Temperature, work, power
   (B) Velocity, speed
   (C) Velocity displacement
   (D) Force, acceleration

6. The vector expression of Linear momentum and Angular momentum are
   (A) $\vec{L} = \vec{r} \times \vec{P}$; $\vec{P} = m\vec{V}$
   (B) $\vec{L} = \vec{P} \times \vec{r}$; $\vec{P} = m\vec{V}$
   (C) $\vec{L} = \vec{P} \cdot \vec{r}$; $\vec{P} = m\vec{a}$
   (D) None of the above

7. Wavelength of range of visible light is
   (A) 30000 to 3000Å
   (B) 40 to 1000Å
   (C) 4000 to 9000Å
   (D) 30 to 3000Å

8. The relation between frequency (ν), wavelength (λ) and energy associated with electromagnetic radiation is
   (A) $E = h\nu$, $E = \dfrac{c}{\lambda}$
   (B) $E = h\lambda$
   (C) $E = hc$
   (D) $E = h\dfrac{\lambda}{c}$

9. The main component of telescope, microscope and eye is
   (A) Concave miror
   (B) Convex miror
   (C) Convex and Concave lense
   (D) Simple glass

10. The formula for moment of inertia (I) is
    (A) $I = mg$
    (B) $I = \sum mr^2$
    (C) $I = mr^3$
    (D) $I = mr$

11. The unit of Electric potential is
    (A) Volt
    (B) Amp.
    (C) Coulomb
    (D) Joule

12. The expression for capacitance of capacitor is
    (A) $C = \dfrac{\epsilon_0 \epsilon_r A}{d}$
    (B) $C = \dfrac{\epsilon_0 \epsilon d}{A}$
    (C) $C = \dfrac{A}{d}$
    (D) $C = \dfrac{I}{A}$

13. The formula for charge stored value and capacitance as well as voltage applied between two electrodes of capacitor is
    (A) $Q = \dfrac{C}{V}$
    (B) $Q = \dfrac{V}{C}$
    (C) $Q = \dfrac{1}{2}C^2 V$
    (D) $Q = CV$

14. Gauss's law will give the association between total electric flux and total stored electric charge.
    (A) Correct
    (B) Not correct
    (C) Both (A) and (B) are correct
    (D) None of the above is incorrect

15. Capacitance value of capacitors is increased in case of
    (A) Parallel combination
    (B) Series combination
    (C) (A) and (B) both are correct
    (D) None of the above is incorrect

16. Any imaginary surface enclosing an electric charge is called
    (A) Laplacian surface
    (B) Gaussian surface
    (C) Poisson's surface of that charge
    (D) None of these

17. Colour codes are used to compute for obtaining
    (A) Resistance
    (B) Inductance
    (C) Velocity
    (D) None of the above

18. The exact expression of magnetic field due to circular current loop is (air) of radius r in which current flow is i amp. is
    (A) $H = \dfrac{i}{2\pi r}$
    (B) $B = \dfrac{\mu_0 i}{2\pi r}$
    (C) (A) and (B) both are correct
    (D) None of the above is correct

19. Which Theorem is concerned to voltage source ?
    (A) Norton theorem
    (B) Thevenin theorem
    (C) Maximum Power transfer theorem
    (D) None of these

20. Biot-Savart law gives the relation between magnetic field (B) and intensity due current carrying wire at a point far away from wire as
    (A) $B \propto i$
    (B) $B \propto \dfrac{1}{r^2}$
    (C) $B \propto \sin \theta$
    (D) All the above

21. If electric cell gives 1.5 volt at maximum current .20 amp, then electric power is
    (A) .6 watt
    (B) .3 watt
    (C) 6 watt
    (D) 3 watt

22. Speaker converts the
    (A) Mechanical energy into Electrical energy
    (B) Electrical energy into sound energy
    (C) Sound energy into electrical energy
    (D) None of the above

23. Transducer is used to
    (A) convert any physical quantity into electrical quantity
    (B) convert any geological quantity into physical quantity
    (C) (A) and (B) both are correct
    (D) None of the above

24. Thermisters can be used in
    (A) Electric Iron
    (B) Refrigerator
    (C) (A) and (B) both are correct
    (D) None of the above

25. Piezo Electric effect can be used for production of
    (A) Low electric signal
    (B) Low current signal
    (C) Low frequency of electrical signals
    (D) None of the above

26. Galvanometer is based on the principle of
    (A) interaction of current carrying conductor with applied magnetic field
    (B) interaction of current carrying conductor with applied uniform field
    (C) (A) and (B) both are correct
    (D) None of the above is incorrect

27. The general vector representatio formulae for force (F) on current carrying conductor of length (l) is
    (A) $\vec{F} = a(\vec{B} \times \vec{V})$
    (B) $\vec{F} = i(\vec{l} \times \vec{V})$
    (C) $\vec{F} = i(\vec{B} \times \vec{l})$
    (D) None of the above

28. Multimeter is employed for measuent of
    (A) Resistance
    (B) Voltage
    (C) Current
    (D) All the above

29. Conversion of Galvanometer into Ammeter can be done by using suitable
   (A) small shunt resistance
   (B) small shunt capacitor
   (C) high series resistance
   (D) None of the above

30. Conversion of Galvanometer into Voltmeter can be done by using suitable
   (A) Small shunt resistance
   (B) Small shunt capacitor
   (C) High series resistance
   (D) None of the above

31. Self-inductance refers to
   (A) Single wire bound coil
   (B) Double wire bound coil
   (C) Interaction between single wire bound coil with voltage
   (D) None of the above

32. Mutual inductance (M) formula is
   (A) $M = K\sqrt{L_1 I_1}$
   (B) $M = K\sqrt{L_1 V_1}$
   (C) $M = K\sqrt{L_1 L_2}$
   (D) $M = K\sqrt{V_1 V_2}(L_1)$

   L_1, I_1 and V_1 refer to self-inductance, electric current and voltage in first coil. L_2, V_2 refer to self-inductance and electric voltage in second coil.

33. Transformer is based on
   (A) Self-inductance
   (B) Mutual inductance
   (C) (A) and (B) both
   (D) None of the above

34. The relation between A.C. peak voltage (E_o) and Root mean square voltage (E_{rms}) for A.C. voltage source is
   (A) $E_{rms} = \dfrac{E_0}{\sqrt{3}}$
   (B) $E_{rms} = \dfrac{E_0}{2}$
   (C) $E_{rms} = \dfrac{E_0}{\sqrt{2}}$
   (D) None of the above

35. Series resonant circuit is made of
   (A) Combination of R & L
   (B) Combination of R & C
   (C) Combination of L & C
   (D) None of the above

36. If electric bulb has power rating as 60 watt and it is used for 230 A.C. voltage, then current drawn is equal to
   (A) $\dfrac{60}{230}$ amp.
   (B) $\dfrac{230}{60}$ amp.
   (C) 230×60 amp.
   (D) None of the above

37. The frequency of series resonant circuit consisting of L & C value is
   (A) $f = \dfrac{1}{4\pi^2 LC}$
   (B) $f = \dfrac{1}{2\pi\sqrt{LC}}$
   (C) $f^2 = \dfrac{1}{4\pi^2 L^2 C^2}$
   (D) None of the above

38. What is the full form of LED ?
    (A) Light Electrical Drum
    (B) Light Emitting Diode
    (C) (A) and (B) both
    (D) None of the above

39. Zener diode works as
    (A) Voltage regulator
    (B) Voltage corrector
    (C) Rectifier
    (D) None of the above

40. P-N junction diode has properties of
    (A) Unidirectional current device
    (B) Multi-directional current device
    (C) (A) and (B) both are correct
    (D) None of the above is incorrect

41. Transistor is a
    (A) Semiconductor device
    (B) Electronic tube
    (C) (A) and (B) both
    (D) None of the above

42. Current gain α for C.B. configuration is
    (A) > 1
    (B) < 1
    (C) = 0
    (D) None of the above

43. If collector current is 5 mA and emitter current is 5.2 mA, then base current will be
    (A) 10.2 mA
    (B) .2 mA
    (C) (A) and (B) both are correct
    (D) None of the above is correct

44. Cathode Ray Oscilloscope is used for
    (A) Study of wave form
    (B) Electric current
    (C) Voltage
    (D) All the above

45. MOS stands for
    (A) Metal Oxides Semiconductor
    (B) Metastable Oxides Series
    (C) (A) and (B) both
    (D) None of the above

46. Optical fibres are used in
    (A) Telecommunication
    (B) Electrical power transmission
    (C) (A) and (B) both
    (D) None of the above

47. LCD stands for
    (A) Light Crystal Diode
    (B) Light Computer Display
    (C) (A) and (B) both
    (D) None of the above

48. SMPS is mainly used in
    (A) Computers
    (B) T.V.
    (C) (A) and (B) both
    (D) None of the above

49. Crystal oscillator is based on
    (A) Piezo-electric effect
    (B) Series Resonance circuit
    (C) (A) and (B) both
    (D) (A) and (B) both are incorre

50. LASER is a
    (A) Opto Electronic device
    (B) Opto Mechanical device
    (C) (A) and (B) both are cor
    (D) None of the above.

SECTION–B
खण्ड–ब

Marks : 50

Time : 1½ Hours

After depositing O.M.R. Sheet of Section–A with invigilator, the candidates are required to answer five questions from Section–B (each question in 250 words) in a separate Answer-book provided to them. All questions carry equal marks. Attempt *one* question from each unit.

खण्ड–अ की ओ.एम.आर. शीट पर्यवेक्षक को जमा कराने के पश्चात परीक्षार्थी खण्ड–ब से कुल **पाँच** प्रश्नों के उत्तर दी गई उत्तर-पुस्तिका में देंगे। प्रत्येक प्रश्न का उत्तर लगभग 250 शब्दों में दिया जाना है। सभी प्रश्नों के अंक समान हैं। प्रत्येक इकाई से **एक** प्रश्न करना अनिवार्य है।

UNIT–I

1. (a) Give the dimensional formulae and SI units for the following physical quantities : Power, Energy, Linear momentum.
   (b) Explain the concept of Least count of an instrument. Give example of Screw gauge.

OR

2. (a) What are Linear momentum and Angular momentum ? Define and discuss these on the basis of mathematical approach.
   (b) When total linear momentum and total angular momentum are conserved ?

UNIT–II

3. (a) In fully charged state, a 20 μF capacitor has potential difference of 20 volt between its two terminals. Calculate the maximum charge and electric energy stored in the capacitor.
   (b) State Gauss Law. What is it use ?

OR

4. (a) What do you understand by Colour codes on a resistance ? Discuss it with examples.
   (b) State Maximum power transform theorem.

UNIT–III

5. (a) What is Thermoelectric effect ? What are the uses of Thermocouples and Thermisters ?
   (b) Discuss and distinguish between Primary and Secondary cells.

OR

6. (a) Discuss the basic theory about interaction of magnetic field with current carrying conductor.
   (b) Derive the expression for shunt resistance to specify range of Ammeter when we are converting Galvanometer into Ammeter.

UNIT–IV

7. (a) State the expression for Self and Mutual conductance.
   (b) Discuss basic theory of Choke coils and Transformer.

OR

8. (a) What are the differences between Series and Parallel resistance circuits ?
   (b) Draw the basic symbol of LED, Zener diode, P-N junction, Photodiode and Solar cell.

UNIT–V

9. (a) Discuss the basic concept of Optical fibre communication. What is its use in modern age ?
   (b) What do you mean by Integrated circuit with scale of integration ?

OR

10. Write short notes on any *two* :
    (a) LASERS.
    (b) Working principle of LCD and Plasma devices.
    (c) Brief idea of CE and CC amplifier and characteristics.

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