

2007 (A)

Time : 3 Hrs.

D1G
Engg. Phy.

Full Marks : 80

Pass Marks : 26

Answer all questions from Gr.-A, any three from Gr.-B,
any three from Gr.-C and any two from Gr.-D

खुी A l sl Hkh] खुी &B , oaC l sfdllgha rhu&rhu , oa

खुी D l sfdllgha nks iz ukadsmlkj nA

All parts of question must be answered at one place in
sequence, otherwise they may not be evaluated.

, d izu ds l Hkh vak dk mlkj , d gh txg 1/2 xkrkj Øe e1/2 g1/2

plfg, vU; Fkk] os ugha tkps tk l drs gA

The figures in right hand margin indicate full marks.

i k' o'z ds vad i wkked ds l pd gA

GROUP-A

1. Write down the correct answer for the following
questions out of the four alternatives given :- **1x20=20**

fuEukadr iz ukadsfy, fn; sx; spkj fodYi kaal sl gh mlkj fy [10]

- (i) Dimension of momentum and impulse are :
(a) the same (b) different
(c) MLT^{-2} & ML^2T (d) None of them.

P.T.O.

I dx , oa vkox dh foek &

- (a) I eku gkrh gS
 (b) fhklu gkrh gS
 (c) MLT^{-2} , oa ML^2T gkrh gS
 (d) buea l s dkbZ ughA

(ii) Force and displacements are vector quantities then work done is :

- (a) Vector (b) scalar
 (c) both (d) None of the above.

cy , oa foLFkki u nksuka l fn'k jkf'k; k; gdrks l a kfnr dk; %

- (a) l fn'k (b) vfn'k
 (c) nksuka (d) buea l s dkbZ ughA

(iii) A man of 70 Kg standing on the weight machine in an elevator moving up with an acceleration 3 m/sec^2 what would be reading in weight machine (use $g = 10 \text{ m / sec}^2$).

- (a) 910 kg (b) 490 kg
 (c) 91 kg (d) 49 kg

, d 0; fDr 70 kg dk mUkkyd $\frac{1}{4}g$ ds vlnj otu eki us dh e'khu ij gA mUkkyd 3 m/sec^2 ds Roj. k l s Åij tk jgk gA e'khu ij i Bu D; k vk, xk \ ($g = 10 \text{ m / sec}^2$)

- (a) 910 kg (b) 490 kg
 (c) 91 kg (d) 49 kg.

(iv) Angle of projection for maximum range is -

egÙke {kfrt ijkl dsfy, i fki dks k dk eku gkrk gS &

- (a) 90° (b) 60°
 (c) 45° (d) 30° .

(v) If angle of Repose of a plane is I and coefficient of friction is m then :

- (a) $\sin I = m$ (b) $\tan m = I$
 (c) $\tan I = m$ (d) None of the above.

; fn fdl h ry dk fojke dks k I , oa ?k'kz k xqkkad m gks rks %

- (a) $\sin I = m$ (b) $\tan m = I$
 (c) $\tan I = m$ (d) buea l s dkbZ ughA

- (vi) In which motion centripetal force acts ?
- (a) Linear Motion (b) Circular Motion
- (c) None of them (d) Both of them.

fdl idkj dh xfr eavi dñæh; cy yxrk gS\

- (a) j[kh; xfr (b) oÙkh; xfr
- (c) buea l s dkbZ ugha (d) buea l snkuka

- (vii) For S.H.M. which of the following is true ?

- (a) acceleration a displacement
- (b) acceleration a – displacement
- (c) acceleration a $\frac{1}{\text{displacement}}$
- (d) acceleration a – $\frac{1}{\text{displacement}}$

l EvkExE dsfy, buea l s dkbZ I R; gS\

- (a) Roj .k a foLFkki u
- (b) Roj .k a – foLFkki u
- (c) Roj .k a $\frac{1}{\text{विस्थापन}}$
- (d) Roj .k a – $\frac{1}{\text{विस्थापन}}$ A

- (viii) Less atmospheric environment on moon due to :

- (a) greater value of escape velocity
- (b) Equal value of escape velocity with respect to earth
- (c) Less value of escape velocity
- (d) None of them.

plæek ij ok; eMy uxll; gS dkj .k gSfd &

- (a) i yk; u ox dk eku vR; f/kd gS
- (b) i Foh ds l eku i yk; u ox gS
- (c) i yk; u ox dk eku de gS
- (d) buea l s dkbZ ugha

- (ix) Water supplied in leaves of a tree due to :

- (a) gravitational force
- (b) capillary rise
- (c) both of them
- (d) None of them.

i M+dh i fUk; ka rd ty vki firZ gksh gS dkj .k gS&

- (a) x#Rokd"lk cy (b) ds' kdkRo f[kpko
- (c) buea l snkuka (d) buea l s dkbZ ugha

(x) In parallel plate condenser it's capacity increases when :

- (a) distance of two plates is increased
 (b) distance of two plates is reduced
 (c) plates are charges
 (d) None of them.

EkukUrj lyS/ I dkkfj = ea/kkfjrk c<rh gS tc

- (a) lyS/ka dschp dh njh c<k; h tkrh gS
 (b) lyS/ka dschp dh njh ?kV/k; h tkrh gS
 (c) lyS/ka dkschy fn; k tkrk gS
 (d) buea l s dkbZ ughA

(xi) If $E = \text{emf}$, $R = \text{external resistance}$, $I = \text{current}$, $r = \text{internal resistant}$, then relation between them is

- (a) $E = I(R + r)$ (b) $E = I(R - r)$
 (c) $E = I(r - R)$ (d) None of them.

; fn $E = \text{fo}[ok[Ec[E]$ $R = \text{ckg}$; i frjksk] $I = \text{fo} | r / \text{kkjk}$
 $r = \text{vkrfjd}$ i frjksk] budschp l dkk gS &

- (a) $E = I(R + r)$ (b) $E = I(R - r)$
 (c) $E = I(r - R)$ (d) buea l s dkbZ ughA

(xii) In parallel connection of resistance distribution of takes place.

- (a) Electric current
 (b) Potential difference
 (c) Both of them
 (d) None of them

ifrjkskka ds l ekukUrj Øe l a kst u ea..... dk foHkk tu gkrk gA

- (a) fo | r /kkjk (b) foHkkUrj
 (c) buea l snksuka (d) buea l s dkbZ ughA

(xiii) In balance condition of wheat stone Bridge current through galvanometer is :

oghV LVksu l r q ds l rgyu dh fLFkr ea xyoukehVj l s cguokyh /kkjk gkrh gA

- (a) min (maximum) (b) zero
 (c) $\frac{I_o}{\sqrt{2}}$ (d) $I_o\sqrt{2}$

(xiv) In Bohr's atomic model, angular momentum is integral multiple of

- (a) h (b) $\frac{h}{2p}$
 (c) $\frac{2p}{h}$ (d) None of them.

ckj dh ijek.kq l j puk ea dks kh; l ox

dk iwkl xqkt gkrk gA

- (a) h (b) $\frac{h}{2p}$
 (c) $\frac{2p}{h}$ (d) bu ea l s dks bz ughA

(xv) If e = charge of one electron, V = p.d. across anode and cathode of x-ray tube, h = plank constant, λ = wavelength of emitted x-ray. c velocity of light then relation among them is

- (a) $\frac{V}{e} = \frac{hc}{\lambda}$ (b) $\frac{e}{V} = \frac{c}{h\lambda}$
 (c) $eV = \frac{hc}{\lambda}$ (d) $eV = \frac{h\lambda}{c}$

; fn $e =$, d electron dk vko\$kh] $V =$ x-ray $V =$ p.d. ds anode cathode ke beech me. $h =$ plank constant, $\lambda =$ wavelength of emitted x-ray dk rjank\$; L , oac = i dk'k dk ox gks rks buds chp dk l cdk gskk

- (a) $\frac{V}{e} = \frac{hc}{\lambda}$ (b) $\frac{e}{V} = \frac{c}{h\lambda}$
 (c) $eV = \frac{hc}{\lambda}$ (d) $eV = \frac{h\lambda}{c}$

(xvi) The energy which binds the free electrons with metallic surface is known as

- (a) Heat energy (b) Light energy
 (c) Work function (d) None of these.

og Atkl tk\$lor\$ by dvr\$u dks ekkr Rod ry l stkm\$; j [krh g\$

- (a) Atkl tk\$lor\$ (b) i dk'k Atkl
 (c) dk; l Qyu (d) bu ea l s dks bz ughA

(xvii) Optical fibre use property of light mainly.

- (a) Polarisation
 (b) Differentiation
 (c) Total internal reflection

izk'krarqizk'k dsxqkkael seq; : i l s.....

xqk dk mi ; ksx djrk gA

- (a) /kp.k
- (b) foorZl
- (c) i wkZvKUrfd i jkorZlA

(xviii) For forward biasing of pn junction the p end is connected to terminal and n end to terminal of a cell.

pn junction ds QkVokMZ i fj i Fk cukus dsfy, bl dsp Nkj ds l y ds Nkj l s , oa n Nkj dks Nkj l s tkMk tkrk gA

- (a) p to +ve, n to +ve
- (b) n to -ve, p to +ve
- (c) both n & p to -ve end
- (d) None of the these.

(xix) Transmission of Heat from sun to earth's surface is due to :

- (a) Convection
- (b) Radiation
- (c) Conduction.

I wZl sÅ"ek i Foh rd dk l pj.k djrh gA..... ds

dkj.k &

- (a) l ogu
- (b) fofdj.k
- (c) pkyuA

(xx) There are two bulbs of rating (1) 100 W, 220 V (2) 40 W, 220 Volt which statement is true :

- (a) Resistance of filament of (1) is more than that of (2)
- (b) resistance of the filament (2) is more than that of (1)
- (c) Both have equal resistance
- (d) None of these.

nks cYo (1) 100 W, 220 V (2) 40 W, 220 Volt gA dks l k dFku l R; gA

- (a) (1) ds rarqdk i frjksk (2) ds rarqI svf/kd gA
- (b) (2) ds rarqdk i frjksk (1) ds rarqI svf/kd gksk
- (c) nksuka dk i frjksk l eku gA
- (d) buel s dkbZ ughA

GROUP-B

Answer any **three** questions :

3x3=9

fdllgha rhu ç'uka ds mlkj na%

2. State laws of static friction.

flFkt ?k"lk ds fu; eka dk mYys[k djA

3. What is amplitude ?

A body executes S.H.M. with time period of 3.14 second and amplitude 4 cm. Find its displacement and speed at time $t = p/8$ second.

vk; ke D; k gS\

, d oLrq 3.14 l d.M vkoUkZdky , oa 4 l fEhE vk; ke ds l kfk l EvkExE djrh gA l e; ds eku $t = p/8$ l d.M ij ml dk foLFkki u , oa pky Kkr djA

4. Describe surface Tension. What is capillarity ?

i"B ruko dk o.kZu djA df'kdKRo D; k gS\

5. Define photo-electric effect.

Calculate the maximum K.E. of photo-electrons when a light of 2000 \AA is incident on a metal of work function 4 eV .

$$[h = 6.6 \times 10^{-34} \text{ JS}, 1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}]$$

izk'k fo |r i Hkko dks i fjHkkf"kr djA

izk'k fo |r byDVksuka ds egÙke xfrt ÅtkZ dh x.kuk djA tc 2000 \AA dk izk'k , d /kkrqij vki frr gkrk gSftl dk dk; ZQyu 4 eV gA $[h = 6.6 \times 10^{-34} \text{ JS}, 1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}]$

GROUP-C

Answer any **three** questions :

13x3=39

fdllgha rhu ç'uka ds mlkj na%

6. State Newton's laws of Gravitation. Write the dimensional formulae and units of 'G' and 'g'.

Discuss the motion of Satellite. Find expression for its orbital velocity and time period of revolution.

U; W'u ds x#Rokd"lkz k fu; eka dk mYys[k djA 'G' , oa 'g' ds foeh; l # , oa ek=d fy[kA

mi xg dh xfr dk o.kZu djA bl ds d{kh; osx , oa i fjHkæ.k dky ds fy; 0; atd i klr djA

7. Describe moment of inertia and radius of gyration.

Find the moment of inertia of an uniform solid sphere about its diameter.

tMRo vk?kwkz , oa ?kwkZu $f=T$; k dk o.kZu djA

, d , dl eku Bkd xkys ds 0; kl ds i fjr% tMRo vk?kwkz Kkr djA

P.T.O.

8. Define electric field intensity and electric potential at a point.

What are units and dimensions of electric intensity and potential ?

Find electric intensity and potential at a point due to a point electric charge.

fo | qh; {ks= dh rhork , oafolko fdl h fclnq ij i fjHkkf"kr djA

fo | qh; rhork , oafolko ds ek=d , oafok, j D; k gS \

fdl h fclnqfo | qh; vkosk ds dkj .k fdl h fclnq ij fo | qh; rhork , oafolko Kkr djA

9. Describe thermionic emission and diode valve and its characteristic.

Describe a half wave rectifier.

rki k; fud mRl tL dk o.kL dja , oa Mk; kM okYo , oa bl ds vfHkyk{kf.kd dk o.kL djA

v)Zrjæ fn"Vdkjh dk o.kL djA

10. What is "Green House Effect" ?

Describe noise pollution and its effect on human life.

Discuss non-conventional sources of energy.

xhu gkÅI i Hkko D; k gS \ èofu i nHk.k rFk bl dsekuoh; thou ij gkukys i Hkko dk o.kL djA xj&i kjEi fjd Å tkz I krka dh 0; k [; k

djA

GROUP-D

Answer any **two** questions :

6x2=12

fdllgha nksç'uka ds mlkj na %

11. A particle executes S.H.M. on a straight line 10 cm long with a frequency of 0.21 sec^{-1} . Calculate its velocity and acceleration at its mean position and one extremity of its motion.

What will be its displacement after 50/63 sec. from start?

How much time would have passed for its displacement 2.5 cm from its mean position ?

, d d.k 10 l fEhE yEckbz dh , d l jy js[kk ij 0.21 l s.M^{-1} vkofÜk ds l kfk l fEvkExE djrk gA ekè; fLFkr ij , oaxfr ds , d Nkj ij d.k ds ox , oaRoj.k dh x.kuk djA

i kjEHk l s50/63 l s.M ckn bl dk foLFki u D; k gksk \ ekè; fLFkr l stc bl dk foLFki u 2.5 l fEhE gksk rc fdruk l e; chr x; k gksk \

12. A ball is thrown making an angle 30° with the vertical attains maximum height of 33.75 metre. Find its range and time of flight.

P.T.O.

How much time will it take to cover horizontal distance of 30 meter from the point of projection ? [$g = 10 \text{ ms}^{-2}$]

mnxz l s 30° dks k ij Qdth x; h , d xth ds }kjk 33.75 ehVj egÜke Åpkbz i klr dh tkrh gÅ bl dk ijkl , oamMku dky Kkr djA

i {ki .k fclnql s30 ehVj {kfrt njh r; djusefdrak l e; yxxk\

13. Electrons are accelerated through a potential difference of 18 KV. Find the momentum and K.E. gained by the electrons.

Calculate the minimum wavelength of x-rays emitted.

Electron charge = $1.6 \times 10^{-19} \text{ C}$

$1 \text{ Å} = 10^{-10} \text{ m}$

Electron mass = $9 \times 10^{-31} \text{ Kg}$,

Speed of light = $3 \times 10^8 \text{ ms}^{-1}$

18 fdykvV ds folkoklrj l s byDVkuka dks Rofjr fd; k tkrh gÅ byDVkuka }kjk i klr l osx , oaxfrt Åtkz Kkr djA

mRl ftr x-fdj .kkadk U; ure rjxn6; 7/rjx yEckbZ dh x. kuk djA

$e = 1.6 \times 10^{-19} \text{ dyEc}$ $1 \text{ Å} = 10^{-10} \text{ ehVj}$

$m = 9 \times 10^{-31} \text{ fd-xk}$ $c = 3 \times 10^8 \text{ eh-l s}^{-1}$

