S.B. Roll No.....

APPLIED PHYSICS-I

1st Exam/COMMON/2355/0351/5403/May'17

Duration: 3 Hrs **M. Marks: 75**

SECTION – A

Q1. (a) Fill in the blanks: **5x1=5**

i. Dimensional formula of Gravitational constant is……. .
ii. When a man jumps from a floating boat, it moves away from the man due to the Newton's …….
iii. Torque acting on a body is defined as the product of ……
iv. A liquid wets the walls of the containing vessel. The meniscus of the liquid will be ……..
v. The work done by a coolie, carrying a mass of 30kg over his head covers a distance of 100 meters in the horizontal direction is ……

(b) State true or false: **5x1=5**

i. Angular velocity is defined as the rate of change of angular displacement of a body.
ii. Rolling is a combination of rotational and translational motion.
iii. Attraction force between like molecules is knows as Adhesion.
iv. With the rise of temperature, generally the viscosity of fluid decreases.
v. Gaps are left between two rails at the joints to accommodate volume expansion of rails.

(c) Choose the correct one: **5x1=5**

(i) Impulse is the product of force and
(a) area (b) displacement (c) time (d) velocity

(ii) A particle moves in a circle of radius R with a constant speed under a centripetal force F. the work done in completing a full circle is:
(a) Zero (b) π RF joules (c) 2 π RF joules (d) πR^2F joules

(iii) The moment of inertia of a ring of mass M and radius R about an axis passing through its centre and perpendicular to the plane of the ring is.
(a) $MR^2/2$ (b) $MR^2/4$ (c) MR^2 (d) $3MR^2/4$

(iv) Bernoulli's theorem is valid in the case of :
(a) Incompressible and non viscous fluid (b) Turbulent motion and non viscous fluid
(c) Steady flows and compressible fluid (d) Turbulent flows and incompressible fluid

(v) The temperature of a body is 90°C. Its temperature in Fahrenheit is given by:
(a) 19.4 (b) 124 (c) 164 (d) 194

SECTION B

Q2. Attempt any six questions: **6x5-30**

i. Define scalar and vector quantities with examples.
ii. What are significant figures? Give rules for finding significant figures.
iii. Find the expression for work done in moving an object on horizontal and inclined plane (incorporating frictional forces).
iv. If A = i + 4 j + 3 k and B = 4 i + 2 j – 4 k Find their scalar product.
v. State and prove theorem of perpendicular axis.
vi. An electric motor lifts a load of 180 kg to a height of 30 m in 2 minutes. Find the power of motor?
vii. What are the three modes of heat transfer? Explain with examples.
viii. Derive expression for terminal velocity.

S.B. Roll No.....

SECTION C

Attempt any three questions:

Q3. Discuss Newton's laws of Motion in detail. **10**

Q4. Explain the Concept of friction and give its applications. **10**

Q5. Discuss principle of conservation of mechanical energy for a freely falling body. **10**

Q6. What do you mean by Co-efficient of linear, surface and cubical expansions and give relation among them? **10**

Q7. (a) A metal cube, having each side 10 cm is subjected to a tangential force of 10^4 N. The upper face of the cube is displaced through 0.2 m.m with respect to the bottom face. Find the value of the modulus of rigidity (in Nm^{-2}). **6**

(b) Define Hooke's law by drawing stress – strain diagram. **4**

S.B. Roll No.....

APPLIED PHYSICS – I

1st Exam /Common/2355/0351/5403/Nov' 2016

Duration: 3Hrs **M. Marks=75**

SECTION – A

Q1. a) Fill in the blanks : **5x1 = 5**

(i) Energy and power have _____ dimensions.
(ii) It is impossible to go around a curved path _____ acceleration.
(iii) Radius of gyration have the unit of _____.
(iv) Bulk modulus of a perfect rigid body is _____.
(v) In convection the heat is transferred by _____ of particles.

b) Choose true/false : **5x1 = 5**

(i) The equation $v^2 + u^2 = 2as$ is dimensionally correct.
(ii) Current is a vector quantity.
(iii) Work done in raising a load depends upon the time in which it is done.
(iv) Analogue of mass in rotator motion is moment of inertia.
(v) Melting point of ice on Kelvin scale is ok.

c) Choose the correct answer : **5x1 =5**

(i) A difference of temperature of 25^oC is equivalent to a difference of
(a) 45^oF (b) 72^oF (c) 32^oF (d) 25^oF

(ii) For pure water and clean glass the angle of contact is
(a) O^o (b) 90^o (c) 180^o (d) 60^o

(iii) The torque on a body is zero which of the following should not change
(a) Linear velocity (b) Angular velocity (c) Force (d) None of these

(iv) For the resultant of two vectors to be maximum, the angle between them is :
(a) O^o (b) 60^o (c) 90^o (d) 180^o

(v) How many significant figures are there in 40.00?
(a) 1 (b) 2 (c) 3 (d) 4

SECTION B

Q2. Attempt any six questions : **6x5 = 30**

(i) Check the correctness of the relation $t=2\pi\sqrt{l/g}$ where l is length and g is acceleration due to gravity.
(ii) Show that newton's second law of motion is real law of motion.
(iii) Two equal forces have their resultant equal to the either force. At what angle are they inclined to each other ?
(iv) What are laws of friction ?
(v) State and prove law of conservation of angular momentum.
(vi) A force of 40 N is applied on a nail, whose up has an area of cross section of 0.001 cm^2. Find the pressure on the up.
(vii) Define young's modulus of elasticity (y). Give mathematical expression & SI unit of it.
(viii) Define heat and temperature on the basis of kinetic theory of gases. What is differene between heat and temperature ?

S.B. Roll No.....

SECTION C

Attempt any three questions: **10x3 = 30**

Q3. (a) The wavelength λ associated with a moving particles depends upon its mass m, velocity v and planck's constant h. Show dimensionally that $\lambda \alpha \frac{h}{mv}$. (7)

(b) The maximum error in the measurement of mass and length are 3% and 2% respectively. Find the maximum error in the measurement of density. (3)

Q4. (a) It is easier to pull a lawn roller than to push it. Explain. (5)

(b) What is banking of roads? Explain (5)

Q5. What is law of conservation of energy?
Explain conservation of mechanical energy of a freely falling body. (10)

Q6. (a) Derive the relation between various scales of temperature. (7)

(b) At what temperature on Fahrenheit scale will be double of reading on Celsius scale. (3)

S.B. Roll No.....

APPLIED PHYSICS-I

1st/Common/2355/0351/5403/May'16

Duration: 3 Hrs **M. Marks=75**

SECTION A

Q.1 (A)Fill in the blanks: **5x1=5**

i. SI unit of temperature is _____
ii. Newton's _____law is called law of inertia
iii. Time period is _____of frequency
iv. In cold welding _____wave are used
v. When earth revolves around sun, its _____remains constant

(B)State true or false: **5x1=5**

i. Work is dot product of force and displacement.
ii. Surface tension is numerically equal to force.
iii. High viscosity liquids are used in shock absorbers of vehicles.
iv. In automatic fire alarms bimetallic strips are used.
v. Air is heated by conduction.

(C) Choose the correct one: **5x1=5**

(i) The significant figures in 0.07805 is
(a) 3 **(b)** 4 **(c)** 5 **(d)** 6

(ii) The minimum resultant of two forces of 4N and 3N is
(a) 7N **(b)** 3N **(c)** 4N **(d)** 1N

(iii)A force of 10N on a body moves it with a velocity 5m/ s. Power will be
(a) 2 watt **(b)** 25 watt **(c)** 50 watt **(d)** 500 watt

(iv) Pressure is defined as force per unit
(a) Length **(b)** volume **(c)** mass **(d)** area

(v) Mercury thermometer can be used to measure temperature up to
(a) 100°c **(b)** 212°c **(c)** 500°c **(d)** 360°c

SECTION B

Q2. Attempt Any FIVE Questions. **5x6=30**

a. State and prove Principle of Homogeneity of Dimension.
b. Drive the force equation from Newton's 2nd law of motion.
c. What is difference between Transverse waves and longitudinal waves?
d. What will be the velocity of a body having mass 1Kg and kinetic energy of 1 joule?
e. Define Elasticity, Deforming force, Restoring force Elastic body, Plastic body.
f. What are different modes of Transfer of heat?
g. At what temperature Fahrenheit and Celsius scale will record the same reading.

SECTION C

Q3. Attempt Any THREE Questions. **3x10=30**

(i) State and prove Law of conservation of linear momentum. 10

(ii) Explain Principle, Construction Working, of Piezo-electric Oscillator. 10

(iii) **(a)** State and prove Law of conservation of angular momentum. 7
(b) What torque will produce an acceleration of 2rad/ s^2 in a body of moment? of inertia of 500 Kg/ m^2 3

(iv) **(a)** Prove that for freely falling body , Total mechanical energy remains constant. 7
(b) What are advantages of Friction? 3

(v) **(a)**The wave length of a moving electron depends upon its mass m, its velocity v And Planck's constant h. Prove that $\lambda \alpha h/m v$ 7
(b) State and explain Stake's Law. 3

S.B. Roll No……

APPLIED PHYSICS-I

1st Exam/Common/2355/0351/5403/Nov'18

Duration: 3Hrs. **M.Marks:75**

SECTION-A

Q1. a) Fill in the blanks. **15x1=15**

i. Dimensional formula of pressure is_____
ii. Vectors having same magnitude and same direction are called _____ vectors.
iii. Sound waves are _____ in nature.
iv. Momentum is a product of mass and _____
v. _____is used to measure very high temperature.

b) State True or False.

vi. Rockets works on the principle of conservation of momentum.
vii. Surface tension of liquid increases with increase in temperature.
viii. Velocity of sound on vacuum is 3×10^8 m/s.
ix. Cubical expansion is related with change in volume.
x. Centripetal force is given by mv^2/r.

c) Multiple choice questions.

xi. Dimensional formula of angular velocity is same as that of
a) Linear velocity b) Acceleration c) Frequency d) Speed

xii. Newton's first law of motion gives the concept of
a) Energy b) Work c) Momentum d) Inertia

xiii. One Horse power in terms of watt is
a) 7.46 watt b) 74.6 watt c) 746 watt d) 74 watt

xiv. Which of the following is not a unit of pressure?
a) Torr b) Bar c) N/m^2 d) Tesla

xv. If temperature of a patient is 40^0C , his temperature in Kelvin scale is
a) 273 K b) 323 K c) 312 K d) 313 K

SECTION-B

Q2. Attempt any six questions. **6x5=30**

a. Check the accuracy of the relation $v^2 - u^2 = 2as$
b. Prove that the vectors $\vec{A}$ and $\vec{B}$ are perpendicular to each other: $\vec{A} = \hat{\imath} + 2\hat{\jmath} + 3\hat{k}$, $\vec{B} = 2\hat{\imath} - \hat{\jmath}$
c. Differentiate between longitudinal and transverse waves.
d. State the laws of friction.
e. State theorem of perpendicular axis.
f. Differentiate between Streamline, Turbulent and Laminar flow.
g. Friction is a necessary evil. Justify.
h. What is Hooke's law?

SECTION-C

Attempt any three questions. **3x10=30**

Q3. a) Prove that Newton's second law of motion is real law of motion. **7**
b) A force of 50N is applied on a mass of 5 kg. What will be the acceleration on the mass? **3**

Q4. A body of mass m is moving with uniform speed v in a circle of radius r. Find and expression for centripetal force F by the method of dimensions. **10**

Q5. a) What is the difference between scalars and vectors? Explain with examples. **5**
b) Why lubricants are used in machines? **5**

Q6. What are different modes of transfer of heat? Explain with examples **10**

Q7. a) State law of conservation of angular momentum. **5**
b) What is moment of inertia? Write down the formulas of moment of inertia of ring and disc. **5**

Q8. What is Simple harmonic motion? Derive the expression for displacement and velocity in S.H.M. **10**

S.B. Roll No.....

APPLIED PHYSICS-I

1st Exam/Common/5752/Nov'19 (FOR 2018 BATCH ONWARDS)

Duration: 3Hrs. **M.Marks:75**

SECTION-A

Q1. a) Fill in the blanks. **15x1=15**

i. The condition for vectors $\vec{A}$ & $\vec{B}$ to be perpendicular is that $\vec{A}.\vec{B}$ should be_____.
ii. SI stands for_____
iii. The capacity of a body to do work is_____.
iv. The motion of planet in solar system is an example of conservation of_____
v. Solids are heated by the process of _____.

b) State True or False.

vi. Center of mass of a rigid body is a point where whole mass of a body is supposed to be concentrated.
vii. The magnitude of unit vector is one.
viii. Dimensions of mass and weight are same.
ix. Kelvin scale is absolute scale of temperature.
x. Ratio of normal stress to longitudinal strain is called modulus of rigidity.

c) Multiple choice Questions.

xi. Which of the following is not a system of units?
a) FCS b) SI c) MKS d) CGS
xii. When angle between force and displacement is greater than 90°,the work done is
a) 1 b) zero c) positive d) negative
xiii. Which of the following is not a unit of pressure?
a) Torr b) Bar c) N/m^2 d) Tesla
xiv. Two bodies are said to be in thermal equilibrium, if they have same
a) Temperature b) Amount of heat c) Specific Heat d) Thermal Capacities.
xv. Cream gets separated from milk because of
a) Gravitational force b) Nuclear force c) Centrifugal force d) Coulomb force.

SECTION-B

Q2. Attempt any six questions. **6x5=30**

a. Check the accuracy of the relation: $E = mgh + \frac{1}{2} mv^2$
b. What do you mean by banking of roads? Solve the question for banking angle.
c. Differentiate between heat and temperature.
d. State the laws of limiting friction.
e. State theorem of perpendicular axis.
f. Define various modes of transfer of heat.
g. Define Young's modulus of elasticity. Give its mathematical expression and SI unit.
h. What is Centrifugal force? Give two applications of Centrifugal force.

SECTION-C

Attempt any three Questions. **3x10=30**

Q3. State and prove law of conservation of linear momentum. **(3+7)**

Q4. Derive an expression for P.E. possessed by a body of mass (m), when raised through a certain height (h) under the acceleration due to gravity (g) by using method of dimensions. **10**

Q5. What do you mean by linear expansion? Derive an expression of coefficient of linear expansion (α). **10**

Q6. State Bernoulli's theorem and explain its any three applications. **(4+6)**

Q7. Show that for a freely falling body, total mechanical energy is constant. **10**

Q8. i) Define radius of gyration. Also, derive its relation. **5**

ii) Show that vector $\vec{A} = 2\hat{i}-3\hat{j}-\hat{k}$ and $\vec{B} = -6\hat{i}+9\hat{j}+3\hat{k}$ are parallel. **5**

S.B. Roll No……..

APPLIED PHYSICS-I

1st Exam/Common/2355/0351/5403/May'19

Duration: 3Hrs. **M.Marks:75**

SECTION-A

Q1. a) Fill in the blanks. **15x1=15**

i. Heat flows from a body at _____temperature to a body at _____temperature.
ii. The moment of momentum of a body is called_____
iii. Sounds waves are a _____wave.
iv. Dimensional formula of potential energy is_____
v. Speed is a _____Quantity and velocity is a _____quantity.

b) State True or False.

vi. One Fermi is equal to 10^{-15} m.
vii. Rolling is a combination of rotational and translational motion.
viii. Centripetal force and Centrifugal force are equal in magnitude and opposite in direction.
ix. Moment of force is called Torque.
x. Small insects can walk on the surface of still water due to viscosity.

c) Multiple choice questions.

xi. The significant figures in 0.09 are
a) 1 b) 2 c) 3 d) 4

xii. Which of the following relation is not correct?
a) $v = r\omega$ b) $a = r\alpha$ c) $l = r\theta$ d) $\omega = 2\pi T$

xiii. A flying bird possesses
a) K.E. only b) P.E. Only c) both K.E. and AP.E. d) Wind energy

xiv. What causes reverberation?
a) Reflection b) refraction c) diffraction d) interference

xv. To controls temperature one uses
a) Thermocouple b) Thermometer c) Thermostat d) Pyrometer

SECTION-B

Q2. Attempt any six questions. **6x5=30**

a. Convert 1 Newton of force into dyne using dimensional analysis.
b. Show that Newton's second law of motion is a real law of motion.
c. Differentiate between Echo and reverberation.
d. Define pressure and give its units.
e. What do you mean by term viscosity and coefficient of viscosity? Give its units.
f. Convert 90˚ F into Kelvin scale
g. Define free, forced and resonant vibrations.
h. Frivtion is a necessary evil. Explain.
i. State different modulus of elasticity.

SECTION-C

Attempt any three questions. **3x10=30**

Q3. Explain conservation of mechanical energy of a freely falling body.

Q4. a) It is easier to pull a lawn roller than to push it. Explain.
b) What is banking of roads? Explain.

Q5. State and prove Bernoulli's theorem.

Q6. What are different modes of transfer of heat? Explain with examples.

Q7. a) Give difference between scalar and vector quantities.
b) Check the correctness of relation $t = 2\pi \sqrt{l/g}$ where l is length and g is acceleration due to gravity.

Q8. Define three coefficient of thermal expansion. Establish relation between them.

Q9. State and explain Newton's law of motion.

Q10. State and prove conservation of linear momentum.

S.B. Roll No……

APPLIED PHYSICS-I

1st Exam/Common/2355/0351/5403/Sep'2020

Duration: 1.15 Hrs. **M.Marks:25**

SECTION-A

Q1. Attempt any three questions. **3x5=15**

a. Prove that Newton's second law of motion is real law of motion.
b. Differentiate between transverse and longitudinal waves?
c. State the laws of limiting friction.
d. Define young's modulus of elasticity(y). Give mathematical expression & SI unit of it.
e. Give difference between scalar and vector quantities.
f. Check the accuracy of the relation $v^2-u^2= 2as$.
g. Differentiate between heat and temperature.
h. State theorem of perpendicular axis.
i. What is Hooke's law?

SECTION-B

Q2. Attempt any one question. **1x10=10**

i. Define Work along with its units. What are different types of work?
ii. Discuss the Newton's law of motion in detail?
iii. Discuss the different modes of transfer of heat.
iv. The wavelength λ associated with a moving particles depends upon its mass m, velocity v and planck's constant h. Show dimensionally that $\lambda \alpha \frac{h}{mv}$.
v. a) What torque will produce an acceleration of 2 rad/s^2 in a body of moment of inertia of 500 Kg/m^2?
b) Define pressure and give its units?