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First/Second Semester B.E. Degree Examination, Dec.2016/Jan.2017
Engineering Physics

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer any FIVE full questions, choosing at least two from each part.

2. Physical constants: $h = 6.63 \times 10^{-34} \text{ JS}$, $C = 3 \times 10^8 \text{ m/s}$, $e = 1.6 \times 10^{-19} \text{ C}$,

$1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}$, $m_e = 9.1 \times 10^{-31} \text{ kg}$, $m_n = 1.674 \times 10^{-27} \text{ kg}$, $NA = 6.025 \times 10^{26} / \text{Kmol}$.

PART – A

- 1 a.** Choose the correct answers for the following : (04 Marks)
- i) The wavelength (λ) associated with a particle of mass m , moving with a velocity v is given by
 A) $\lambda = \frac{h}{mv}$ B) $\lambda = \frac{hv}{m}$ C) $\lambda = \frac{mv}{h}$ D) $\lambda = \frac{m}{hv}$
- ii) In black body radiation spectrum, the Wein's distribution law is applicable for
 A) Longer wavelength B) Shorter wavelength
 C) Entire wavelength D) None of these
- iii) If the group velocity of particle is $4.7 \times 10^6 \text{ m/s}$, then its phase velocity is
 A) $6 \times 10^9 \text{ m/s}$ B) $4.7 \times 10^9 \text{ m/s}$ C) $9.4 \times 10^6 \text{ m/s}$ D) $1.91 \times 10^{10} \text{ m/s}$
- iv) Photo electric effect establishes
 A) Wave nature of light B) Particle nature of light
 C) Dual nature of light D) None of these
- b. What is Planck's radiation law? Show how Wein's law and Rayleigh-Jean's law can be derived from it. (06 Marks)
- c. Describe Davisson and Germer experiment for the justification of de Broglie waves. (06 Marks)
- d. Find the energy of neutrons in eV whose de Broglie wavelength is 1 \AA . Given the mass of neutron is $1.674 \times 10^{-27} \text{ kg}$. (04 Marks)
- 2 a.** Choose the correct answers for the following : (04 Marks)
- i) The product of uncertainties between position and momentum is given by
 A) $\Delta x \Delta p \geq \lambda$ B) $\Delta x \Delta p \geq \frac{h}{4\pi}$ C) $\Delta x \Delta p \geq mv$ D) $\Delta x \Delta p \geq \frac{nh}{2\pi}$
- ii) The energy corresponding to the first permitted energy level is given by
 A) Excited energy B) Metastable state energy
 C) Zero point energy D) None of these
- iii) The wave function is acceptance wave function if it is
 A) Finite every where B) Continuous everywhere
 C) Single valued everywhere D) All of these
- iv) If the electron moves in one dimensional potential box of length 2 nm , the normalization constant is
 A) $1(\text{nm})^{-1/2}$ B) $2(\text{nm})^{-1}$ C) $[\sqrt{2} \text{ nm}]^{-1}$ D) None of these.
- b. Using time independent Schrodinger wave equation obtain the expression for the normalized wave function for a particle in one dimensional potential well of infinite height. (08 Marks)
- c. Explain Heisenberg's uncertainty principle. (04 Marks)
- d. An electron is confined to a box of length 10^{-9} m , calculate the minimum uncertainty in its velocity. (04 Marks)

- 3 a. Choose the correct answers for the following : (04 Marks)
- The free electrons in classical free electron theory are treated as
A) Rigidly fixed lattice points B) Liquid molecules
C) Gas molecules D) None of these
 - If the mobility of electrons in a metal increases, the resistivity
A) Increases B) Decreases C) Remains constant D) None of these
 - Matthiessen's rule is given by
A) $\rho = \rho_{ph} - \rho_i$ B) $\rho = \frac{\rho_{ph}}{\rho_i}$ C) $\rho = \rho_{ph} + \rho_i$ D) $\rho = \frac{\rho_i}{\rho_{ph}}$
 - The value of Fermi function in Fermi level at $T \neq 0K$ is,
A) ZERO B) 0.5 C) 0.75 D) 1
- b. Using the classical free electron theory, derive an expression for electrical conductivity in metals. (06 Marks)
- c. Define Fermi energy and Fermi factor. Discuss the variation of Fermi factor with temperature. (06 Marks)
- d. Calculate the conductivity of sodium given $\tau_m = 2 \times 10^{-14}s$. Density of sodium is 971 kg/m^3 , its atomic weight is 23 and has one conduction electron per atom. (04 Marks)
- 4 a. Choose the correct answers for the following : (04 Marks)
- The electric dipole moment per unit volume is
A) Magnetization B) Bipole moment
C) Electric polarization D) Electric susceptibility
 - For Ferromagnetic substances, the Curie-weiss law is
A) $\psi = \frac{C}{T}$ B) $\psi = \frac{C}{T - \theta}$ C) $\psi = \frac{T - \theta}{C}$ D) $\frac{C}{T + \theta}$
 - The relation between B, M and H is
A) $H = \mu_0 (M + B)$ B) $B = \mu_0 (H + M)$ C) $M = \mu_0 (H + B)$ D) None of these
 - In the inverse piezoelectric effect
A) Ultrasonic waves are produced B) Electromagnetic waves are produced
C) Microwaves are produced D) None of these
- b. What is internal field? Derive an expression for the internal field in the case of one dimensional array of atoms in dielectric solids. (07 Marks)
- c. Distinguish between hard and soft magnetic materials. (05 Marks)
- d. Sulphur is elemental solid dielectric whose dielectric constant is 3.4. Calculate the electronic polarizability if its density is $2.07 \times 10^3 \text{ kg/m}^3$ and atomic weight is 32.07. (04 Marks)

PART - B

- 5 a. Choose the correct answers for the following : (04 Marks)
- Wavelength of LASER can be used as a standard of
A) Time B) Temperature C) Length D) Angle
 - The lifetime of atoms in meta stable state is of the order of
A) Milliseconds B) Microseconds C) Nanoseconds D) Unlimited
 - Which of these is not a LASER property?
A) Highly monochromatic B) Highly divergent
C) Highly directional D) Highly intense
 - Pumping technique used in semiconductor LASER is
A) Electrical discharge B) Forward bias C) Optical pumping D) None of these
- b. Describe the construction and working of He-Ne LASER. (07 Marks)
- c. What is holography? Explain the principle of recording of hologram with suitable diagrams. (05 Marks)
- d. The ratio of population of two energy levels is 1.059×10^{-30} . Find the wavelength of light emitted at 330K. (04 Marks)

- 6 a. Choose the correct answers for the following : (04 Marks)
- The NA of an optical fiber is 0.2, when surrounded by air. The acceptance angle when it is in water of refractive index 1.33 is
A) 8.21° B) 8.65° C) 0.11° D) None of these
 - Superconductors are
A) Ferromagnetic B) Paramagnetic C) Anti Ferromagnetic D) Diamagnetic
 - Below critical temperature, if the temperature of superconductor is increased, the critical field
A) Increases B) Decreases
C) Remains constant D) First increases. then decreases
 - Attenuation in optical fiber is due to
A) Absorption B) Scattering C) Radiation loss D) All the above
- b. Discuss various types optical fibers with suitable diagrams. (06 Marks)
- c. Write a note on Maglev vehicles. (05 Marks)
- d. The refractive indices of the core and cladding of a step index fiber are 1.45 and 1.40 respectively and its core diameter is $45\mu\text{m}$. Calculate its relative refractive index difference, V-number at wavelength 1000nm and the number of modes. (05 Marks)
- 7 a. Choose correct answers for the following : (04 Marks)
- The relation between atomic radius R and its lattice constant 'a' in FCC is
A) $a = 2R$ B) $a = 2\sqrt{2}R$ C) $a = \frac{\sqrt{3}}{4}R$ D) $a = \frac{\sqrt{3}}{2}R$
 - The coordination number in the case of BCC is
A) 6 B) 8 C) 10 D) 12
 - A plane intercepts at a, b/2, 2c in a simple cubic cell. The miller indices of the plane are.
A) (214) B) (241) C) (421) D) (124)
 - Bragg's equation is expressed as
A) $2d\sin\theta = n\lambda$ B) $2a\sin\theta = n\lambda$ C) $2\sin\theta = n\lambda$ D) None of these
- b. What is atomic packing factor? Calculate APF in the case of BCC and FCC. (06 Marks)
- c. What are miller indices of planes? Explain how to find the miller indices of planes with an example. (06 Marks)
- d. A monochromatic X-ray beam of wavelength 1.5\AA undergoes 2nd order Bragg reflection from the plane (211) of a cubic crystal at a glancing angle of 54.38° . Calculate the lattice constant. (04 Marks)
- 8 a. Choose the correct answers for the following : (04 Marks)
- The elastic behavior of the liquid is characterized by its
A) Young's modulus B) Modulus of rigidity
C) Bulk modulus D) Poisson's ratio
 - The state of the matter around nanosize is known as
A) Liquid state B) Plasma state C) Mesoscopic state D) Solid state
 - A bulk material reduced to one dimension is called quantum
A) Dot B) Well C) Particle D) Wire
 - The frequency of ultrasonic waves is
A) $< 20\text{kHz}$ B) Between 20Hz and 20kHz
C) $> 20\text{kHz}$ D) None of these
- b. What are nanomaterials? Explain any two methods of preparation of nanomaterials with neat sketches and mention any one application. (08 Marks)
- c. Describe a method of measuring velocity of ultrasonic waves in solids. Using this how can we find the rigidity modulus of the solid? (08 Marks)

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14PHY12/22

First/Second Semester B.E. Degree Examination, Dec.2016/Jan.2017
Engineering Physics

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing one full question from each module.**
2. Physical constants : Velocity of light $C = 3 \times 10^8$ m/s ;
Plank's constant $h = 6.625 \times 10^{-34}$ JS ; Mass of electron $e = 9.11 \times 10^{-31}$ kg ;
Boltzman constant $K = 1.38 \times 10^{-23}$ JK ; Avagadro number $N_A = 6.02 \times 10^{26}$ /k mole.

Module-1

- 1 a. Show that how Plank's law can be reduced to Wein's law and Rayleigh – Jeans law. (06 Marks)
 b. What is a Wave function? List the properties of wave function. (06 Marks)
 c. Show that group velocity is equal to particle velocity. (04 Marks)
 d. A Quantum particle is confined to one dimensional box of width 'a' is its first excited state. What is the probability of finding the particle over an interval of a/2 marked symmetrically at the centre of the box. (04 Marks)
- 2 a. Explain Black body radiation spectrum. (04 Marks)
 b. Obtain the energy eigen value expression and energy eigen functions for an electron in one dimensional potential well of infinite height. (08 Marks)
 c. What are the characteristics of matter waves? (04 Marks)
 d. The velocity of an electron of a hydrogen atom in the ground state is 2.19×10^6 m/s. Calculate the wavelength of the de Broglie waves associated with its motion. (04 Marks)

Module-2

- 3 a. Define the terms drift velocity, thermal velocity, mean collision time and mean free path. (04 Marks)
 b. What is Hall effect? Obtain an expression for Hall coefficient. (06 Marks)
 c. Explain the temperature dependence of electrical resistivity in metals and super conductors. (06 Marks)
 d. The Hall coefficient of a specimen of doped silicon found to be 3.66×10^{-4} m³/Coulomb. The resistivity of a specimen is 9.33×10^{-3} ohm – m. Find the mobility and density of the charge carrier, assuming single carrier concentration. (04 Marks)
- 4 a. Explain the success of Quantum free electron theory. (06 Marks)
 b. What are intrinsic and extrinsic semiconductors? Obtain an expression for fermi level in intrinsic semiconductors. (06 Marks)
 c. Explain in brief construction and working of maglev vehicles. (04 Marks)
 d. An intrinsic semiconductors has an energy gap of 0.4ev. Calculate the probability of occupation of the lowest energy level in conduction band at 100°C. (04 Marks)

Module-3

- 5 a. Obtain an expression for energy density of emitted radiation under equilibrium condition. (06 Marks)
 b. Obtain an expression for numerical aperture in an optical fiber. (05 Marks)
 c. Explain the construction and working of semiconductor laser. (05 Marks)
 d. The angle of acceptance of an optical fiber is 30, when kept in air. Find the angle of acceptance when it is in a medium of refractive index 1.33. (04 Marks)

- 6 a. What is Holography? Explain the recording and reconstruction processes in holography, with the help of suitable diagrams. (06 Marks)
- b. Describe the application of optical fibers in point to point communication with suitable block diagram. (05 Marks)
- c. Explain different types of optical fibers. (05 Marks)
- d. The average output power of Laser Source emitting a laser beam of wavelength 6328 \AA is 5mw. Find the number of Photons emitted per second by the laser source. (04 Marks)

Module-4

- 7 a. Explain in brief Seven Crystal Systems, with neat diagram. (07 Marks)
- b. Define Lattice, basis, crystal structure and unit cell. (04 Marks)
- c. Explain the procedure to find Miller indices of crystal plane. (04 Marks)
- d. The first order Bragg's reflection occurs at angle 20° in the plane (111). Find the wavelength of X – rays if lattice constant is 3.615 \AA . (05 Marks)
- 8 a. Derive Bragg's law for crystal structure. (05 Marks)
- b. Explain the structure of Perovskite crystal structure, with neat diagram. (07 Marks)
- c. List the differences between LED and LCD devices. (04 Marks)
- d. Draw the following planes in a cubic unit cell (100), (110), (111) and (112). (04 Marks)

Module-5

- 9 a. Explain the description and working of Reddy's shock tube. (08 Marks)
- b. Describe the various Quantum structures. (04 Marks)
- c. List the characteristics of Reddy's Shock tube. (04 Marks)
- d. Describe the preparation of nanoparticles by ball milling method. (04 Marks)
- 10 a. Describe Acoustic, Ultrasonic, Subsonic and Supersonic waves. (04 Marks)
- b. Explain the structure of different Carbon nanotubes, with neat diagram. (08 Marks)
- c. Describe the principle and working of SEM, with neat diagram. (08 Marks)

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CBCS Scheme

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15PHY12/22

First/Second Semester B.E. Degree Examination, Dec.2016/Jan.2017 Engineering Physics

Time: 3 hrs.

Max. Marks: 80

Note: 1. Answer FIVE full questions, choosing one full question from each module.

2. Physical Constants : Velocity of light, $c = 3 \times 10^8 \text{ ms}^{-1}$,

Planck's constant, $h = 6.625 \times 10^{-34} \text{ J.S}$,

Mass of electron, $m_e = 9.1 \times 10^{-31} \text{ kg}$,

Avogadro number, $N_A = 6.02 \times 10^{26} \text{ /Kmol}$,

Boltzmann constant, $k = 1.38 \times 10^{-23} \text{ J/K}$,

Charge of an electron, $e = 1.602 \times 10^{-19} \text{ C}$

Module-1

- 1 a. State Planck's radiation law. Show how Planck's law could be reduced to Wien's law and Rayleigh-Jeans law. (07 Marks)
- b. State Heisenberg's uncertainty principle and show that electron does not exist inside the nucleus by this principle. (05 Marks)
- c. Find deBroglie wavelength of a particle of mass $0.58 \text{ MeV}/c^2$ has a kinetic energy 90 eV . where c is velocity of light. (04 Marks)

OR

- 2 a. Using Schrodinger's time independent wave equation obtain eigen values and eigen function for a particle in a one dimensional potential well of infinite height. (07 Marks)
- b. Define phase velocity and group velocity. Show that group velocity is equal to particle velocity. (05 Marks)
- c. The inherent uncertainty in the measurement of time spent by Iridium – 191 nuclei in the excited state is found to be $1.4 \times 10^{-10} \text{ s}$. Estimate the uncertainty that results in its energy in eV in the excited state. (04 Marks)

Module-2

- 3 a. Explain Meissner effect. Write any three differences between Type-I and Type-II superconductors. (07 Marks)
- b. Explain the failure of classical free electron theory. (05 Marks)
- c. For intrinsic Gallium Arsenide, the electric conductivity at room temperature is $10^{-6} \text{ ohm}^{-1} \text{ m}^{-1}$. The electron and hole mobilities are respectively $0.85 \text{ m}^2/\text{V.S}$ and $0.04 \text{ m}^2/\text{V.S}$. Calculate the intrinsic carrier concentration at room temperature. (04 Marks)

OR

- 4 a. State law of mass action. Obtain an expression for electrical conductivity of semiconductors. (07 Marks)
- b. Explain the BCS theory of super conductivity. (05 Marks)
- c. Calculate the probability of finding an electron at an energy level 0.02 eV above Fermi level at 200 K . (04 Marks)

Module-3

- 5 a. Describe construction and working of carbon dioxide laser with suitable diagrams. (07 Marks)
 b. Obtain an expression for the numerical aperture of an optical fiber. (05 Marks)
 c. Find the ratio of population of two energy levels in a medium at thermal equilibrium, if the wavelength of light emitted at 291 K is 6928 \AA . (04 Marks)

OR

- 6 a. Describe the recording and reconstruction process in holography with the help of suitable diagrams. (07 Marks)
 b. Discuss point to point optical fiber communication system. (05 Marks)
 c. Calculate the numerical aperture and angle of acceptance for an optical fiber having refractive indices 1.563 and 1.498 for core and cladding respectively. (04 Marks)

Module-4

- 7 a. Describe briefly the seven crystal systems. (07 Marks)
 b. Describe with a neat diagram the crystal structure of diamond. (05 Marks)
 c. Draw the crystal planes (102) (111) (011) and (002) in a cubic crystal. (04 Marks)

OR

- 8 a. Define atomic packing factor. Calculate the atomic packing factor for sc, bcc and fcc structures. (07 Marks)
 b. Describe the construction and working of a Bragg's x-ray spectrometer. (05 Marks)
 c. An x-ray beam of wavelength 0.7 \AA undergoes first order Bragg's reflection from the plane (302) of a cubic crystal at glancing angle 35° , calculate the lattice constant. (04 Marks)

Module-5

- 9 a. Explain Ball Milling method of synthesis of nano materials. (06 Marks)
 b. Describe hand operated Reddy shock tube with diagram. (05 Marks)
 c. Define shock waves. Mention its applications. (05 Marks)

OR

- 10 a. Explain the working of SEM with the help of a neat diagram. (07 Marks)
 b. Mention Rankine-Hugonit shock equations and expand the terms. (05 Marks)
 c. Write any four applications of carbon nano tubes. (04 Marks)

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10CIV13/23

First/Second Semester B.E. Degree Examination, Dec.2016/Jan.2017

Elements of Civil Engineering and Engineering Mechanics

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting atleast TWO questions from each part.

PART – A

- 1 a. Choose the correct answers for the following : (04 Marks)
- i) A branch of civil engineering that deals with testing soils and foundation design is called.
 - A) structural engineering
 - B) geotechnical engineering
 - C) environmental engineering
 - D) highway engineering
 - ii) Highways which are superior to national highways and are provided wherever volume of traffic is very high are :
 - A) airways
 - B) express ways
 - C) road ways
 - D) district roads
 - iii) A bascule bridge is a
 - A) floating bridge
 - B) arch bridge
 - C) suspension bridge
 - D) movable bridge
 - iv) Shoulders are the components of
 - A) bridges
 - B) buildings
 - C) roads
 - D) dams.
- b. Write a note on role of civil engineer in infrastructure development of a Nation. (08 Marks)
- c. Explain any four types of dams with sketches. (08 Marks)
- 2 a. Choose the correct answers for the following : (04 Marks)
- i) Forces whose line of action lie along the same line
 - A) coplanar non-concurrent
 - B) coplanar parallel
 - C) collinear
 - D) concurrent
 - ii) An object with only mass but no size in mechanics is
 - A) rigid body
 - B) point body
 - C) particle
 - D) deformable body
 - iii) Effect of a force on a body depends on
 - A) direction
 - B) magnitude
 - C) position
 - D) all of these
 - iv) The translators effect of a couple on the rigid body is
 - A) zero
 - B) maximum
 - C) minimum
 - D) none of these.
- b. State the law of transmissibility of force. (02 Marks)
- c. A circular disc of radius 1 m is acted upon by four forces as shown in Fig. 2(c). Replace the forces by equivalent force couple system at O. (06 Marks)

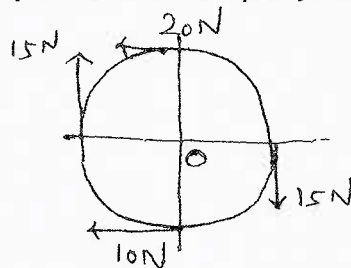


Fig. Q2(c)

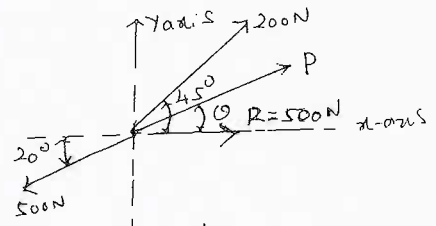
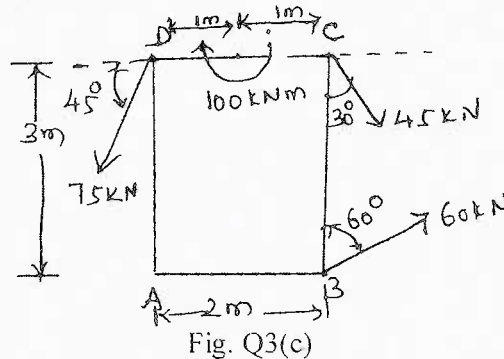


Fig. Q2(d)

- d. The four coplanar forces acting at a point are as shown in Fig. Q2(d). One of the forces is unknown and its magnitude is shown by P. The resultant is 500 N and is along x-axis. Determine the forces P and its inclination θ with x-axis. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

- 3 a. Choose the correct answers for the following : (04 Marks)
- The technique of finding the resultant of a system of forces is called
A) resultant B) resolution C) composition D) equilibrium
 - If two concurrent forces each P act at right angles to each other, their resultant will be equal to
A) $2\sqrt{P}$ B) $P\sqrt{2}$ C) $4P$ D) P
 - Varignon's theorem is applicable to
A) only coplanar force system B) only concurrent force system
C) only non concurrent force system D) coplanar, concurrent and non-concurrent systems
 - In a coplanar concurrent system if $\sum H = 0$ then the resultant is
A) horizontal B) vertical C) moment D) none of these.
- b. State and prove Varignon's theorem of moments. (08 Marks)
- c. Find the magnitude, direction and distance of the resultant from the point A for the system of forces shown in Fig. Q3(c). (08 Marks)



- 4 a. Choose the correct answers for the following : (04 Marks)
- Moment of total area about its centroidal axis
A) twice the area B) three times the area C) zero D) none of these
 - Centroid of plane is the point at which
A) weight of the body is concentrated
B) Mass of the body is concentrated
C) surface area of the body is concentrated
D) all of these
 - Centroid of a rectangle of base width b and depth d is
A) $b/3$ and $d/3$ B) $b/2$ and $d/2$ C) $b/4$ and $d/4$ D) none of these
 - Centroid of a quarter of a circular lamina lies from diameter line at a distance of
A) $4R/3\pi$ B) $R\pi/3$ C) $2R/3\pi$ D) none of these.
- b. Show that the centroid of a semi circle is at a distance of $4R/3\pi$ from the diametral axis. (06 Marks)
- c. Locate the centroid for the Fig. Q4(c) with respect to point O. (10 Marks)

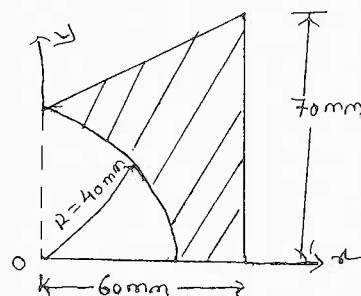


Fig. Q4(c)
2 of 4

PART – B

- 5 a. Choose the correct answers for the following : (04 Marks)
- A free body diagram is a diagram
 - drawn by free hand
 - separating the body from its surrounding and replacing with force vector
 - represents of a floating body
 - all of these
 - If a body is in equilibrium it is concluded that
 - no force is acting
 - resultant is zero
 - moment about any part is zero
 - both B and C
 - The Lami's theorem can be applied only when number of unknown forces are
 - two
 - three
 - five
 - none of these
 - The force which is equal and opposite to the resultant is
 - resultant force
 - force
 - equilibrant
 - none of these.
- b. Find the tension in the strings for the Fig. Q5(b). (06 Marks)

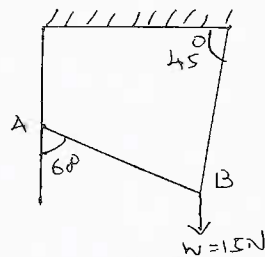


Fig. Q5(b)

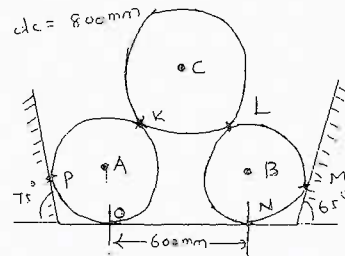


Fig. Q5(c)

- c. Determine the reaction at contact points for spheres A, B and C shown in Fig. Q5(c). Take $W_A = W_B = 4 \text{ kN}$, $W_C = 6 \text{ kN}$, $d_A = d_B = 500 \text{ mm}$, $d_C = 800 \text{ mm}$. (10 Marks)

- 6 a. Choose the correct answers for the following : (04 Marks)
- Statically determinate beams are
 - The beams which can be analyzed completely, using static equations of equilibrium
 - the beams which can be analyzed without using static equations of equilibrium
 - fixed beams
 - none of these
 - Water in a tank is an example of
 - point load
 - UDL
 - UVL
 - none of these
 - Reaction line at roller support with respect to plane of contact is
 - oblique
 - perpendicular
 - inclined
 - none of these
 - At fixed end of cantilever, the number of unknown reaction components are
 - 1
 - 2
 - 3
 - 4
- b. Explain different types of supports with sketches. (06 Marks)
- c. Determine the support reactions for the beam shown in Fig. 6(c). (10 Marks)

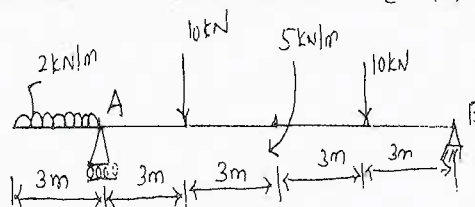


Fig. Q6(c)
3 of 4

- 7 a. Choose the correct answers for the following : (04 Marks)
- The coefficient of friction depends on

A) area of contact	B) roughness of contact surface ;
C) both A and B	D) none of these
 - The maximum frictional force developed when the body just begins to slide is called

A) limiting friction	B) rolling friction	C) static friction	D) none of these
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 - Angle of friction is angle between

A) normal reaction and frictional force	B) normal reaction and resultant
C) weight of the body and friction force	D) normal reaction and weight of the body
 - Compared to static friction, dynamic friction is

A) larger	B) equal	C) smaller	D) none of these
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- b. Explain with sketches : i) cone of friction ii) angle of repose. (06 Marks)
- c. An 8 m long uniform ladder weighing 500 N is resting on a rough horizontal floor and inclined at angle of 30° with the vertical wall Fig. Q7(c). A man weighing 750 N climbs the ladder. At what position will he induce slipping? The coefficient of friction between the ladder and the wall is 0.3 and that between the ladder and floor is 0.2. (10 Marks)

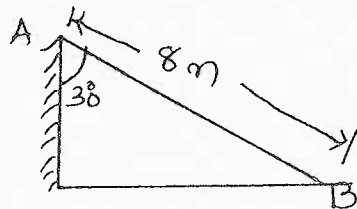


Fig. Q7(c)

- 8 a. Choose the correct answers for the following : (04 Marks)
- The moment of inertia of an area about an axis which is perpendicular to the plane is called

A) radius of Gyration	B) polar moment of inertia
C) second moment of area	D) none of the above
 - If I_G is moment of inertia of a rectangle about its centroidal axis and I_{AB} is moment of inertia about its base, then

A) $I_G > I_{AB}$	B) $I_G < I_{AB}$	C) $I_G = I_{AB}$	D) none of the above
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 - Moment of inertia of a square of side 'B' about its centroidal axis is

A) $B^4/8$	B) $B^4/12$	C) $B^4/36$	D) $B^4/48$
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 - M.I of hollow circular section whose external diameter is 8 mm and internal diameter is 4 mm about centroidal axis is

A) 437.5 mm^4	B) 337.5 mm^4	C) 237.5 mm^4	D) 188.4 mm^4
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- b. State and prove parallel axis theorem. (06 Marks)
- c. Find the polar radius of gyration for the area shown in Fig. Q8(c) through the centroid. (10 Marks)

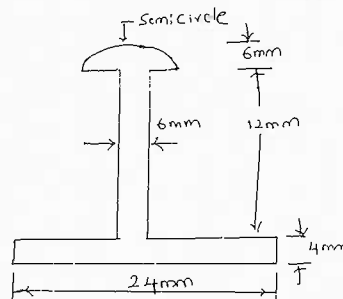


Fig. Q8(c)

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14CIV13/23

First/Second Semester B.E. Degree Examination, Dec.2016/Jan.2017
Elements of Civil Engineering and Mechanics

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting ONE full question from each module.

Module – 1

- 1 a. With a neat sketch, explain the components of i) Earth dam; ii) Gravity dam. (10 Marks)
- b. Determine the X and Y components of the forces shown in Fig.Q.1(b). (10 Marks)

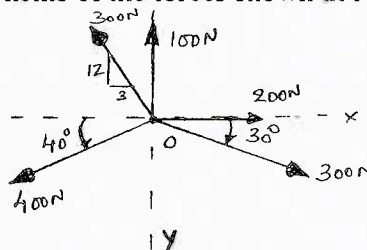


Fig.Q.1(b)

- 2 a. Define couple and state its characteristics. (06 Marks)
- b. Draw a neat sketch of RCC-T beam bridge and name its components. (04 Marks)
- c. Replace the system of forces acting on the frame shown in Fig.Q.2(c), by a resultant force 'R' through 'A' and a couple acting horizontally through 'B' and 'C'. (10 Marks)

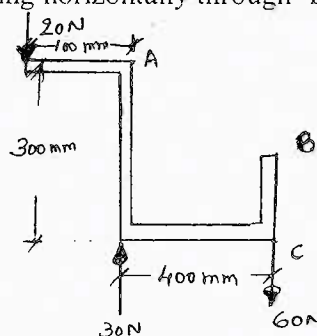


Fig.Q.2(c)

Module – 2

- 3 a. State and prove parallelogram law of forces. (06 Marks)
- b. Check the stability of the dam carrying the forces as shown in Fig.Q.3(b). The dam is said to be stable if the resultant lies in the middle 1/3 of the base OT. (10 Marks)

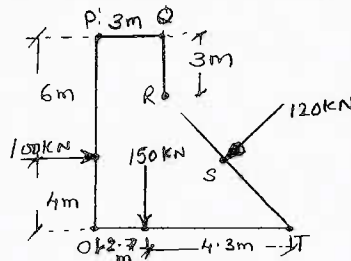


Fig.Q.3(b)

- c. Define resultant and equilibrant of a force system. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

- 4 a. State and prove Varignon's theorem. (06 Marks)
- b. Two locomotives on opposite banks of a canal pull a vessel moving parallel to the banks of a canal by means of ropes as shown in Fig.Q.4(b). The tension in the ropes are 20kN and 24kN while the angle between them is 60° . Find the resultant pull on the vessel along the centerline and the angle ' α ' and ' β '. (08 Marks)

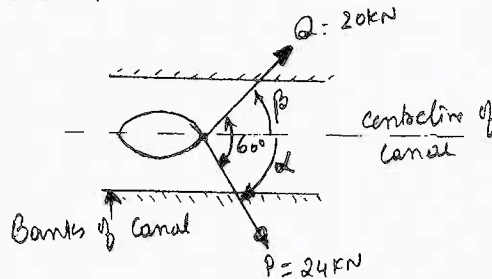


Fig.Q.4(b)

- c. An electric transmission tower supports two cables carrying tensions of 80kN and 120kN as shown in Fig.Q.4(c). Determine the required tension in the guy wire AB, so that the resultant of the forces exerted by three cables will be vertical. Also find the magnitude of the resultant. (06 Marks)

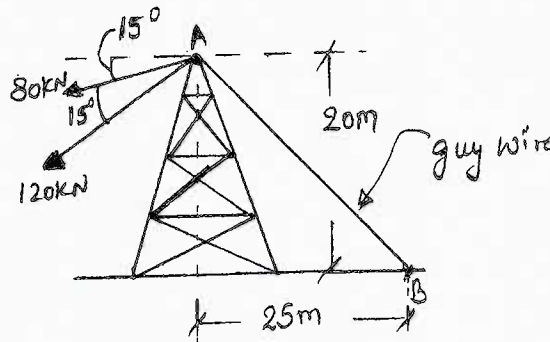


Fig.Q.4(c)

Module - 3

- 5 a. State conditions of equilibrium for coplanar concurrent and non concurrent force system. (04 Marks)
- b. Draw a neat sketch showing the number of reactions at i) Roller support; ii) Hinged support; iii) Fixed support. (06 Marks)
- c. Find the least value of ' P ' required to cause the system of block shown in Fig.Q.5(c) to have impending motion to the left. The coefficient of friction for all contact surfaces are 0.2. (10 Marks)

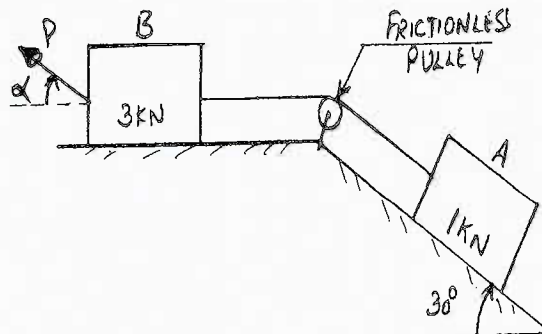


Fig.Q.5(c)

- 6 a. Define the terms: i) Coefficient of friction; ii) Angle of repose. (06 Marks)
 b. Find the reactions for the beam loaded as shown in Fig.Q.6(b). (06 Marks)

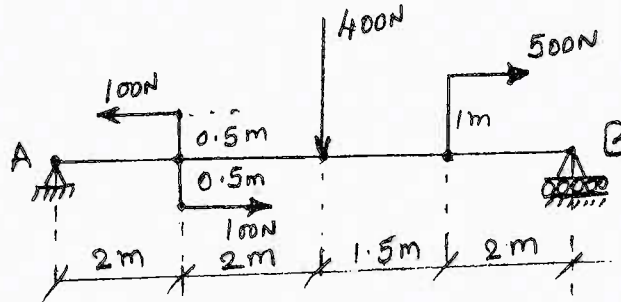


Fig.Q.6(b)

- c. Cylinder 'A' of diameter 200mm and cylinder 'B' of diameter 300mm are placed in a trough shown in Fig.6(c). If cylinder 'A' weighs 800N and cylinder 'B' weighs 1200N, determine the reactions developed at contact surfaces P, Q, R and S. Assume that all contact surfaces are smooth. (08 Marks)

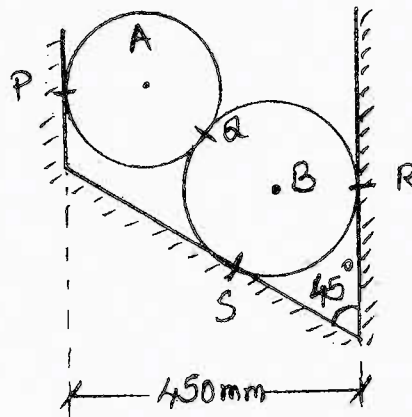
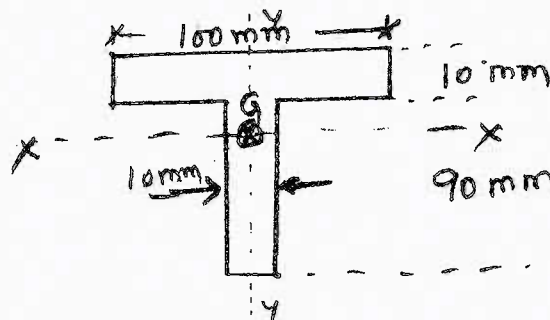


Fig.Q.6(c)

Module - 4

- 7 a. Derive an expression for the centroid of a semicircle of radius 'r' with respect to the base of the semicircle from the first principles. (06 Marks)
 b. Determine the radius of gyration for the area shown in Fig.Q.7(b), along horizontal XX and vertical YY axis passing through the centroid of the area. (14 Marks)



- 8 a. State and prove parallel axis theorem. (06 Marks)
 b. Locate the centroid of the lamina shown in Fig.Q.8(b) with respect to point 'O'. (14 Marks)

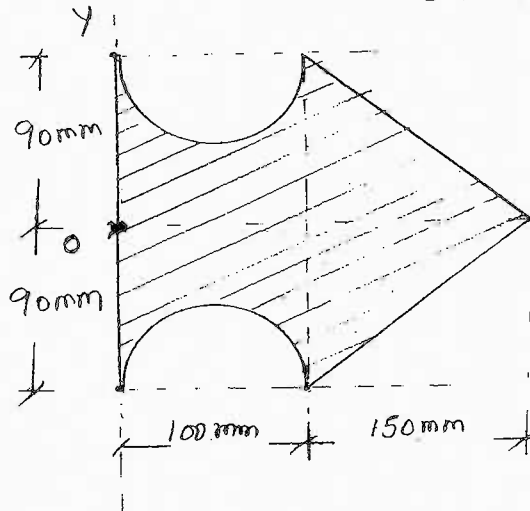


Fig.Q.8(b)

Module – 5

- 9 a. State Newton's Law's of motion. (06 Marks)
 b. What is super elevation and list the benefits of providing the super elevation. (06 Marks)
 c. A projectile is fired at certain angle with the horizontal and has a horizontal range of 3.5km. If the maximum height reached is 500m, what is the angle of elevation of the cannon? What was the muzzle velocity of the projectile? (08 Marks)
- 10 a. A small steel ball is shot up vertically with a velocity of 19.6 m/sec, from the top of a building 24.5m high. Calculate:
 i) Time required for the ball to reach maximum height.
 ii) How high the ball will rise above the building?
 iii) Compute the velocity with which it will strike the ground.
 iv) Total time for which the ball is in motion. (10 Marks)
- b. The distance between two stations is 2500m. The locomotive starts from first station with an acceleration such that it reaches a speed of 36 kmph in 30 secs until its speed attained is 55 kmph. This speed is maintained until the brakes are applied and the locomotive is brought to rest at second station with a retardation of 1m/sec^2 . Find the time taken to perform the journey and the distance covered during the acceleration, uniform and retarded motion. (10 Marks)

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CBCS Scheme

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First Semester B.E. Degree Examination, Dec.2016/Jan.2017 Elements of Civil Engineering and Engineering Mechanics

Time: 3 hrs.

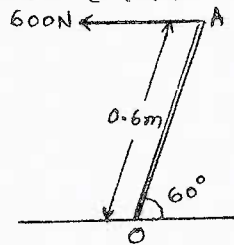
Max. Marks: 80

Note: Answer FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. Explain briefly the scope of the following civil engineering fields. (04 Marks)
 i) Hydraulics ii) Transportation engineering.
- b. Explain on what bases under which the dams are classified. (05 Marks)
- c. Replace the horizontal force of 600N acting on the lever by an equivalent system consisting of a force and a couple at O as shown in fig.Q1(c). (07 Marks)

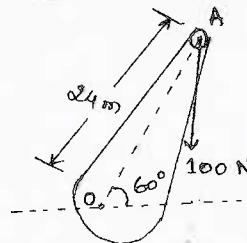
Fig.Q1(c)



OR

- 2 a. Give the comparison of Flexible and Rigid pavements. Also give their advantages and limitations. (04 Marks)
- b. List the various systems of forces with their characteristics and an example for each, with a neat sketch. (05 Marks)
- c. A 100N vertical force is applied to the end of a lever which is attached to a shaft as shown in fig.Q2(c). Determine i) The moment of force about O.
 ii) The horizontal force applied at A which creates same moment about O.
 iii) The smallest force applied at A which creates same moment about O. (07 Marks)

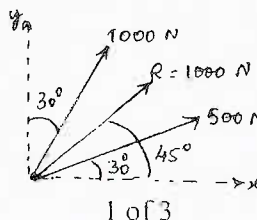
Fig.Q2(c)



Module-2

- 3 a. State and prove Parallelogram law of forces. (05 Marks)
- b. Two forces acting on a body are 500N and 1000N as shown in fig. Q3(b). Determine the third force F such that the resultant of all the three forces is 1000N directed at 45° to the x - axis. (06 Marks)

Fig.Q3(b)

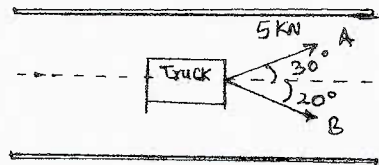


1 of 3

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

- c. A truck is to be pulled along a straight road as shown in fig. Q3(c).
 i) If the force applied along rope A is 5kN inclined at 30° , what should be the force in the rope B, which is inclined at 20° , so that vehicle moves along the road.
 ii) If force of 4kN is applied in rope B at what angle rope B should be inclined so that the vehicle is pulled along the road. (05 Marks)

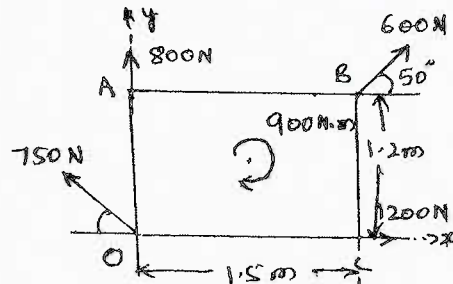
Fig.Q3(c)



OR

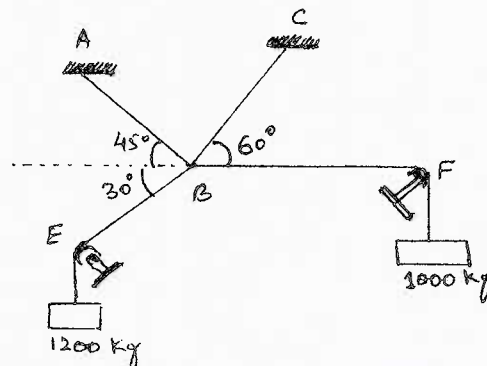
- 4 a. With a neat sketch, explain the basics of static friction and kinetic friction. (03 Marks)
 b. A block of mass 10 kgs placed on an inclined plane is subjected a force F which is parallel to the plane. Taking inclination of the plane with respect to the horizontal as 30° and coefficient of friction between the block and the plane is 0.24. Determine the value of F for i) Impending motion of the block down the plane and ii) Impending motion of the block up the plane. Take acceleration due to gravity $g = 9.81$. (05 Marks)
 c. Find the resultant of the force system acting on a body OABC as shown in fig.Q4(c). Also find the points where the resultant will cut the X and Y axis. (08 Marks)

Fig.Q4(c)

Module-3

- 5 a. Explain the different types of supports and loads in the analysis of beams. (06 Marks)
 b. Find the forces in cables AB and CB shown in fig.Q5(b). The remaining two cables pass over frictionless pulleys E and F and support masses 1200 kg and 1000kg respectively. (10 Marks)

Fig.Q5(b)

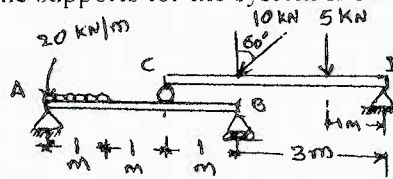


OR

- 6 a. Define Equilibrant. Explain the conditions for equilibrium of coplanar concurrent force system and coplanar non concurrent force system. (06 Marks)

- b. Determine the reactions at the supports for the system shown in fig.Q6(b). (10 Marks)

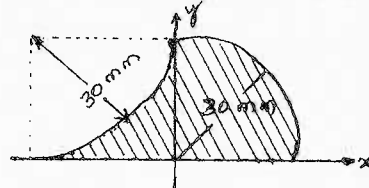
Fig.Q6(b)



Module-4

- 7 a. Determine the Moment of inertia of a semi circle about centroid axis parallel to diameter by the method of integration. (08 Marks)
 b. Determine the centroid of the lamina as shown in fig. Q7(b). (08 Marks)

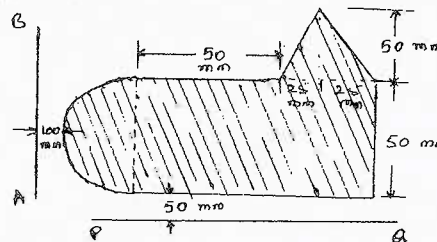
Fig.Q7(b)



OR

- 8 a. Determine the centroid for sector of circle by the method of Integration. (08 Marks)
 b. Find the moment of Inertia of hatched area shown in fig.Q8(b) about the axis PQ. Also determine the radius of gyration. (08 Marks)

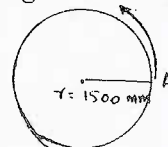
Fig.Q8(b)



Module-5

- 9 a. Derive all three basic equations of motion in Kinematics. (06 Marks)
 b. What is Super elevation and what is its necessity? (04 Marks)
 c. A horizontal bar on length 1.5m rotates. It accelerates uniformly from 1200 rpm to 1500 rpm in an interval of 5 seconds. Find the linear velocity at the beginning and end of the interval. What are the normal and tangential components of the acceleration at the mid – point of the bar after 4 sec after the acceleration begins as shown in fig. Q9(c)? (06 Marks)

Fig.Q9(c)



OR

- 10 a. Derive the equation to the path of the projectile. (08 Marks)
 b. A passenger and goods train are moving on a parallel track in same direction. The passenger train 250m length is moving with a constant velocity of 72 kmph. At an instant its engine approaches the last compartment of the goods train. After 25 sec. the engine starts overtaking the engine of goods train. It takes 30 seconds more to completely overtake the goods train. Find the length and speed of goods train. (08 Marks)

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First/Second Semester B.E. Degree Examination, Dec.2016/Jan.2017
Basic electrical Engineering

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting
atleast TWO questions from each part.**

PART – A

- 1 a. Choose the correct answers for the following : (04 Marks)

- i) Which of the following does not represent the power
 A) VI B) V/I C) I^2R D) J/sec
- ii) The potential difference between A and B in Fig. Q1(a)(ii) is

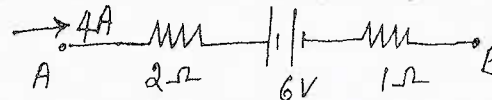


Fig. Q1(a)(ii)

- A) 18V B) -18V C) 4V D) -4V
- iii) When two identical inductors are connected in series aiding, the effective inductance is
 A) $L_1 + L_2 + 2m$ B) $L_1 + L_2 - 2M$ C) $2L_1 + 2L_2 + M$ D) $2L_1 + 2L_2 - 2M$
- iv) The coupling between two magnetically coupled coils is said to be ideal if the coefficient of coupling is
 A) 0 B) 0.25 C) 0.5 D) 1.
- b. Obtain the potential difference V_{xy} in the circuit of Fig. Q1(b). (05 Marks)

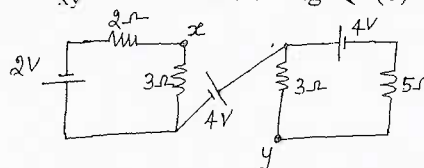


Fig. Q1(b)

- c. Define coefficient of coupling and find its relation with L_1 , L_2 and M . (06 Marks)
- d. A coil consists of 600 turns and current of 10 A in the coil gives rise to a magnetic flux of 1 milli weber. Calculate : i) the self inductance ii) the energy stored iii) the self induced emf when current is reversed in 0.01 second. (05 Marks)
- 2 a. Choose the correct answers for the following : (04 Marks)
- i) The time period of a sinusoidal waveform with frequency 200 Hz is
 A) 0.05 sec B) 0.005 sec C) 0.00055 sec D) 0.5 sec
- ii) The rms value of an AC sinusoidal current is 10A it's peak value is
 A) 7.07 A B) 14.14A C) 10A D) 28.28A
- iii) The power factor of a series RL circuit is given by
 A) $\frac{X_L}{R}$ B) $\frac{R}{X_L}$ C) $\frac{R}{Z}$ D) $\frac{Z}{R}$
- iv) In a series RLC circuit, the inductive reactance is 10Ω and capacitive reactance is 15Ω . Then the total reactance is
 A) 25Ω B) 18.03Ω C) 5Ω D) 1.5Ω .
- b. Derive average value of sinusoidal voltage in terms of its maximum value. (04 Marks)
- c. Prove that current in a purely inductive circuit lags behind the applied voltage by 90° . (06 Marks)
- d. A circuit consists of resistance 10Ω an inductance 16 mH and a capacitance of $150 \mu F$ connected in series. A supply of 100V, 50 Hz is given to the circuit. Find the current and power consumed by the circuit. (06 Marks)

- 3 a. Choose the correct answers for the following : (04 Marks)
- The frequencies of 3 phase voltage in a three phase balanced system are
A) different B) same C) zero D) infinity
 - Electrical displacement between different phases in a six phase system is
A) 60° B) 120° C) 240° D) none of these
 - A balanced star connected load of $(8 + j6)\Omega$ per phase is connected to a 3 phase 440V supply. The line current is
A) 254.03A B) 25.403A C) 103.3A D) 33.33A
 - Two wattmeters connected in a balanced system indicates 4.5 KW, -0.5 KW. The power factor of the circuit is
A) 0.4193 B) 0.707 C) units D) 0.963.
- b. Obtain the relationship between the phase and line values of voltages and currents in a balanced star connected system. (08 Marks)
- c. Three similar coils each having resistance 10Ω and reactance 10Ω are connected in star across 440V, 3-phase supply. Find line current and reading of each two wattmeters connected to measure power. (08 Marks)
- 4 a. Choose the correct answers for the following : (04 Marks)
- The electric energy meter installed near the mains switch in a house is
A) an indicating instrument B) an integrating instrument
C) a recording instrument D) an absolute instrument
 - The damping force in an instrument to
A) oppose the deflecting force B) oppose the controlling force
C) bring the pointer to steady position quickly D) none of these
 - A good earthing should provide _____ resistance in earth path
A) low B) high C) medium D) none of these
 - The ratio fusing current to rated current is known as
A) fuse current ratio B) fuse rated capacity C) fusing factor D) none of these.
- b. Explain two-way control of a lamp. (04 Marks)
- c. Explain the principle of operation of dynamometer type wattmeter. (06 Marks)
- d. Explain with a neat diagram pipe earthing. (06 Marks)

PART – B

- 5 a. Choose the correct answers for the following : (04 Marks)
- The back emf in a DC motor is given as
A) $V + I_a R_a$ B) $V - I_a R_a$ C) V D) $I_a R_a$
 - The emf generated by a DC generator depends upon
A) the flux only ;B) the speed only;C) both the flux and speed ;D) the terminal voltage
 - At the moment of starting a DC motor, its back emf is
A) zero B) maximum C) minimum D) optimum
 - The function of a starter in a DC motor is to
A) control its speed B) increase its starting torque
C) limit the starting current to safer value D) reduce armature reaction.
- b. Mention the classification of DC generator. (04 Marks)
- c. A shunt wound DC generator delivers 496A at 440V to a load. The resistance of the shunt field coil is 110Ω and that of the armature winding is 0.02Ω . Calculate the emf induced in the armature. (04 Marks)
- d. An 8-pole DC generator has 500 conductors on its armature and produces 0.02Wb of flux per pole.
- What voltage will it generate at a speed of 1800 pm if armature is a) lap wound and b) if armature is wave wound?
 - If the allowable current is 5A per path, what KW power generated by the machine when a) lap wound b) wave wound. (08 Marks)

- 6 a. Choose the correct answers for the following :
- The eddy current loss in a transformer is minimized by using
A) solid core B) laminated core C) plastic core D) none of these
 - If an ammeter in the secondary of a 100V/10V transformer reads 10A, the current in the primary would be
A) 1A B) 2A C) 10A D) 100A
 - Efficiency of a transformer is maximum when
A) copper loss = $\sqrt{\text{core loss}}$ B) core loss = $\sqrt{\text{copper loss}}$
C) copper loss = core loss D) none of these
 - Losses which do not occur in a transformer is
A) copper losses B) magnetic losses C) friction losses D) none of these.
- b. Explain briefly the principle of operation of a transformer and show that the voltage ratio of primary and secondary windings is the same as their turns ratio. (04 Marks)
- c. Derive the condition for maximum efficiency in a single-phase transformer. (04 Marks)
- d. In a 25 KVA, 2000/200V transformer, the iron and copper losses are 350 watts and 400 watts respectively, calculate the efficiency at UPF at half full load. (08 Marks)
- 7 a. Choose the correct answers for the following : (04 Marks)
- A 6 pole 1000 rpm alternator generates emf at a frequency of
A) 60 Hz B) 40 Hz C) 25 Hz D) 50 Hz
 - A smooth cylindrical type rotor is used for alternator having
A) low speed B) low and medium speed C) high speed D) none of these
 - Frequency of supply in India is
A) 60 Hz B) 25 Hz C) 50 HZ D) 75 Hz
 - The frequency of emf generated by an alternator depends upon the alternator speed N and number of poles P is given by
A) $\frac{PN}{60}$ B) $\frac{60N}{P}$ C) $\frac{PN}{120}$ D) $\frac{120N}{P}$
- b. Obtain expression for emf of an alternator. (06 Marks)
- c. What are the advantages of stationary armature? (04 Marks)
- d. A 3 phase 50 Hz 16 pole alternator with star connected windings has 144 slots with 10 conductors/slot. The flux per pole is 24.8 mwb. The coils are full pitched and assume $k_d = 0.96$; find : i) speed ii) the line emf. (06 Marks)
- 8 a. Choose the correct answers for the following : (04 Marks)
- An induction motor works with
A) DC only B) AC only C) both AC and DC D) none of these
 - A 3-phase 50Hz 6-pole induction motor has a full load slip of 3%, the synchronous speed is
A) 2000 rpm B) 1000 rpm C) 100 rpm D) 10 rpm
 - Speed of an induction motor is _____ that of N_s
A) greater than B) less than C) same as D) double
 - The frequency of rotor induced current is given by
A) $f' = f/s$ B) $f' = sf$ C) $f' = \sqrt{sf}$ D) $f' = 1 - s$.
- b. What is slip in an induction motor? Why slip is never zero in an induction motor. (04 Marks)
- c. Derive an expression for frequency of rotor induced emf interms of slip of induction motor. (06 Marks)
- d. If a 6-pole induction motor supplied from a 3-phase 50 Hz supply has a rotor frequency of 2.3 Hz. Calculate: i) the percentage slip ii) speed of the rotor. (06 Marks)

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CBCS Scheme

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First/Second Semester B.E. Degree Examination, Dec.2016/Jan.2017 Basic Electrical Engineering

Time: 3 hrs.

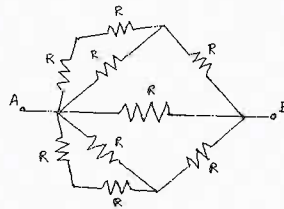
Max. Marks: 100

Note: Answer FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. Calculate effective resistance between points A and B for the combination of resistances given in fig.Q1(a). (05 Marks)

Fig.Q1(a)



- b. Bring out clearly analogy between Magnetic and Electric circuits. (06 Marks)
 c. State and explain : i) Faraday's laws ii) Fleming's left hand rule iii) Fleming's right hand rule. (09 Marks)

OR

- 2 a. The domestic power in a house comprises of loads as given in table. Calculate i) The total load and current taken from the supply of 230V ii) Total energy consumption per month 1HP = 746W. (08 Marks)

Sl. No.	Item	Load	Hours used/day
1	8 Lamps	100 W	10
2	3 fans	80 W	8
3	1 Refrigerator	½ HP	24
4	1 Heater	1000 W	1

- b. An air cored Solenoid consists of 1500 turns of wire wound on a length of 60cm. A search coil of 500 turns, enclosing a mean area of 20cm² is placed centrally in the solenoid. Find
 i) the mutual inductance of the arrangement ii) the emf induced in the search coil, when the current in the solenoid is changing uniformly at the rate of 250A/sec. (06 Marks)
 c. Derive an expression for dynamically induced e.m.f. (06 Marks)

Module-2

- 3 a. With neat sketch, explain the constructional features of a D.C machine. (08 Marks)
 b. Explain with neat sketch, the construction, working and theory of operation of Dynamometer type Wattmeter. (08 Marks)
 c. A four pole D.C. motor has its armature lap wound with 1040 conductors and runs at 1000 rpm, when taking an armature current of 50A from a 250V D.C supply. The resistance of the armature is 0.2Ω. Calculate the useful flux per pole of the motor. (04 Marks)

OR

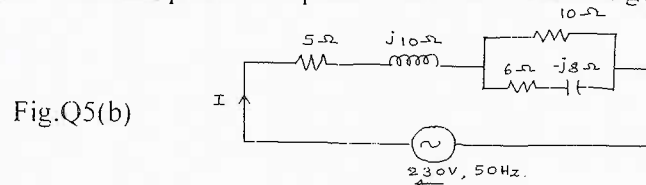
- 4 a. Explain types of D.C. motors and characteristics of D.C. shunt motor. (08 Marks)
 b. Derive the e.m.f. equation of a D.C. generator. (06 Marks)
 c. List out applications of D.C. motor and explain why starter is required for a D.C. motor. (06 Marks)

Module-3

- 5 a. Define i) Real power ii) Reactive power iii) Apparent power iv) Power factor v) Form factor. (05 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

- b. Find the total current, power and power factor of the circuit given in fig. Q5(b). (07 Marks)



- c. Write a note on : i) Two way control of lamp ii) M.C.B. (08 Marks)

OR

- 6 a. With a neat diagram, explain service mains, meter board and distribution board of a domestic wiring system. (08 Marks)
 b. Derive an equation for the power consumed by an R-C series circuit. Draw the waveforms of voltage, current and power. (08 Marks)
 c. An alternating current i is given by $i = 141.4 \sin 314t$. Find i) The maximum value ii) Frequency iii) Time period and iv) the instantaneous value when t is 3m.s. (04 Marks)

Module-4

- 7 a. Show that two Wattmeters are sufficient to measure three phase power and also derive expression for power factor. (08 Marks)
 b. Write the differences between salient pole type and non salient pole type rotor of a synchronous generator. (04 Marks)
 c. Each phase of a delta connected load comprises a resistor of 50Ω and capacitor of $50 \mu\text{f}$ in series. Calculate i) line and phase currents ii) total power when load is connected to a 440V, 3 phase, 50Hz supply. (08 Marks)

OR

- 8 a. A 4 pole, 3 phase, 50Hz star connected alternator has an induced line voltage of 3300V. Determine the flux per pole assuming $K_p = 1$ and $K_d = 0.96$. The armature has 9 slots per pole and 8 conductors per slot. (06 Marks)
 b. The input power to a 1.6KV, 50Hz, 3 phase motor is measured by using two wattmeter method. The motor is running on full load with an efficiency of 86%. The readings of the two wattmeters are 255KW and 85KW. Determine i) The input power ii) The power factor iii) The line current and iv) The output power. (08 Marks)
 c. Derive the emf. equation of an alternator. (06 Marks)

Module-5

- 9 a. Define Efficiency and voltage regulation of a transformer and give their equations. (06 Marks)
 b. Explain the working of Star – Delta starter, with neat sketch for a 3 phase induction motor. (06 Marks)
 c. A single phase 25 KVA, 1000/2000V, 50Hz transformer has a maximum efficiency of 98% at full load u.p.f. Determine its efficiency at i) $3/4^{\text{th}}$ full load u.p.f ii) $1/2$ full load 0.8 p.f iii) 1.25 full load 0.9 p.f. (08 Marks)

OR

- 10 a. Prove that the stator magnetic field has a constant magnitude and rotates at synchronous speed in an induction motor. (08 Marks)
 b. Derive the e.m.f equation of a transformer. (06 Marks)
 c. A 3 phase induction motor is wound for 4 pole and is supplied from 50Hz system. Calculate i) Synchronous speed ii) The speed of the motor when slip is 4% iii) The rotor current frequency when motor runs at 1440 rpm. (06 Marks)

* * * * *

CBCS Scheme

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15EME14/24

First/Second Semester B.E. Degree Examination, Dec.2016/Jan.2017 Elements of Mechanical Engineering

Time: 3 hrs.

Max. Marks: 80

Note: Answer FIVE full questions, choosing
ONE full question from each module.

Module-1

- 1 a. Define renewable and non-renewable energy resources and differentiate them. (06 Marks)
b. With the help of T-H diagram, explain the generation of steam at constant pressure. (10 Marks)

OR

- 2 a. Define : i) Dryness fraction ii) Sensible heat iii) Latent heat iv) Enthalpy of steam. (04 Marks)
b. Draw a neat diagram and explain the construction and working of "Liquid flat plate collector" used for water heating applications. (12 Marks)

Module-2

- 3 a. What is steam turbine? Show the classifications of steam turbine. (06 Marks)
b. With a neat sketch, explain the working of Francis's turbine. (10 Marks)

OR

- 4 a. With the help of 'P-V' diagram, explain the operation of 4-S petrol engine. (08 Marks)
b. Following data are collected from a 4-S single cylinder engine at full load.
Bore = 200mm ; stroke = 280mm ; speed = 300rpm. Indicated mean effective pressure = 5.6 bar, Torque on the brake drum = 250N-m, fuel consumed = 4.2kg/hour, and calorific value of fuel = 41,000kJ/kg.
Determine :
i) Mechanical efficiency
ii) Indicated thermal efficiency, and
iii) Brake thermal efficiency. (08 Marks)

Module-3

- 5 a. With simple sketches, explain the following lathe operations :
i) Facing ii) Cylindrical turning. (06 Marks)
b. Define automation. Discuss the types of automation along with their merits and demerits. (10 Marks)

OR

- 6 a. Show the differences between drilling and boring. (04 Marks)
b. Define robot. State the different types of robot configurations. (04 Marks)
c. Draw a neat diagram to show the robot arm movement in Cartesian configuration and explain. (08 Marks)

Module-4

- 7 a. State the characteristics and applications of : i) Aluminium and its alloys ii) Copper and its alloys. (08 Marks)
b. Differentiate between soldering and brazing. (04 Marks)
c. State the advantages and disadvantages of welding over other types of joining processes. (04 Marks)

OR

- 8 a. List the advantages and limitations of composites. (08 Marks)
b. With a neat diagram, explain the Oxy-acetylene welding process. (08 Marks)

Module-5

- 9 a. Define refrigeration. State the applications of refrigeration. (04 Marks)
b. Define the following refrigeration terms :
i) Refrigerant ii) ton of refrigeration iii) COP iv) relative COP. (04 Marks)
c. With the help of a flow diagram, explain the functioning of "Vapour compression refrigeration cycle". (08 Marks)

OR

- 10 a. What is refrigerant? State the desired properties of refrigerant. (06 Marks)
b. Draw a neat diagram of a room air conditioner and explain. (10 Marks)

* * * * *

CBCS Scheme

14

USN

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14ELE15/25

First/Second Semester B.E. Degree Examination, Dec.2016/Jan.2017 Basic Electrical Engineering

Time: 3 hrs.

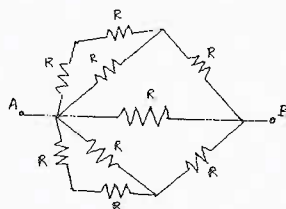
Max. Marks: 100

Note: Answer FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. Calculate effective resistance between points A and B for the combination of resistances given in fig.Q1(a). (05 Marks)

Fig.Q1(a)



- b. Bring out clearly analogy between Magnetic and Electric circuits. (06 Marks)
 c. State and explain : i) Faraday's laws ii) Fleming's left hand rule iii) Fleming's right hand rule. (09 Marks)

OR

- 2 a. The domestic power in a house comprises of loads as given in table. Calculate i) The total load and current taken from the supply of 230V ii) Total energy consumption per month 1HP = 746W. (08 Marks)

Sl. No.	Item	Load	Hours used/day
1	8 Lamps	100 W	10
2	3 fans	80 W	8
3	1 Refrigerator	½ HP	24
4	1 Heater	1000 W	1

- b. An air cored Solenoid consists of 1500 turns of wire wound on a length of 60cm. A search coil of 500 turns, enclosing a mean area of 20cm² is placed centrally in the solenoid. Find
 i) the mutual inductance of the arrangement ii) the emf induced in the search coil, when the current in the solenoid is changing uniformly at the rate of 250A/sec. (06 Marks)
 c. Derive an expression for dynamically induced e.m.f. (06 Marks)

Module-2

- 3 a. With neat sketch, explain the constructional features of a D.C machine. (08 Marks)
 b. Explain with neat sketch, the construction, working and theory of operation of Dynamometer type Wattmeter. (08 Marks)
 c. A four pole D.C. motor has its armature lap wound with 1040 conductors and runs at 1000 rpm, when taking an armature current of 50A from a 250V D.C supply. The resistance of the armature is 0.2Ω. Calculate the useful flux per pole of the motor. (04 Marks)

OR

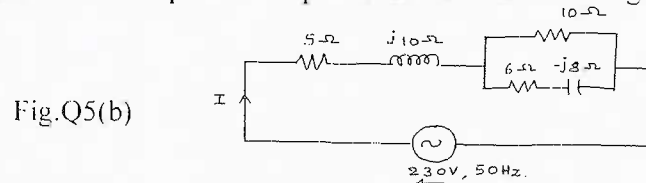
- 4 a. Explain types of D.C. motors and characteristics of D.C. shunt motor. (08 Marks)
 b. Derive the e.m.f. equation of a D.C. generator. (06 Marks)
 c. List out applications of D.C. motor and explain why starter is required for a D.C. motor. (06 Marks)

Module-3

- 5 a. Define i) Real power ii) Reactive power iii) Apparent power iv) Power factor v) Form factor. (05 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

- b. Find the total current, power and power factor of the circuit given in fig. Q5(b). (07 Marks)



- c. Write a note on : i) Two way control of lamp ii) M.C.B. (08 Marks)

OR

- 6 a. With a neat diagram, explain service mains, meter board and distribution board of a domestic wiring system. (08 Marks)
 b. Derive an equation for the power consumed by an R-C series circuit. Draw the waveforms of voltage, current and power. (08 Marks)
 c. An alternating current i is given by $i = 141.4 \sin 314t$. Find i) The maximum value ii) Frequency iii) Time period and iv) the instantaneous value when t is 3m.s. (04 Marks)

Module-4

- 7 a. Show that two Wattmeters are sufficient to measure three phase power and also derive expression for power factor. (08 Marks)
 b. Write the differences between salient pole type and non salient pole type rotor of a synchronous generator. (04 Marks)
 c. Each phase of a delta connected load comprises a resistor of 50Ω and capacitor of $50 \mu\text{f}$ in series. Calculate i) line and phase currents ii) total power when load is connected to a 440V, 3 phase, 50Hz supply. (08 Marks)

OR

- 8 a. A 4 pole, 3 phase, 50Hz star connected alternator has an induced line voltage of 3300V. Determine the flux per pole assuming $K_p = 1$ and $K_d = 0.96$. The armature has 9 slots per pole and 8 conductors per slot. (06 Marks)
 b. The input power to a 1.6KV, 50Hz, 3 phase motor is measured by using two wattmeter method. The motor is running on full load with an efficiency of 86%. The readings of the two wattmeters are 255KW and 85KW. Determine i) The input power ii) The power factor iii) The line current and iv) The output power. (08 Marks)
 c. Derive the emf. equation of an alternator. (06 Marks)

Module-5

- 9 a. Define Efficiency and voltage regulation of a transformer and give their equations. (06 Marks)
 b. Explain the working of Star – Delta starter, with neat sketch for a 3 phase induction motor. (06 Marks)
 c. A single phase 25 KVA, 1000/2000V, 50Hz transformer has a maximum efficiency of 98% at full load u.p.f. Determine its efficiency at i) $3/4^{\text{th}}$ full load u.p.f ii) $1/2$ full load 0.8 p.f iii) 1.25 full load 0.9 p.f. (08 Marks)

OR

- 10 a. Prove that the stator magnetic field has a constant magnitude and rotates at synchronous speed in an induction motor. (08 Marks)
 b. Derive the e.m.f equation of a transformer. (06 Marks)
 c. A 3 phase induction motor is wound for 4 pole and is supplied from 50Hz system. Calculate i) Synchronous speed ii) The speed of the motor when slip is 4% iii) The rotor current frequency when motor runs at 1440 rpm. (06 Marks)

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CBCS Scheme

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15
15ELE15/25

First/Second Semester B.E. Degree Examination, Dec.2016/Jan.2017 Basic Electrical Engineering

Time: 3 hrs.

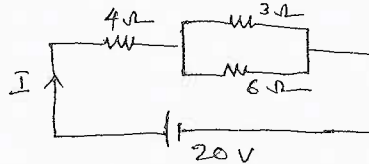
Max. Marks: 80

Note: Answer FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. Define KCL and KVL with an example. (05 Marks)
b. From the given below circuit, find the current through 6Ω resistor. [Fig.Q.1(b)]. (05 Marks)

Fig.Q.1(b)



- c. A coil of 1000 turns is wound on a ring of silicon steel, having mean diameter of 10cm and relative permeability 1200. Its cross sectional area is 12 sq.cm. When a current of 5A flows through the coil, find:
i) Flux in the core
ii) Inductance of the coil
iii) Induced emf if the flux falls to zero in 20m sec. (06 Marks)

OR

- 2 a. Derive an expression for dynamically induced emf with a neat diagram. (05 Marks)
b. Two coupled coils of self inductance 0.8H and 0.2H, have a coefficient of coupling 0.9. Find the mutual inductance and turns ratio. (05 Marks)
c. A 10Ω resistance is connected in series with a parallel combination of 15Ω and 20Ω resistors. The circuit is applied with V volts. The power taken by the circuit is 150 watts. Find the total current through the circuit and power consumed in all the resistors. (06 Marks)

Module-2

- 3 a. With a neat sketch, explain the construction of various parts of a DC machine. (05 Marks)
b. A 4-pole, lap connected DC generator has 600 armature conductors and runs at 1200rpm. If the flux per pole is 0.06 wb, calculate the emf induced. Also find the speed at which it should be driven to produce same emf when wave connected. (05 Marks)
c. With a neat figure, explain the construction and working principle of dynamometer type wattmeter. (06 Marks)

OR

- 4 a. Explain the construction and principle of operation of induction type single phase energy meter. (05 Marks)
b. 4-pole, 220V, lap connected DC shunt motor has 36 slots, each slot containing 16 conductors. It draws a current of 40A from supply. The field resistance and armature resistances are 110Ω and 0.1Ω respectively. The motor develops an output power of 6kW. The flux per pole in 40m wb. Calculate: i) Speed; ii) Torque developed by armature; iii) Shaft torque. (05 Marks)
c. Derive emf equation for DC generator. (06 Marks)

Module-3

- 5 a. Derive an expression for power in pure capacitor circuit and draw voltage, current and power waveforms. (05 Marks)
- b. A series circuit with a resistor of 100Ω , capacitor of $25\mu\text{F}$ and inductance of 0.15H is connected across 220V , 50Hz supply. Calculate impedance, current, power and p.f. of circuit. (05 Marks)
- c. With a neat sketch, explain 3-way control of lamp. (06 Marks)

OR

- 6 a. Define earthing. Explain any one type of earthing with a neat diagram. (05 Marks)
- b. Two impedances $(150-157j)\Omega$ and $(100 + 110j)\Omega$ are connected in parallel across 200V , 50Hz supply. Find branch currents, total current and total power consumed in the circuit. Draw the phasor diagram. (05 Marks)
- c. Define power factor and mention its practical importance. (06 Marks)

Module-4

- 7 a. Mention the advantages of three phase system over single phase system. (05 Marks)
- b. Three coils each having resistance of 10Ω and inductance of 0.02H are connected in star across 440V , 50Hz , 3ϕ supply. Calculate the line current and total power consumed. (05 Marks)
- c. A 6-pole, 3ϕ , star connected alternator has an armature with 90 slots and 12 conductors per slot and rotates at 1000 rpm . The flux per pole is 0.5wb . Calculate emf generated, if the winding factor is 0.97 and full pitched. (06 Marks)

OR

- 8 a. With a neat sketch, explain the constructional details of alternator. (05 Marks)
- b. A 3ϕ , 16 pole alternator has a star connected winding with 144 slots and 10 conductor per slots. The flux per pole is 30mwb . Find the phase and line voltages, if the speed is 375rpm . (05 Marks)
- c. A 3ϕ , 400V , motor takes an input of 40kW at 0.45 p.f. lag. Find the reading of each of the two single phase wattmeters connected to measure the input. (06 Marks)

Module-5

- 9 a. Explain the working principle of single phase transformer. (05 Marks)
- b. Find the efficiency of 150kVA , single phase transformer at i) Full load upf; ii) 50% of full load at 0.8p.f . If the copper loss at full load is 1600 watts and iron loss is 1400 watts. (05 Marks)
- c. A 3ϕ , 4-pole, 400V , 50Hz induction motor runs with a slip of 4% , find rotor speed and frequency. (06 Marks)

OR

- 10 a. Explain the working principle of an 3ϕ induction motor with a neat sketch. (05 Marks)
- b. A 10 pole induction motor supplied by a 6 pole alternator, which is driven at 1200 rpm . If the motor runs at slip of 3% , what is its speed? (05 Marks)
- c. A single phase transformer has 400 primary and 1000 secondary turns. The net cross sectional area of core is 60cm^2 . The primary winding is connected to 500V , 50Hz . Find: i) Peak value of core flux density; ii) Emf induced in the secondary winding. (06 Marks)

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I / II Semester B.E Degree Examination, Dec.2016/Jan.2017

**CONSTITUTION OF INDIA AND PROFESSIONAL ETHICS
(COMMON TO ALL BRANCHES)**

Time: 2 hrs.]

[Max. Marks: 50

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the fifty questions, each question carries one mark.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners on the OMR sheets are strictly prohibited.**

-
1. The system of Dyarchy was introduced for the first time by the
 - a) Government of India Act, 1858
 - b) Indian Councils Act, 1909
 - c) Government of India Act, 1919
 - d) Government of India Act, 1935.
 2. The emergency provisions of the Indian Constitution are adopted from the Constitution of
 - a) U.S.A
 - b) Germany
 - c) Canada
 - d) Russia.
 3. Which of the following Articles contain Fundamental Rights?
 - a) Article 12 to 35
 - b) Article 15 to 39
 - c) Article 30 to 45
 - d) Article 19 to 29.
 4. Since when India became a republic?
 - a) 15th August, 1947
 - b) 26th November, 1949.
 - c) 26th January, 1950
 - d) 1st January, 1949.
 5. This word was not added to the Preamble of the Indian Constitution by 42nd Constitution Amendment Act.
 - a) Socialist
 - b) Republic
 - c) Secular
 - d) Integrity.
 6. Fundamental Rights have been classified into
 - a) Five groups
 - b) Six groups
 - c) Seven groups
 - d) Four groups.
 7. Dr. B.R. Ambedkar termed Article 32 of the Indian Constitution as the "Heart and Soul of the Indian Constitution". Which one of the following fundamental right it contains?
 - a) Right to freedom
 - b) Right to Constitutional remedies
 - c) Right against exploitation
 - d) Right to freedom of religion.
 8. Cultural and Educational Rights have been incorporated under Fundamental Rights with the objective
 - a) To preserve Indian culture
 - b) To eradicate illiteracy
 - c) To evolve a single culture
 - d) To help minorities to conserve their culture

9. Under the Constitution, the power to issue a writ of Habeas Corpus is vested in
 - a) High Courts alone
 - b) Supreme Court alone
 - c) Both Supreme Court and High Court
 - d) All Courts down to the District Courts
10. Right to property, according to Constitution of India is a
 - a) Fundamental Right
 - b) Directive principle
 - c) Legal Right
 - d) Social Right
11. Which part of the Indian Constitution deals with the Directive Principles of State Policy?
 - a) Part III
 - b) Part IV
 - c) Part V
 - d) Part VI.
12. Which of the following Directive Principles is based on Gandhian ideology?
 - a) Equal pay for equal work of both men and women
 - b) Protection of children from exploitation
 - c) Securing for all people right to work
 - d) Promotion of cottage industries.
13. The main purpose of including the Directive Principles of State Policy in the Indian Constitution is to
 - a) Establish a Welfare state
 - b) Establish a Secular state
 - c) Check the arbitrary action of the Government
 - d) Establish a religious state.
14. The Directive Principles of State Policy are
 - a) Non - Justiceable
 - b) Partly Justiceable
 - c) Always Justiceable
 - d) Justiceable.
15. Which one of the following is not a Directive Principle of State Policy?
 - a) Improvement of Public health
 - b) Prohibiting the slaughter of cows and calves
 - c) Free legal aid to poor
 - d) Provisions for Adult Education.
16. Which one among the following is not a fundamental duty?
 - a) Safeguarding public property
 - b) Avoid corruption
 - c) Abide by the Constitution
 - d) Developing scientific temper
17. The total number of Fundamental duties of Indian citizens are
 - a) 10
 - b) 11
 - c) 12
 - d) 15
18. Members of Rajya Sabha are elected by
 - a) Members of Lok Sabha
 - b) Members of Legislative council
 - c) Members of Legislative Assembly
 - d) Adult Franchise
19. How many members represent Union Territories in Lok Sabha?
 - a) 20
 - b) 21
 - c) 22
 - d) 25
20. President of India is an integral part of
 - a) Lok Sabha only
 - b) Rajya Sabha only
 - c) Parliament
 - d) Union Council of Ministers.
21. The Supreme Court of India is
 - a) Under the Prime Minister
 - b) Under the President
 - c) Under the Parliament
 - d) Independent.
22. Who among the following gives advice to the President of India?
 - a) Council of Ministers with the Prime Minister at the head
 - b) Lok Sabha Speaker
 - c) Chief Justice of India
 - d) Chairman of Rajya Sabha.

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First/Second Semester B.E Degree Examination, Dec.2016/Jan.2017

Constitution of India and Professional Ethics

(COMMON TO ALL BRANCHES)

Time: 2 hrs.]

[Max. Marks: 50

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the fifty questions, each question carries **ONE mark**.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

-
1. 'Legislature' means

a) Body of Administrator	b) Body of law making
c) Body of Ministers	d) Body of governors
 2. The ultimate source of authority of India.

a) The people	b) The supreme court of India
c) The constitution	d) The Government
 3. Full form of PIL is,

a) Private Interest Litigation	b) Public Interest Legislation
c) Public Interest Litigation	d) None of these
 4. A political party is accorded status of an opposition party in Lok Sabha if it captures atleast.

a) 15%	b) 20%	c) 18%	d) 10%
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 5. Engineering ethics is a.

a) Natural ethics	b) Preventive ethics
c) Developing ethics	d) Scientifically developed ethics
 6. Patent holder does not allow others to use patented information for _____ years from date of filing.

a) 50 years	b) 75 years	c) 20years	d) 100 years
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 7. Conflict of interest may be

a) Potential	b) False	c) Created	d) Imaginary
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 8. The formulae of a soft drink is an example of,

a) Trade mark	b) Copy right	c) Patent	d) Trade secret
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9. For an ethical engineer, responsibility is,
 a) Moral responsibility
 c) Both legal and moral
 b) Legal responsibility
 d) Social responsibility
10. Present chief justice of India is,
 a) Mr. H. Lakshminaraswamy Dattu
 c) Balakrishnan
 b) Homi Kapadia
 d) Markandeya Katju
11. Constitution of this country is the oldest and the shortest,
 a) Germany
 b) UK
 c) Japan
 d) USA
12. 'Amend' means
 a) Make the meaning more clear
 c) Remove the difficulties
 b) Omit
 d) Make the object of the act more clear
13. Who made the constitution of India?
 a) The Indian parliament
 c) All state assemblies
 b) The British parliament
 d) The constituent assembly
14. Our constitution was adopted on _____ and came into effect on _____,
 a) 26th Nov. 1949 : 26th Jan. 1950
 c) 15th Aug. 1948 : 15th Jan. 1950
 b) 26th Jan. 1950 : 26th Nov. 1949
 d) 15th Jan. 1950 : 15th Aug. 1947
15. Balwanth Rai Mehtha committee was appointed in,
 a) 1958
 b) 1956
 c) 1960
 d) 1972
16. The 73rd and 74th constitutional amendments which came into affect in,
 a) 1972
 b) 1997
 c) 1962
 d) 1993
17. The self governing rural local bodies are known in India as,
 a) Lok Pal institutions
 c) Panchyati Raj institution
 b) Lok Adalat institutions
 d) All of these
18. The international co-operative alliance defines a cooperative as,
 a) an autonomous association
 c) a rich class people association
 b) an government association
 d) a poor class people association.
19. The Mac lagan committee advocated that,
 a) there should be one cooperative for every village
 b) there should be one cooperative for every town
 c) there should be one cooperation for every district.
 d) All of these
20. Which is the commission appointed by the Government of India to investigate the conditions of socially and educationally backward classes of the society?
 a) Narasimhan
 b) Nanavathi
 c) Mandal
 d) Singhvi
21. Who appoints the Attorney general of India?
 a) Chief Justice of India
 c) Prime Minister
 b) President
 d) Union Minister of Law
22. Which of the following is no longer a fundamental right?
 a) Right of liberty
 c) Right to religion
 b) Right to equality
 d) Right to property

GBCS Scheme

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Question Paper Version : C

First/Second Semester B.E Degree Examination, Dec.2016/Jan.2017

Constitution of India, Professional Ethics & Human Rights

(COMMON TO ALL BRANCHES)

Time: 2 hrs.]

[Max. Marks: 40

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the forty questions, each question carries one mark.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
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-
1. What kind of elections takes place to Rajya Sabha?
a) direct elections
b) indirect election
c) by elections
d) mid-term election
 2. Annual statement of income and expenditure of the government is known as
a) agenda
b) catalogue
c) calendar
d) budget
 3. The Governor of the state is responsible for his actions to
a) The state legislative assembly
b) The president
c) The prime minister
d) The chief minister
 4. This is not the power of the chief minister
a) formation of government
b) control over ministers
c) chief advisor to the governor
d) control over state judiciary
 5. The number of ministers including the chief minister shall not exceed _____ of the total number of MLAs.
a) 25%
b) 30%
c) 15%
d) 20%
 6. The supreme court has the power to
a) create high courts
b) create the whole judicial system
c) supervise and control the high court
d) none of these
 7. Article 243(D) and 243(T) provides for reservation of seats for SC's and ST's in _____.
a) Lok Sabha
b) Rajya Sabha
c) Vidhan Sabha
d) Panchayat Raj

8. The term backward class implies backwardness
 a) socially and educationally b) culturally
 c) economically d) none of these
9. Proclamation of emergency must be laid before _____.
 a) both the houses of the parliament b) either house of parliament
 c) before the supreme court d) none of these
10. President can impose state emergency when he receives a report from the _____.
 a) chief minister b) governor
 c) chief justice d) attorney general
11. Every citizen of the age of _____ years is eligible to vote in an election.
 a) 16 years b) 21 years c) 22 years d) 18 years
12. Election disputes can be adjudicated only by _____.
 a) high court b) criminal court
 c) civil court d) election commission
13. Which among the following were given supremacy over fundamental rights?
 a) fundamental duties b) citizenship
 c) DPSP d) none of these
14. What do you mean by 'minimalist approach'?
 a) sticking on maximum acceptable standards
 b) sticking on minimum acceptable standards
 c) sticking on full acceptable standards
 d) none of these
15. In 'good work views' focus is given on _____.
 a) concept of skillful work
 b) concept of legal work
 c) concept of logical work
 d) the concept of responsibility beyond the legal and moral and call of duty
16. What is one of the hindrances to the responsibility?
 a) self-deception b) self-assessment
 c) self-realization d) negligence
17. Telling truth when should not is _____.
 a) honesty b) Dharma of an engineer
 c) misusing of the truth d) business principle
18. Integrity in engineering means _____.
 a) quality of being honest and fair b) quality of service to the customer
 c) quality of self-esteem behavior d) quality of self-aggrandizement
19. Plagiarism means _____.
 a) Use of intellectual property of others
 b) Research work
 c) Copying information from other sources
 d) None of these

- 20. Copyright is for _____.
a) 15 years after his or her death b) 20 years after his or her death
c) 50 years after his or her death d) 100 years after his or her death
- 21. The formulae of a soft drink is an example of
a) trade secret b) patent c) copy right d) trade mark
- 22. When did the Human Rights Act come into effect?
a) 1951 b) 1989 c) 1993 d) 1995
- 23. "Human Rights" means the rights relating to
a) life b) liberty c) equality d) all of these
- 24. Conflict of interest may be
a) potential b) false c) created d) imaginary
- 25. One of the objectives of the constitution is to achieve
a) law and order b) justice
c) political stability d) social control
- 26. State is authorized to make special provision for _____.
a) women and children b) men only
c) men and women d) none of these
- 27. Freedom of speech and expression means right to express one's own opinion only by _____.
a) words by mouth b) writing and printing
c) both (a) and (b) d) none of these
- 28. Article 21 protects
a) life only b) liberty only
c) life and personal liberty d) none of these
- 29. Telephone tapping is violation of
a) right to freedom of speech and expression
b) right to life and personal liberty
c) right to carry on any profession
d) right to equality
- 30. Right to education is a _____.
a) fundamental right b) ordinary legal right
c) not a right d) both (a) and (b)
- 31. Minorities have right to _____.
a) establish and administer educational institutions
b) only to establish educational institutions
c) carry out profession or business
d) none of these
- 32. Mandamus means
a) request b) command c) permission d) all of these

33. The underlying objective of the directive principles is to achieve _____.
a) police state b) secular state c) welfare state d) none of these
34. 'Equal pay for equal work' is an accomplishment of _____.
a) right to freedom b) right to religion
c) right to constitutional remedies d) right to equality
35. Sexual harassment of working women is violation of
a) fundamental duty b) directive principles of state policy
c) fundamental right d) rule of law
36. State should protect every monument or place or object declared to be of _____.
a) state importance b) national importance
c) international importance d) local importance
37. In Child Labour Abolition case the supreme court has held that the children below the age of _____ cannot be employed in any hazardous industry.
a) 16 years b) 18 years c) 21 years d) 14 years
38. Name the group, which is created for the election of the president
a) electoral college b) elected college
c) electoral commission d) none of these
39. Who is the supreme commander of the defense force of India?
a) Prime minister b) The president
c) Chief justice of S.C. d) Parliament
40. Who can allot and transfer the portfolios to the ministers?
a) The prime minister b) The president
c) Parliament d) Cabinet

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22

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10PHY12/22

First/Second Semester B.E. Degree Examination, June/July 2017
Engineering Physics

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer any FIVE full questions, choosing at least two from each part.

2. Physical constants: $h = 6.625 \times 10^{-34}$ J-S, $C = 3 \times 10^8$ ms⁻¹, $m_e = 9.1 \times 10^{-31}$ kg, $L = 1.38 \times 10^{-23}$ Fm⁻¹, $\epsilon_0 = 8.854 \times 10^{-12}$ Fm⁻¹, $e = 1.6 \times 10^{-19}$ C, Avogadro number $N_A = 6.025 \times 10^{26}$ /K mole.

PART – A

- 1 a. Choose the correct answers for the following :
- i) The associated wavelength of an electron beam is acceleration from rest through a potential difference of 200V is
 A) 0.868 Å B) 0.0868 Å C) 0.969 Å D) 0.0969 Å
 - ii) In blackbody radiation spectrum, with increase of temperature the maximum intensity position shift towards.
 A) Shorter wavelength B) longer wavelength
 C) Entire wavelength D) no change.
 - iii) Davisson and Germer succeeded in their experiment in proving
 A) Bragg's law B) Particle nature of electrons
 C) Wave nature of electrons D) That nickel is a crystal
 - iv) Einstein's photo electric equation is given by
 A) $\frac{1}{2} mV_{\max}^2 = h\nu - \phi$ B) $\frac{1}{2} mV_{\max}^2 = h\nu + \phi$ C) $\frac{1}{2} mV_{\max}^2 = h\nu - h_1$ D) None of these
- (04 Marks)**
- b. What is Plank's radiation law? Show that Planck's law reduces to Wien's law and Rayleigh Jeans law. **(06 Marks)**
- c. Define phase velocity and group velocity and derive a relation between them. **(06 Marks)**
- d. Estimate the potential difference through which a proton is needed to be accelerated so that its de Broglie wavelength becomes equal to 1 Å, given mass of proton is 1.673×10^{-27} kg. **(04 Marks)**
- 2 a. Choose the correct answers for the following :
- i) The energy required for an electron to jump from ground state to the second excited state in a potential well of width L is
 A) $E = \frac{h^2}{mL^2}$ B) $E = \frac{h^2}{4mL^2}$ C) $E = \frac{h^2}{8mL^2}$ D) $\frac{2h^2}{mL^2}$
 - ii) According to max Born's interpretation, $|\psi|^2$ represents
 A) probability density B) Energy density
 C) Particle density D) Charge density.
 - iii) A wave function is an acceptable wave function if it is
 A) Finite every where B) Continuous every where
 C) Single valued every where D) All of these.
 - iv) If the uncertainty in momentum is large, the uncertainty in wavelength is
 A) Small B) Large C) Zero D) None of these
- (04 Marks)**

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

- b. Obtain the time independent Schrödinger wave equation, in one dimension. (07 Marks)
- c. State and explain Heisenberg's uncertainty principle. (04 Marks)
- d. An electron and a 150×10^{-3} Kg base ball are travelling at a velocity of 220m/s, measured to an accuracy of 0.005%. Calculate uncertainty in position of each. (05 Marks)
- 3 a. Choose the correct answers for the following :
- i) The free electrons in classical free electron theory are treated as
 A) rigidly fixed lattice points B) Gas molecules
 C) Liquid molecules D) None of these.
- ii) The electron mobility in a solid is
 A) $\mu = \frac{V_d}{E}$ B) $\mu = V_d E$ C) $\mu = \frac{V_d}{L}$ D) $\mu = V_d L$
- iii) The Fermienergy of a metal at absolute zero temperature is proportional to
 A) $n^{1/3}$ B) $n^{3/2}$ C) $n^{2/3}$ D) n^2
- iv) The collision time and root mean square velocity of an electron at room temperature are 3×10^{-14} s and 1×10^5 m/s respectively. The classical value of mean free path of the electron is
 A) 3×10^{-19} m B) 3×10^{-10} m C) 3×10^{-9} m D) 3×10^{19} s
 (04 Marks)
- b. Using the free electron theory, derive an expression for electrical conductivity in metals. (06 Marks)
- c. Discuss the dependence of Fermic factor on temperature. (06 Marks)
- d. Calculate the Fermienergy of sodium at 0K assuming that it has one free electron per atom and density of sodium is 970 kg/m^3 and atomic weight 23. (04 Marks)
- 4 a. Choose the correct answers for the following :
- i) If the radius of hydrogen atom is 0.053×10^{-9} m, then its electronic polarizability is
 A) $1.656 \times 10^{-41} \text{ Fm}^2$ B) $3.035 \times 10^{-40} \text{ Fm}^2$ C) $5.9 \times 10^{-21} \text{ Fm}^2$ D) $16.56 \times 10^{-41} \text{ Fm}^2$
- ii) The polarization mechanism that depends on temperature is
 A) Electronic B) ionic C) orientational D) Space charge
- iii) The relative permeability for diamagnetic materials is
 A) > 1 B) < 1 C) $= 1$ D) Zero
- iv) Piezoelectric effect is used to convert _____ energy into _____ energy.
 A) Mechanical, electrical B) Electrical, mechanical
 C) Electrical, light D) None of these. (04 Marks)
- b. Define dielectric polarization. Discuss different types of polarization mechanics. (07 Marks)
- c. Compare soft and hard magnetic materials on the basis of hysteresis curve, Give example and applications for each type. (05 Marks)
- d. The dielectric constant of sulphur is 3.4. Assuming a cubic lattice for its structure, calculate the electronic polarizability of sulphur. The atomic weight and density of sulphur are 32.07 and $2.07 \times 10^3 \text{ kg/m}^3$ respectively. (04 Marks)

PART – B

- 5 a. Choose the correct answers for the following :
- i) The ratio of Einstein's spontaneous and stimulated emission coefficients is
 A) $\frac{8\pi h \lambda^3}{C^3}$ B) $\frac{8\pi h \gamma^3}{C^3}$ C) $\frac{8\pi h \gamma^2}{C^2}$ D) $\frac{8\pi h \lambda^2}{C^2}$
- ii) The process of producing population inversion is known as
 A) absorption B) emission C) pumping D) None of these

- b. What are miller indices? Explain procedure to find miller indices with an example. (05 Marks)
- c. Describe how Bragg's X-ray spectrometer is used to determine the wavelength of an X-ray beam. (06 Marks)
- d. Monochromatic X-rays of wavelength 0.82 \AA undergo first order Bragg reflection from a crystal of cubic lattice with lattice constant 3 \AA , at a glancing angle of 7.855° . Identify the possible planes which give rise to this reflection in terms of their miller indices. (05 Marks)
- 8 a. Choose the correct answers for the following :
- i) The nanostructure reduced in only one direction is known as
A) quantum dot B) Quantum wire C) film D) Quantum well
- ii) The signal due to a reflected wave is called
A) transmitted wave B) longitudinal wave C) echo D) peaco
- iii) The elastic behavior of a liquid is characterized by its
A) Young's modulus B) Bulk modulus
C) Rigidity modulus D) Poisson's ratio
- iv) An acoustic grating can be made by
A) Setting up a standing wave pattern in a liquid using ultrasonic's
B) Subjecting an optical grating to pressure waves of ultrasonic frequency.
C) Drawing lines on a glass plate at equal width
D) It is only a theoretical concept. (04 Marks)
- b. Write a note on nanotechnology. (04 Marks)
- c. Write a note on fullerene with applications. (06 Marks)
- d. Describe a method of measuring velocity of ultrasonic waves in a liquid. (06 Marks)

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14PHY12/22

First/Second Semester B.E. Degree Examination, June/July 2017

Engineering Physics

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer FIVE full questions, selecting ONE full question from each module.

2. Physical constants : Velocity of light, $c = 3 \times 10^8$ m/s

Planck's constant, $h = 6.625 \times 10^{-34}$ JS

Mass of electron, $m = 9.1 \times 10^{-31}$ kg

Boltzmann constant, $k = 1.38 \times 10^{-23}$ J/K

Avagadro number, $N_A = 6.02 \times 10^{26}$ /K mole

Module-1

- 1
 - a. State and explain Planck's law of radiation. Show that it reduces to Wien's law and Rayleigh-Jeans law under certain conditions. (06 Marks)
 - b. State Heisenberg's uncertainty principle. Using this principle show that an electron does not exist within the nucleus of an atom. (06 Marks)
 - c. What is the physical significance of wave function? Mention its properties. (04 Marks)
 - d. Estimate the potential difference through which an electron is needed to be accelerated so that its de Broglie wavelength becomes equal to 20 Å. (04 Marks)

- 2
 - a. Define phase velocity and group velocity. Show that group velocity is equal to particle velocity. (06 Marks)
 - b. Derive the expression for energy eigen value for a material particle in a one dimensional infinite potential well. (07 Marks)
 - c. What are matter waves? Mention their properties. (03 Marks)
 - d. A material particle is moving with a speed of 4×10^5 m/s. If the uncertainty in the measurement of its position is equal to its de-Broglie wavelength. what is the uncertainty in the measurement of its velocity? (04 Marks)

Module-2

- 3
 - a. Explain the drawbacks of classical free electron theory of metals. (06 Marks)
 - b. What is critical field? Explain type-I and type-II superconductors. (06 Marks)
 - c. Find the resistivity of an intrinsic semiconductor with an intrinsic carrier concentration of $2.5 \times 10^{19}/m^3$. The mobilities of electrons and holes are 0.4 m²/Vs and 0.20 m²/Vs respectively. (04 Marks)
 - d. Explain in brief the construction and working of Maglev vehicle. (04 Marks)

- 4
 - a. State and explain law of mass action for semiconductors. Derive an expression for Fermi level in an intrinsic semiconductor. (07 Marks)
 - b. What is superconductivity? Explain BCS theory of superconductivity. (05 Marks)
 - c. Define terms: i) drift velocity, ii) relaxation time, iii) density of states, iv) Fermi energy. (04 Marks)
 - d. Calculate the probability of an electron occupying an energy level 0.2 eV below the Fermi level at 1000 K. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

Module-3

- 5 a. Describe the construction and working of CO₂ laser with necessary diagrams. (07 Marks)
 b. What is attenuation in an optical fiber? Explain various factors contributing to the fiber loss. (06 Marks)
 c. Describe point to point communication system using optical fibers with the help of a block diagram. (04 Marks)
 d. Calculate the wavelength of emission from a GaAs semiconductor laser whose band gap energy is 1.44 eV. (03 Marks)
- 6 a. Describe the recording and reconstruction processes in holography with the help of suitable diagram. (06 Marks)
 b. With neat diagrams, explain the different types of optical fibers. (06 Marks)
 c. Discuss the application of lasers in welding and cutting. (04 Marks)
 d. Calculate the number of modes that can propagate inside an optical fiber, given: $n_{\text{core}} = 1.47$, $n_{\text{clad}} = 1.43$, core diameter = 60 μm , $\lambda = 1.5 \mu\text{m}$. (04 Marks)

Module-4

- 7 a. Explain in brief the seven crystal system with neat diagrams. (07 Marks)
 b. With a neat diagram, explain the structure of the diamond and calculate its atomic packing factor. (05 Marks)
 c. Discuss allotropy and polymorphism. (04 Marks)
 d. Copper has fcc structure and the atomic radius is 0.1278 nm. Calculate the interplanar spacing for (111) plane. (04 Marks)
- 8 a. What are liquid crystals? Mention their classifications. Explain the working of LCD with necessary diagram. (07 Marks)
 b. What are Miller indices? Derive an expression for interplanar spacing in terms of Miller indices for cubic lattice. (06 Marks)
 c. Write a short note on perovskites. (03 Marks)
 d. Draw the crystal planes (110), ($\bar{1}\bar{1}2$) in a cubic crystal. (04 Marks)

Module-5

- 9 a. Define Mach number. Distinguish between subsonic and supersonic waves. (04 Marks)
 b. Describe the construction and working of Reddy shock tube with the help of a diagram. Give the characteristics of Reddy tube. (06 Marks)
 c. Discuss ball milling method of synthesis of nanomaterials. Mention any two of its disadvantages. (06 Marks)
 d. Explain the properties of carbon nanotubes. (04 Marks)
- 10 a. Describe the principle, construction and working of scanning electron microscope. (06 Marks)
 b. Explain the experimental method of producing shock waves and measuring its Mach number using Reddy shock tube. (06 Marks)
 c. Explain the pyrolysis method of synthesis of carbon nanotubes. Mention two applications of carbon nanotubes. (04 Marks)
 d. What are shock waves? Give three applications of shock waves. (04 Marks)

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CBCS Scheme

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15PHY12/22

First/Second Semester B.E. Degree Examination, June/July 2017 Engineering Physics

Time: 3 hrs.

Max. Marks: 80

Note: 1. Answer FIVE full questions, choosing one full question from each module.

2. Physical constants : Velocity of light, $c = 3 \times 10^8$ m/s; $h = 6.625 \times 10^{-34}$ J-S;

$k = 1.38 \times 10^{-23}$ J/K; $N_A = 6.02 \times 10^{23}$ /Kmole; $m_e = 9.1 \times 10^{-31}$ kg; $e = 1.6 \times 10^{-19}$ C.

Module-1

- 1 a. Define phase velocity and group velocity. Derive an expression for group velocity in terms of phase velocity. (05 Marks)
- b. What is wave function? Set up time-independent Schrodinger's wave equation in one dimension. (07 Marks)
- c. A spectral line of wavelength 5896 Å has a width of 10^{-5} Å. Evaluate the minimum time spent by the electrons in the upper energy state between the excitation and de-excitation processes. (04 Marks)

OR

- 2 a. What is a blackbody? Explain energy spectrum of a Blackbody. (05 Marks)
- b. Obtain energy values and normalized wave function, with respect to a particle in a one dimensional potential well of infinite height. (07 Marks)
- c. Compare the energy of a photon with that of a neutron when both are associated with a wavelength 0.25 nm. mass of neutron is 1.675×10^{-27} kg. (04 Marks)

Module-2

- 3 a. State law of mass action and derive the expression for electrical conductivity of a semiconductor. (05 Marks)
- b. Write a note on high temperature superconductors and Maglev vehicles. (07 Marks)
- c. Gold has one free electron/atom. Its density, atomic weight and resistivity are 19300 kg/m³, 197 and 2.21×10^{-8} Ωm. Calculate the free electron concentration and mobility of conduction electron. (04 Marks)

OR

- 4 a. What is Fermi factor? Discuss the variation of Fermi factor with temperature. (05 Marks)
- b. What are the assumptions of quantum free electron theory? Derive the expression for electrical conductivity based on quantum free electron theory. (07 Marks)
- c. Calculate the drift velocity and thermal velocity of conduction electrons in copper at a temperature of 300 K, when a copper wire of length 2 m and resistance 0.02 Ω carries a current of 15 A. Given the mobility of free electrons in copper is 4.3×10^{-3} m²/V.S. (04 Marks)

Module-3

- 5 a. Explain the construction and working of a semi-conductor laser. (06 Marks)
- b. Explain three different types of optical fibers with neat diagrams. (06 Marks)
- c. A pulsed laser emits photons of wavelength 820 nm with 22 mW average power/pulse. Calculate the number of photons contained in each pulse, if the pulse duration is 12 ns. (04 Marks)

OR

- 6 a. Derive the expression for energy density of radiation in terms of Einstein's coefficients. (06 Marks)
- b. What is attenuation? Explain factors contributing to the fiber losses. (06 Marks)
- c. A glass clad fiber is made with core glass of refractive index 1.5 and cladding is doped to give a fractional index difference of 0.0005. Determine the cladding index and numerical aperture. (04 Marks)

Module-4

- 7 a. Derive the expression for interplanar spacing in terms of Miller Indices. (05 Marks)
- b. Describe how Bragg's spectrometer is used to determine the crystal structure. (07 Marks)
- c. Draw the following planes in a cubic unit cell,
i) (001) ii) (110) iii) (112) iv) (020). (04 Marks)

OR

- 8 a. Define Allotropy and polymorphism with examples. (05 Marks)
- b. What are lattice parameters? Explain seven crystal systems. (07 Marks)
- c. Find the Miller indices of a set of parallel planes which make intercepts in the ratio 3a:4b and parallel to z-axis and also calculate the interplanar distance of the planes taking the lattice to be cubic with $a = b = c = 2\text{\AA}$. (04 Marks)

Module-5

- 9 a. What is Mach number? Explain experimental method of finding Mach number of a shock wave by Reddy Shock tube. (06 Marks)
- b. Describe arc discharge method of obtaining carbon nano tubes with the help of a diagram. (06 Marks)
- c. Distinguish between acoustic, ultrasonic, subsonic and supersonic waves. (04 Marks)

OR

- 10 a. Discuss the basis of laws of conservation of energy, mass and momentum. (07 Marks)
- b. Discuss the structure and properties of carbon nano tubes. (05 Marks)
- c. Explain Sol-gel method of preparing nanomaterials. (04 Marks)

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97

First/Second Semester B.E. Degree Examination, June/July 2017
Elements of Civil Engineering and Engineering Mechanics

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, selecting at least ONE question from each part.

Module-1

- 1 a. Draw a neat sketch of an earthen dam and name its components. (06 Marks)
- b. What are the basic idealizations in mechanics? (04 Marks)
- c. A boat is moved uniformly along a canal by two horses pulling with forces $P = 890\text{N}$ and $Q = 1068\text{N}$ acting under an angle $\alpha = 60^\circ$ [Refer. Fig.Q1(c)]. Determine the magnitude of the resultant pull on the boat and the angles ' β ' and ' ρ ' as shown in the figure. (10 Marks)
- 2 a. Draw a neat sketch of an RCC bridge and name its components. (06 Marks)
- b. State and explain the principle of transmissibility of forces. (04 Marks)
- c. Replace the given force system shown in Fig.Q2(c), with an equivalent force and couple system at "A". (10 Marks)

Module-2

- 3 a. Define : i) resultant ii) equilibrant. (04 Marks)
- b. State and explain parallelogram law of forces. (06 Marks)
- c. Three wires exert the tensions indicated on the ring shown in Fig.Q3(c). Determine the force in a single wire which will replace the three wires. (10 Marks)
- 4 a. State and prove Varignon's theorem. (06 Marks)
- b. State and explain principle of resolved parts. (04 Marks)
- c. Determine the resultant of the force acting on the bell crank shown in Fig.Q4(c). (10 Marks)

Module-3

- 5 a. State and prove Lami's theorem. (06 Marks)
- b. What do you mean by statically determinate and indeterminate structure? (04 Marks)
- c. To pull up a post, the arrangement shown in Fig.Q5(c), is used. A cable ABC is fixed to the post at "A" and to the frame at "C" having the portion AB vertical and the portion BC inclined there to by a small angle " α ". The cable BDE fastened to the ring at "B" to the frame at "E" has the portion BD horizontal and the portion DE inclined to the horizontal by the small angle " β ". On the ring at "D" a man pulls vertically downward with his entire weight "Q". Determine the vertical pull "P" applied to the post at "A" if $\alpha = \beta = 6^\circ$ and $Q = 670\text{N}$. (10 Marks)
- 6 a. Explain the concept of force body diagram. (04 Marks)
- b. Determine the reactions at supports for the beam loaded as shown in Fig.Q6(b). (08 Marks)
- c. What is the value of "P" in the system shown in Fig.Q6(c) to cause the motion to impend? Assume the pulley is smooth and coefficient of friction between the contact surfaces is 0.20. (08 Marks)

Module-4

- 7 a. Define : i) centroid ii) axis of symmetry. (04 Marks)
- b. Derive from first principles the centroid of a right angled triangle of base "b" and height "h". (08 Marks)
- c. Locate the centroid of the section of the concrete dam shown in Fig.Q7(c). (08 Marks)
- 8 a. Define : i) polar moment of inertia ii) radius of gyration. (04 Marks)
- b. State and prove parallel axis theorem. (06 Marks)
- c. Compute the moment of inertia of the $100\text{mm} \times 150\text{mm}$ rectangle shown in Fig.Q8(c), about xx axis to which it is inclined at an angle $\theta = \sin^{-1}[4/5]$. (10 Marks)

Module-5

- 9 a. What do you mean by Kinematics? (02 Marks)
- b. With a graph explain the displacement – time curve. (04 Marks)
- c. A ball is dropped from the top of a tower 30m high. At the same instant a second ball is thrown upward from the ground with an initial velocity of 15m/sec. When and where do they cross each other and with what relative velocity? (14 Marks)
- 10 a. With a graph explain the velocity–time curve. (04 Marks)
- b. With respect to projectiles define : i) velocity projection ii) angle of projection iii) trajectory iv) horizontal range. (06 Marks)
- c. A pressure tank issues water at “A” with a horizontal velocity “u” as shown in Fig.Q10(c). For what range of values of “u”, will water enter the opening “BC”? (06 Marks)

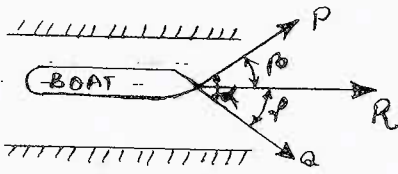


Fig.Q1(c).

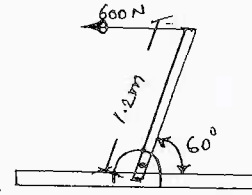


Fig.Q2(c).

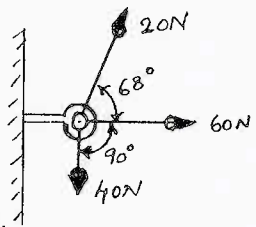


Fig.Q3(c).

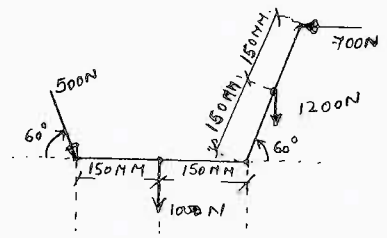


Fig.Q4(c).

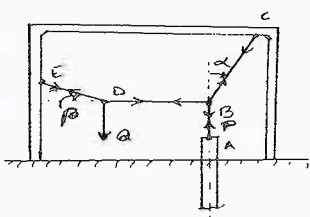


Fig.Q5(c)

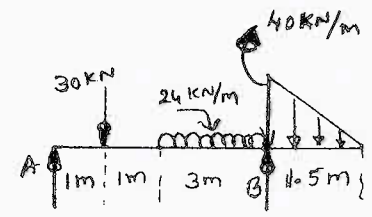


Fig.Q6(b)

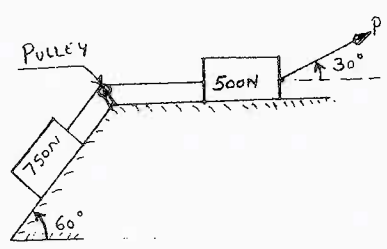


Fig.Q6(c).

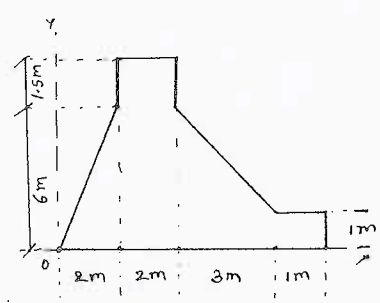


Fig.Q7(c)

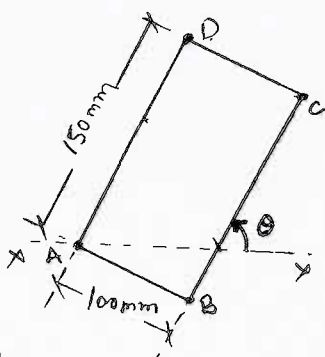


Fig.Q8(c)

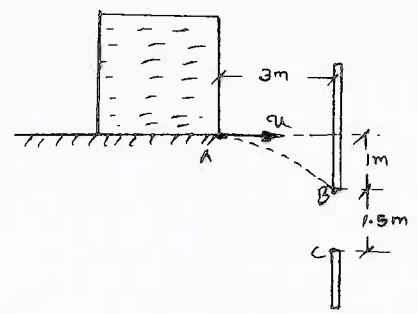


Fig.Q10(c)

CBCS Scheme

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15CIV13/23

First/Second Semester B.E. Degree Examination, June/July 2017 Elements of Civil Engineering and Engineering Mechanics

Time: 3 hrs.

Max. Marks: 80

Note: Answer FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. Explain briefly the scope of the following civil engineering fields:
 - i) Environmental engineering
 - ii) Transportation engineering (06 Marks)
- b. Explain: i) Static and dynamics (06 Marks)
 ii) Kinematics and kinetics
 iii) Couple and moment of couple (06 Marks)
- c. Find the components of 100 N force shown in Fig.1(c) along general x and y axes shown.

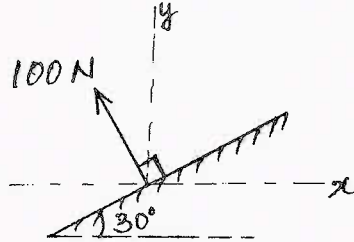


Fig.1(c)

(04 Marks)

OR

- 2 a. Explain the terms: (i) Kerbs, (ii) Skew bridge, (iii) Spillways, (iv) Subgrade. (08 Marks)
- b. With example, explain the characteristics of a force. (04 Marks)
- c. Transfer the force acting at point A to the point B. Refer Fig.Q2(c).

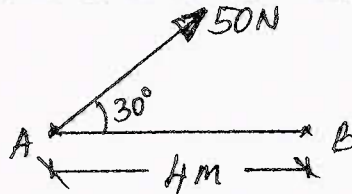


Fig.Q2(c)

(04 Marks)

Module-2

- 3 a. Four coplanar concurrent forces are acting at a point 'O' as shown in Fig.Q3(a). Determine the resultant completely.

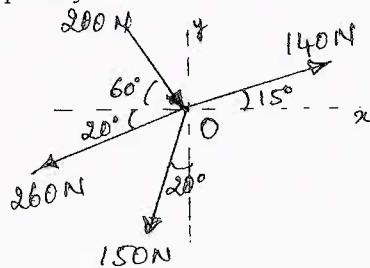


Fig.Q3(a)

(08 Marks)

- b. Explain: i) Angle of friction (08 Marks)
 ii) Angle of repose
 iii) Limiting friction (08 Marks)
 iv) Coefficient of friction

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written e.g, 42+8 = 50, will be treated as malpractice.

OR

- 4 a. Three cylinders A, B and C of diameter 200 mm, 300 mm and 250 mm and weight 75 N, 200 N and 100 N respectively are placed in a ditch as shown in Fig.Q4(a). Assuming contact surfaces smooth, determine the reaction between cylinder A and the vertical wall.

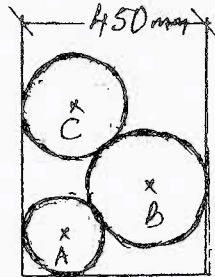


Fig.Q4(a)

(08 Marks)

- b. A pull of 180 N applied upward at 30° to a rough horizontal plane was required to just move a body resting on the plane, while a push of 220 N applied along the same line of action was required to just move the same body. Determine the weight of body and the coefficient of friction.

(08 Marks)

Module-3

- 5 a. With the nature of reaction, explain: (i) fixed support, (ii) Hinged support, (iii) simple support. (06 Marks)
- b. Determine completely the resultant of the system of four forces acting on the body shown in Fig.Q5(b) with respect to point 'O'.

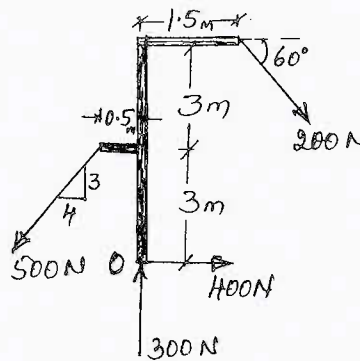


Fig.Q5(b)

(10 Marks)

OR

- 6 a. Give the statement and application of Varignon's theorem. (04 Marks)
- b. With sketch, explain space diagram (SPD) and free body diagram (FBD). (04 Marks)
- c. Find the support reactions for the beam loaded as shown in Fig.Q6(c).

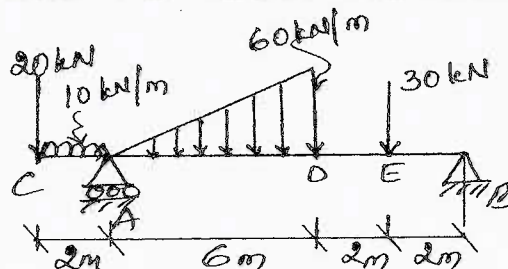


Fig.Q6(c)

(08 Marks)

Module-4

- 7 a. State and prove parallel axis theorem. (06 Marks)
 b. Locate the centroid of the plane area shown in Fig.Q7(b).

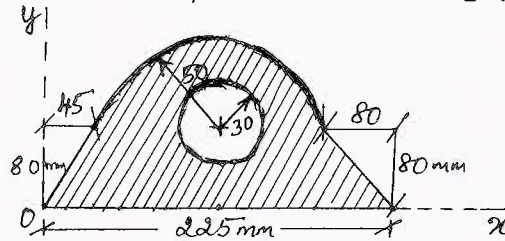


Fig.Q7(b) (10 Marks)

OR

- 8 a. Determine the centroid of a triangle by first principle. (06 Marks)
 b. For the cross section shown in Fig.Q8(b), calculate the MI about the centroidal axis parallel to top edge. Also determine the radius of gyration.

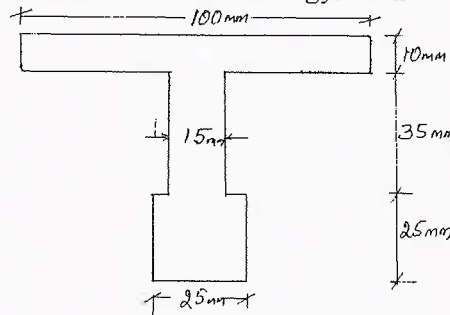


Fig.Q8(b) (10 Marks)

Module-5

- 9 a. A stone is dropped into a well. After 4 seconds the sound of splash is heard. If the velocity of sound is 330 m/sec, find the depth of the well up to water surface. (10 Marks)
 b. Explain with a sketch for projectile motion:
 i) Range ii) Time of flight
 iii) Maximum height iv) Angle of projection (06 Marks)

OR

- 10 a. A stone is projected with a velocity of 20 m/sec perpendicular to the incline as shown in Fig.Q10(a). Determine the range R on the inclined plane.

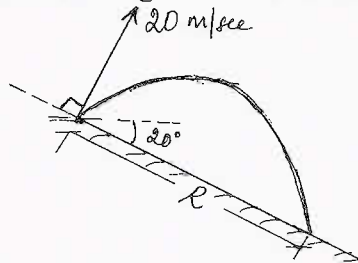


Fig.Q10(a) (06 Marks)

- b. Explain: (i) Super elevation, (ii) Relative motion. (04 Marks)
 c. A body moves in a straight line has the equation of motion given by $S = 2t^3 - 4t + 10$. Determine:
 i) The time required for the body to gain a velocity of 68 m/sec starting from rest.
 ii) The acceleration of the body when the velocity is equal to 32 m/sec. (06 Marks)

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14EME14/24

First/Second Semester B.E. Degree Examination, June/July 2017
Elements of Mechanical Engineering

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer FIVE full questions, selecting ONE full question from each module.
2. Draw the sketches neatly.

Module – 1

- 1 a. Classify renewable and non-renewable energy sources and explain. (10 Marks)
- b. Name some of the bio-fuels used in engineering applications. (05 Marks)
- c. Explain the principle of solar photovoltaic cell. (05 Marks)

- 2 a. Classify the fuels and explain i) Calorific value ii) Combustion. (08 Marks)
- b. Explain the properties of steam and explain the formation of steam with a neat sketch. (08 Marks)
- c. List the boiler mountings and accessories. (04 Marks)

Module – 2

- 3 a. Explain Parson's Turbine working principle. (06 Marks)
- b. Classify Turbines in detail. (04 Marks)
- c. With P-V diagram, explain four stroke diesel engines. (10 Marks)

- 4 a. With a neat sketch, explain Two stroke petrol engines. (08 Marks)
- b. Explain principle and working of Pelton wheel. (06 Marks)
- c. In a 4-stroke diesel engine has a piston diameter 250mm, stroke 400mm, MEP = 4 bar and speed is 500rpm. Diameter of brake drum is 1000mm. Effective brake load is 400N, Calculate IP, BP and FP. (06 Marks)

Module – 3

- 5 a. Classify the robots based on configuration. (06 Marks)
- b. What are the advantages and disadvantages of automation? (06 Marks)
- c. Explain any four kinds of operations performed on Lathe machine. (08 Marks)

- 6 a. Explain any four drilling operations performed on drilling machine. (08 Marks)
- b. What are the advantages and disadvantages of robots? (06 Marks)
- c. Explain fixed and flexible automation process. (06 Marks)

Module – 4

- 7 a. Classify the engineering materials. (06 Marks)
- b. Classify the composite materials and its application in Aircraft and Automobile application. (08 Marks)
- c. With a neat sketch, explain oxy-Acetylene welding. (06 Marks)

- 8 a. With a neat sketch, explain Arc welding. (06 Marks)
- b. What are the differences between soldering, welding and brazing? (06 Marks)
- c. List the applications of ferrous alloys. (04 Marks)
- d. Write a note on composite applications. (04 Marks)

Module – 5

- 9 a. What are the properties of good refrigerant? (06 Marks)
- b. Explain the principle of working of vapour Absorption refrigeration with sketch. (10 Marks)
- c. Define the terms : i) COP ii) Unit of refrigeration. (04 Marks)

- 10 a. Explain the working principle of room air-conditioning with a neat sketch. (10 Marks)
- b. List commonly used refrigerants and its properties. (06 Marks)
- c. Define the terms : i) Ton of refrigeration ii) Refrigerating effect. (04 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

CBCS Scheme

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15EME14/24

First/Second Semester B.E. Degree Examination, June/July 2017

Elements of Mechanical Engineering

Time: 3 hrs.

Max. Marks: 80

Note: Answer FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. Explain petroleum based solid, liquid and gaseous fuels. (08 Marks)
b. Explain with a neat sketch the principle and operation of a typical windmill. (08 Marks)

OR

- 2 a. Explain with a neat sketch a Lancashire boiler. (08 Marks)
b. Define internal energy of steam and explain with reference to a T-H diagram formation of steam. (08 Marks)

Module-2

- 3 a. With a neat sketch, explain a Parason's reaction turbine. (08 Marks)
b. Explain with a neat sketch, principle and working of a pelton turbine. (08 Marks)

OR

- 4 a. Explain a 4-stroke C.I. engine with neat sketch and PV diagram. (08 Marks)
b. During a trial on single cylinder 4-stroke petrol engine the following readings were recorded:
Brake torque = 640 N-m
Cylinder diameter = 210 mm
Speed of the engine = 350 rpm
Length of stroke = 280 mm
Mean effective pressure = 6.5 bar
Consumption of petrol = 8.16 kg/hr
Calorific value of fuel = 42.7 MJ/kg
Determine:
i) Mechanical efficiency
ii) Indicated thermal efficiency
iii) Brake thermal efficiency
iv) Brake specific fuel consumption (08 Marks)

Module-3

- 5 a. What is turning? Explain with a neat sketch the taper turning by swiveling compound rest method. (08 Marks)
b. Explain with sketches the following machining operations:
i) End milling
ii) Slot milling (08 Marks)

OR

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

- 6 a. Explain the cylindrical coordinate configuration and spherical coordinate configuration of robots with neat sketches. (08 Marks)
b. What is automation? Explain fixed automation and programmable automation. (08 Marks)

Module-4

- 7 a. Explain in brief ferrous metals and alloys. (08 Marks)
b. What is composite material? Discuss its applications in aircrafts and automobiles. (08 Marks)

OR

- 8 a. Define soldering, brazing and welding. Also differentiate between soldering and brazing. (08 Marks)
b. Explain in brief an arc welding process with a neat sketch. (08 Marks)

Module-5

- 9 a. List out the properties of good refrigerant. (08 Marks)
b. Define the following (any four):
i) Refrigeration
ii) Refrigerant
iii) C.O.P. of a refrigerator
iv) Relative C.O.P.
v) Ton of refrigeration
vi) Ice making capacity
vii) Refrigerator
viii) Air conditioning (08 Marks)

OR

- 10 a. Explain the principle and working of vapour absorption refrigeration with a neat sketch. (08 Marks)
b. Explain with a sketch working of a room air-conditioner. (08 Marks)

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14ELE15/25

First/Second Semester B.E. Degree Examination, June/July 2017
Basic Electrical Engineering

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting ONE full question from each module.

Module – 1

- 1 a. In the network shown, find the current flowing in each branch using Kirchoff's law. (08 Marks)

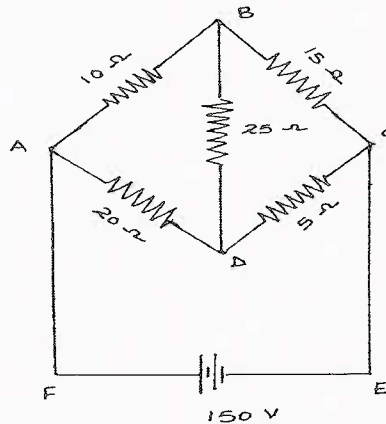


Fig. Q1 (a)

- b. Derive an expression for energy stored in an inductor. (06 Marks)
 c. State and explain Kirchoff's law. (06 Marks)
- 2 a. List the basic analogy between electric and magnetic circuits. (06 Marks)
 b. When a certain battery is loaded by a $60\ \Omega$ resistor, its terminal voltage is 98.4 V. when it is loaded by a $90\ \Omega$ resistor, its terminal voltage is 98.9 V. What load resistance would give a terminal voltage of 90 volts? (08 Marks)
 c. A coil of 1000 turns is wound on a ring of silicon steel, having a mean diameter of 10 cm and relative permeability of 1200. Its cross section area is 12 cm^2 . When a current of 5 A flows through the coil, find
 (i) Flux in the core (ii) The inductance of the coil
 (iii) The induced emf, if the flux falls to zero in 20 milli seconds. (06 Marks)

Module – 2

- 3 a. With a neat diagram, explain the construction and working principle of dynamometer type wattmeter. (08 Marks)
 b. A DC shunt generator supplies a load of 7.5 kW at 200 volts. Calculate the induced emf if the armature winding resistance is $0.6\ \Omega$ and field winding resistance is $80\ \Omega$. (06 Marks)
 c. Derive an expression for torque developed by the armature of a DC motor. (06 Marks)
- 4 a. A 220 V DC shunt motor has a armature resistance of $0.8\ \Omega$ and field resistance of $200\ \Omega$. Find the back emf, when it gives an output of 7.46 kW at 85% efficiency. (06 Marks)
 b. Derive the emf equation of DC generator. (06 Marks)
 c. With a neat diagram, explain constructional features of induction type energy meter. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg., 42+8 = 50, will be treated as malpractice.

Module – 3

- 5 a. With a neat wiring diagram, explain the two-way control of lamp. (08 Marks)
 b. Derive an expression for average value of an alternating quantity. (06 Marks)
 c. A coil of power factor 0.6 is in series with 100 μf capacitor. When it is connected to 50 Hz a.c. supply, the potential drop across the coil is equal to potential drop across capacitor. Find the value of resistance and inductance. (06 Marks)
- 6 a. List the precautions to be taken to prevent persons from getting electric shocks. (06 Marks)
 b. A resistance of 50 Ω and a capacitor of 500 μF , form a series circuit. If an alternating voltage of 100 V at 50 Hz frequency is applied across it. Find the current, power, power factor and draw the phasor diagram. (08 Marks)
 c. With a neat diagram, explain the generation of sinusoidal voltage. (06 Marks)

Module – 4

- 7 a. Show that two wattmeters are sufficient to measure three phase power. (08 Marks)
 b. With a neat diagram, explain the constructional features of synchronous generator. (08 Marks)
 c. Define the terms (i) Phase sequence and (ii) Balanced load. (04 Marks)
- 8 a. A 6 pole, 3 phase star connected alternator has armature with 90 slots and 12 conductors/slot. It rotates with a speed of 1000 rpm. It has a flux/pole of 0.5 wb. Calculate the emf generated / phase. Also calculate the line voltage, if winding factor is 0.97 and the coil is full pitched. (06 Marks)
 b. List the advantages of 3 phase AC system. (08 Marks)
 c. When three balanced impedances are connected in star, across 3 phase 415 V, 50 Hz. Supply the line current drawn is 20 A, at 0.4 power factor lagging. Find the parameters of the impedance in each phase. (06 Marks)

Module – 5

- 9 a. A 20 KVA single phase transformer has 200 turns on primary and 40 turns on secondary. The primary is connected to 1000 V, 50 Hz supply. Find the secondary voltage, rated current flowing through two windings and the maximum value of flux. (06 Marks)
 b. Explain with diagram, working principle of induction motor. (08 Marks)
 c. Derive the emf equation of 1 ϕ transformer. (06 Marks)
- 10 a. A 6 pole induction motor running from 50 Hz supply has an emf in the rotor of frequency 2.5 Hz. Determine the value of slip and speed of motor. (04 Marks)
 b. Define efficiency and obtain the condition for maximum efficiency of a transformer. (08 Marks)
 c. With a neat diagram, explain the star-delta starter used to start 3 phase induction motor. (08 Marks)

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15ELE15/25

First/Second Semester B.E. Degree Examination, June/July 2017 Basic Electrical Engineering

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. State and explain Ohm's Law with an illustration. Also list its limitations. (05 Marks)
b. For the circuit shown in Fig. Q1(b), Obtain voltage between points X and Y. (06 Marks)

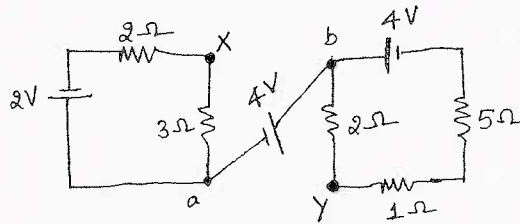


Fig. Q1(b)

- c. Obtain relationship between self inductance of two coils, mutual inductance between the coils and co-efficient of coupling. (05 Marks)

OR

- 2 a. State and explain KCL and KVL with illustration for each. (05 Marks)
b. Coil A and B in a magnetic circuit have 600 and 500 turns respectively. A current of 8A in coil A produces a flux of 0.04Wb in it. If co-efficient of coupling is 0.2, calculate :
i) Self inductance of coil A when coil B is open circuited
ii) emf induced in coil B when flux changes from full value to zero in 0.02s
iii) Mutual inductance. (06 Marks)
c. With illustrations, explain statically and dynamically induced emfs. (05 Marks)

Module-2

- 3 a. Explain the construction and principle of operation of dynamometer type wattmeter. (05 Marks)
b. Discuss about various characteristics of a DC series motor with neat diagrams. (06 Marks)
c. A 30kW, 300V, DC shunt Generator has armature resistance of 0.05Ω and field resistance of 100Ω. Calculate power developed by the armature when it delivers full output power. (05 Marks)

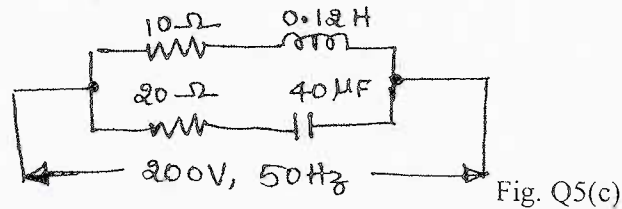
OR

- 4 a. Derive emf equation for a DC Generator. (05 Marks)
b. Explain the construction and principle of operation of a single phase induction type energy meter. (06 Marks)
c. A 4 pole, DC shunt motor takes 22.5A from 250V supply. The armature is wave wound with 300 conductors. The armature resistance is 0.5Ω and field resistance is 125Ω. If useful flux per pole is 0.02Wb ; calculate :
i) Speed ii) Torque developed iii) Electrical power developed. (05 Marks)

Module-3

- 5 a. With a neat connection diagram and functional table, explain three way control of a lamp. (05 Marks)
b. An alternating voltage $(80 + j60)V$ is applied to a circuit and the current flowing through it is $(-4 + j10)A$. Find the i) impedance of the circuit ii) phase angle iii) pf of the circuit
iv) power consumed by the circuit. (06 Marks)

- c. For the circuit shown Fig. Q5(c), Find ;
 i) Current in each branch ii) Power factor of the circuit. (05 Marks)



OR

- 6 a. Show that the power consumed by a pure capacitor is zero. Draw the voltage, current and power waveforms. (05 Marks)
 b. What is earthing? Explain any one type with neat diagram. (06 Marks)
 c. A series RLC circuit with 100Ω , $25\mu\text{F}$ and 0.15H is connected across 220V , 50Hz supply calculate : i) impedance ii) current iii) p.f iv) voltage drops across inductor and capacitor. (05 Marks)

Module-4

- 7 a. Mention advantages of 3 phase system over 1 phase system. (05 Marks)
 b. Three arms of a 3ϕ , delta connected load, each comprise of a coil having 25Ω resistance and 0.15H inductance in series with a capacitor of $120\mu\text{F}$ across 415V , 50Hz supply. Calculate line current, power factor and power consumed. (06 Marks)
 c. A 3ϕ , 4 pole, 50Hz star connected alternator has 36 slots with 30 conductors per slot. The useful flux per pole is 0.05Wb . Find synchronous speed and line voltage on no-load. Assume winding factor of 0.96. (05 Marks)

OR

- 8 a. Mention the advantages of stationary armature of an alternator. (05 Marks)
 b. Establish the relationship between line and phase voltages and currents in a 3ϕ star connected balanced circuit. Shown the vector diagram neatly. (06 Marks)
 c. Calculate power, power factor and line current in a balanced 3ϕ star connected system drawing power from 440V supply in which two wattmeters connected indicate $W_1 = 5\text{kW}$ and $W_2 = 1.2\text{kW}$. (05 Marks)

Module-5

- 9 a. Derive the condition for maximum efficiency of a transformer, (05 Marks)
 b. Explain with neat vector diagrams, the concept of rotating magnetic field theory. (06 Marks)
 c. Define slip speed and slip. What is the slip speed, slip and at what speed rotor runs if the frequency of the emf in the stator of a 4 pole, 3ϕ IM is 50Hz and in the rotor is 1.5Hz ? (05 Marks)

OR

- 10 a. Derive emf equation of a transformer. (05 Marks)
 b. With neat diagrams, explain construction of types of rotors of 3ϕ induction motor. (06 Marks)
 c. A 10KVA , 1ϕ transformer has a primary winding of 300 turns and secondary winding of 750 turns, cross sectional area of core is 64cm^2 . If primary voltage is 440V at 50Hz , find maximum flux density in the core, emf induced in secondary of transformer. At 0.8 lag p.f, calculate the efficiency of transformer if full load copper loss is 400W and iron-loss is 200W . (05 Marks)

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First/Second Semester B.E Degree Examination, June/July 2017**Constitution of India and Professional Ethics****(COMMON TO ALL BRANCHES)**

Time: 2 hrs.]

[Max. Marks: 50

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the fifty questions, each question carries **ONE** mark.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

-
1. The president of the constituent assembly was
a) Dr. K.M. Munshi
b) Jawaharlal Nehru
c) Dr. B.R. Ambedkar
d) De. Rajendra Prasad
 2. The Indian Constitution borrowed the scheme of Indian Federation from the constitution of
a) U.K
b) Canada
c) Ireland
d) U.S.A
 3. How many schedules are there in the Indian Constitution?
a) 11
b) 12
c) 13
d) 15
 4. Who gave the constitution to us?
a) People of India
b) The British Queen
c) The Governor General of India
d) None of these
 5. The concept of Welfare state is found in the Indian Constitution in the
a) Fundamental duties
b) Preamble
c) Directive principles
d) Fundamental rights
 6. Rights to freedom guarantees
a) 5 rights
b) 6 rights
c) 7 rights
d) 8 rights
 7. For the enforcement of fundamental rights, the supreme court may issue
a) A writ
b) A decree
c) An ordinance
d) A notification
 8. Which one of the following is not a fundamental duty?
a) Abide by the constitution and respect its ideals
b) Vote in public elections
c) Develop the scientific temper
d) Safeguard public property and abjure violence

9. Which one has become a legal right under 44th Constitution Amendment Act, 1978?
 - a) Right to property
 - b) Right to education
 - c) Right to work
 - d) Right to judicial remedies
10. When fundamental rights of a person are violated, he can appeal to the
 - a) President
 - b) Prime Minister
 - c) Chief Minister of the state
 - d) None of them
11. The Panchayat Raj Institutions in India are established as per the constitutional directions of the
 - a) federalism
 - b) directive principles of state policy
 - c) preamble
 - d) fundamental rights
12. Which of the following exercised the most profound influence in framing the Indian Constitution?
 - a) British Constitution
 - b) U.S. Constitution
 - c) Irish Constitution
 - d) The Government of India Act, 1935.
13. Constitution of India was enacted by the Constituent Assembly on
 - a) 26th January 1950
 - b) 26th November 1949
 - c) 26th September 1948
 - d) 20th December 1949
14. Indian Independence Act was passed by the British Parliament on:
 - a) 18th July 1947
 - b) 20th July 1947
 - c) 14th August 1947
 - d) 20th July 1946
15. Joint Parliamentary sessions are chaired by
 - a) Prime Minister
 - b) President
 - c) Speaker and Lok Sabha
 - d) Chairman of Rajya Sabha
16. Attorney General of India is appointed by the
 - a) Parliament
 - b) President
 - c) Union Law Minister
 - d) Chief Justice of India
17. Which of the following bills must be passed by each house of the Parliament separately by special 2/3rd majority?
 - a) Finance bill
 - b) Ordinary bill
 - c) Money bill
 - d) Constitution Amendment bill
18. Supreme court of India has interpreted constitutional right to education as
 - a) Right to life
 - b) Right to equality
 - c) Right to employment
 - d) Fundamental right
19. Who is the supreme commander of armed forces in India?
 - a) Home Minister
 - b) Defense Minister
 - c) President
 - d) Prime Minister
20. Two persons are nominated by the President to be the members of Lok Sabha to represent the
 - a) Parsees
 - b) Anglo-Indians
 - c) Buddhists
 - d) Indian-Christians
21. All the Union Council of Ministers are appointed by the
 - a) President
 - b) Prime Minister
 - c) Lok Sabha speaker
 - d) vice-President
22. The executive head of the State Government is
 - a) Chief Justice of the High Court
 - b) The Chief Minister
 - c) The Governor
 - d) The Prime Minister

9. The speaker is elected by the member of _____.
a) Lok Sabha b) Rajya Sabha c) Prime Minister d) President
10. What is the age of retirement of the judges of the supreme court?
a) 58 years b) 60 years c) 62 years d) 65 years
11. A money bill passed by the Lok Sabha can be delayed by the Rajya Sabha for a maximum period of
a) 14 days b) one month c) two month d) three month
12. How many times the president can return bill passed by the parliament for its consideration?
a) once b) twice c) thrice d) never
13. Membership of legislative assembly can vary between
a) 40-500 b) 60-500 c) 50-400 d) 60-300
14. Which among the following house cannot be dissolved but can be abolished?
a) Legislative Assembly b) Lok Sabha
c) Legislative Council d) Rajya Sabha
15. How many members retired in legislative council for every two years?
a) 1/4 b) 1/3 c) 1/5 d) 1/6
16. The election commission consists of _____ members.
a) 3 b) 4 c) 5 d) 6
17. Every party has to stop the election campaign before _____ of polling.
a) 12 hours b) 24 hours c) 36 hours d) 48 hours
18. Voting age of citizens is changed from 21 to 18 years by _____ Constitutional Amendment Act.
a) 7th b) 42nd c) 74th d) 61st
19. Human rights are
a) local b) regional c) universal d) none of these
20. The town and city municipality members enjoy a term of _____ years.
a) 4 b) 6 c) 3 d) 5
21. Breakdown of Constitutional Machinery in a state is popularly known as
a) President rule b) National emergency
c) Financial emergency d) All of these
22. President can proclaim an emergency with the recommendation of the
a) Prime Minister b) Vice-President
c) LS d) Union Cabinet
23. Who has the power to pardon in case of capital punishment?
a) President b) Chief Justice of India
c) Prime Minister d) Governor
24. What is the maximum gap in months permissible between two sessions of parliament?
a) Three b) Four c) Six d) Twelve
25. Engineering ethics is a
a) natural ethics b) developing ethics
c) preventive ethics d) none of these

- 26. One of the impediments to responsibility is
 - a) Self-deception
 - b) Rampant corruption at higher level
 - c) Interference by higher officers
 - d) Interference by politicians
- 27. 'Good Works' means
 - a) responsible work
 - b) work above and beyond the call of duty
 - c) work involving high risk
 - d) superior work done with great care and skill
- 28. Copy right protects the expression of ideas but not the
 - a) predicting ideas
 - b) deriving ideas
 - c) ideas themselves
 - d) both a and b
- 29. One of the ways of reducing risk is
 - a) tight coupling
 - b) complex interaction
 - c) normalization of deviance
 - d) changing the working system
- 30. Conflict of interest may be
 - a) imaginary
 - b) potential
 - c) created
 - d) false
- 31. The first meeting of the constituent assembly was held in
 - a) 1949
 - b) 1950
 - c) 1947
 - d) 1946
- 32. The Indian Constitution came into force on
 - a) 26th Nov 1949
 - b) 26th Nov 1945
 - c) 26th Jan 1950
 - d) 15th Aug 1947
- 33. How much time did the constituent assembly took to prepare the constitution of India?
 - a) 2Y, 11M, 18D
 - b) 2Y, 10M, 18D
 - c) 2Y, 11M, 08D
 - d) 3Y, 10M, 18D
- 34. The Constitution of India is
 - a) an evolved constitution
 - b) unwritten document
 - c) written and bulky document
 - d) based on conventions
- 35. Dr. Rajendra Prasad was chairman of
 - a) Drafting Committee
 - b) Constituent Assembly
 - c) Council of States
 - d) None of these
- 36. The preamble is so far amended
 - a) once
 - b) twice
 - c) thrice
 - d) 42 times
- 37. India is a Sovereign, Socialist, Secular, Democratic, Republic. In the Indian constitution, this expression occurs in
 - a) fundamental rights
 - b) directive principles
 - c) preamble
 - d) none of these
- 38. The concept of fundamental right is borrowed from
 - a) UK
 - b) USA
 - c) Germany
 - d) Russia
- 39. An arrested person must be produced before a magistrate within _____ hours of arrest.
 - a) 24
 - b) 12
 - c) 36
 - d) 48
- 40. Telephone tapping is a violation of
 - a) right to speech
 - b) right to personal liberty
 - c) right to freedom
 - d) none of these

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