May 2018 B.Tech ME

Roll No.

Total No. of Pages: 02

Total No ... ns: 09

B.T... 2011 Onwards) / B.Tech. (Marine Engineering) (2013 Onwards) (Sem. – 3)

THEORY OF MACHINES-I

M Code: 59112

Subject Code: BTME-302

Paper ID: [A1139]

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. Write Briefly:

   a) What are rigid and resistant bodies? Elaborate.

   b) Differentiate between machine and structure.

   c) Explain the phenomenon of creep and slip in belt drives.

   d) What is the purpose of clutches? Explain.

   e) How does a porter governor differ from that of a watt governor?

   f) Differentiate between lower pair and, higher pair.

   g) Why crowning is required on pulleys?

   h) What is the function of the flywheel? Explain by taking an example of four stroke IC engine.

   i) Write the application areas of cam.

   j) What is the function of governor? How does it differ from that of a flywheel?

SECTION B

2. A shaft runs at 80 rpm and drives another shaft at 150 rpm through belt drive. The diameter of the driving pulley is 600 mm. Determine the diameter of the driven pulley in the following cases:

   a) Neglecting belt thickness.

   b) Taking belt thickness as 5 mm.

   c) Assuming for case (b) a total slip of 4%.

   d) Assuming for case (b) a slip of 2% on each pulley.

3. Explain the principle and working of rope brake dynamometer with neat and clean diagram.

4. Deduce expression for the velocity and acceleration of the follower when it moves with simple harmonic motion.

5. A flywheel with a mass of 3 kN has a radius of gyration of 1.6 m. Find the energy stored in the flywheel when its speed increases from 315 rpm to 340 rpm.

6. The distance between the steering pivots of a Davis steering gear is 1.3 m. The wheel base is 2.75 m. what will be the inclination of the track arms to the longitudinal axis of the vehicle if it is moving in a straight path?

SECTION C

7. Explain various inversions of double slider crank chains in detail with neat and clean diagrams.

8. In a spring loaded governor of the Hartnell type, the lengths of the horizontal and the vertical arms of the bell-crank lever are 40 mm and 80 mm respectively. The mass of each ball is 1.2 kg. The extreme radii of rotation of the balls are 70 mm and 105 mm. The distance of the fulcrum of each bell-crank lever is 75 mm from the axis of rotation of the governor. The minimum equilibrium speed is 420 rpm and the maximum equilibrium speed is 4% higher than this. Neglecting the obliquity of the arms, determine the

   a) Spring stiffness,

   b) Initial compression, and

   c) Equilibrium speed corresponding to radius of rotation of 95 mm.

9. Write notes on:

   a) Pentograph.

   b) Hunting of governor.

   c) Coefficient of fluctuation of speed and energy.

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B.Tech.(IE) (All) / (ME) (2010 Batch) (Sem. – 3)

ENGINEERING MATERIALS AND METALLURGY

M Code: 59003

Subject Code: ME-205

Paper ID: [A0860]

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) What is twinning?

   b) What is high speed steel?

   c) Where can we use the property of hardenability?

   d) What is meant by ductility?

   e) Define case hardening.

   f) What is meant by polymorphism?

   g) What is face centered cubic lattice?

   h) What is Pearlite?

   i) What is normalising?

   j) What is the atomic packing factor?

SECTION B

2. What are the manufacturing properties of steel? Explain any one of them.
3. What is Eutectic reaction? How it differ from eutectoid reaction?
4. Explain the various phase transformation from molten state to room temperature in steel having 1.0% carbon content.
5. How surface hardening is done and what are the advantages of this process?
6. Giving suitable examples, explain crystallographic notation of atomic planes.

SECTION C

7. Describe the theories of Plastic deformation and also explain the role of crystal imperfections in plastic deformation.
8. How TTT diagrams are generated. Describe its role in heat treatment.
9. Explain the use of Molybdenum as alloying element in steel.

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B.Tech.(Marine Engineering) (2013 Onwards) / B.Tech.(ME) (2011 Onwards)
(Sem. – 3)

APPLIED THERMODYNAMICS–I

M Code: 59114
Subject Code: BTME-304
Paper ID: [A1141]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) Define atomic mass and molecular mass.

   b) Mention the various applications of I.C. engine.

   c) What is octane and cetane rating of fuels?

   d) What is meant by phase of a substance?

   e) How evaporation differs from boiling?

   f) Write the function of 'Economiser'.

   g) What is bleeding?

   h) Write the functions of nozzle used with steam turbine.

   i) Distinguish between impulse and reaction turbine.

   j) List the various losses of steam in turbine.

SECTION B

2. What do you understand by 'minimum air' and 'excess air' in context of combustion?

3. Explain the need and methods of supercharging in I.C. Engines.

4. Determine the amount of heat required to generate 5 kg of steam at a pressure of 10 bar and temperature of 250°C from water at 25°C. Take specific heat for superheated steam as 2.1 kJ/kg K.

5. Describe with a neat diagram, the construction and working of a Babcock and Wilcox water tube boiler.

6. The inlet and outlet temperatures of cooling water in a condenser are 27 °C and 35 °C respectively. If the vacuum in the condenser is 700 mm of Hg against barometric pressure of 760 mm of Hg, calculate the efficiency of the condenser.

SECTION C

7. Describe the Morse test for determining the indicated power of a multi cylinder engine, state the assumptions made.

8. In a thermal power plant operating on an ideal Rankine cycle, steam at 15 bar and 250°C enters a turbine which generates 40kW indicated power. If the steam consumption is 300 kg/hr and condenser is maintained at 0.15 bar, determine the final condition of steam, Rankine efficiency and relative efficiency. Neglect pump work. Also determine the fuel to be supplied per hour if its calorific value is 41850 kJ/kg.

9. The steam supply to an impulse turbine with a single row of moving blades is 2 kg/s. The 10 turbine develops 130 kW, the blade velocity is being 175 m/s. The steam flows from a nozzle with a velocity of 400 m/s and the velocity coefficient of blade is 0.9. Find the nozzle angle, blade angle at entry and exit, if the steam flows axially after passing over the blades.

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B.Tech. (Marine Engineering) (2013 Onwards) /
B.Tech. (ME) (2011 Onwards) (Sem. – 3)

MACHINE DRAWING

M Code: 59113
Subject Code: BTME-303
Paper ID: [A1140]

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of NINE questions carrying TWO marks each.**
2. **SECTION-B contains FOUR questions carrying FOUR marks each and students have to attempt any THREE questions.**
3. **SECTION-C contains TWO questions carrying THIRTY marks each and students have to attempt any ONE question.**

SECTION A

1. a) Sketch the five types of line used in machine drawing.

   b) Why we need sectional views?

   c) How do you classify various types of fits?

   d) Draw edge and corner welding joints.

   e) Under what circumstances cotter joints are commonly used?

   f) What is blow of cock?

   g) Draw a view of piston and show its important parts.

   h) Why are collars provided on the brasses?

   i) What is the function of a tool post?

SECTION B

2. Show a double riveted Lap joint (chain riveting) with the help of elevation and plan.
3. Name the various form of V threads and give full details of any one form.
4. Make a proportionate free hand sketch of a cone clutch.
5. Draw the free hand front view (upper half in section) of a spigot and socket pipe joint.

SECTION C

6. Figure 1 show the detail of a universal coupling. Assemble the given components and draw the front view (Lower half in section) and top view of assembly.
7. Figure 2 show the detail of a screw jack. Assemble the given components and draw the front view (Left half in section) and top view of assembly.

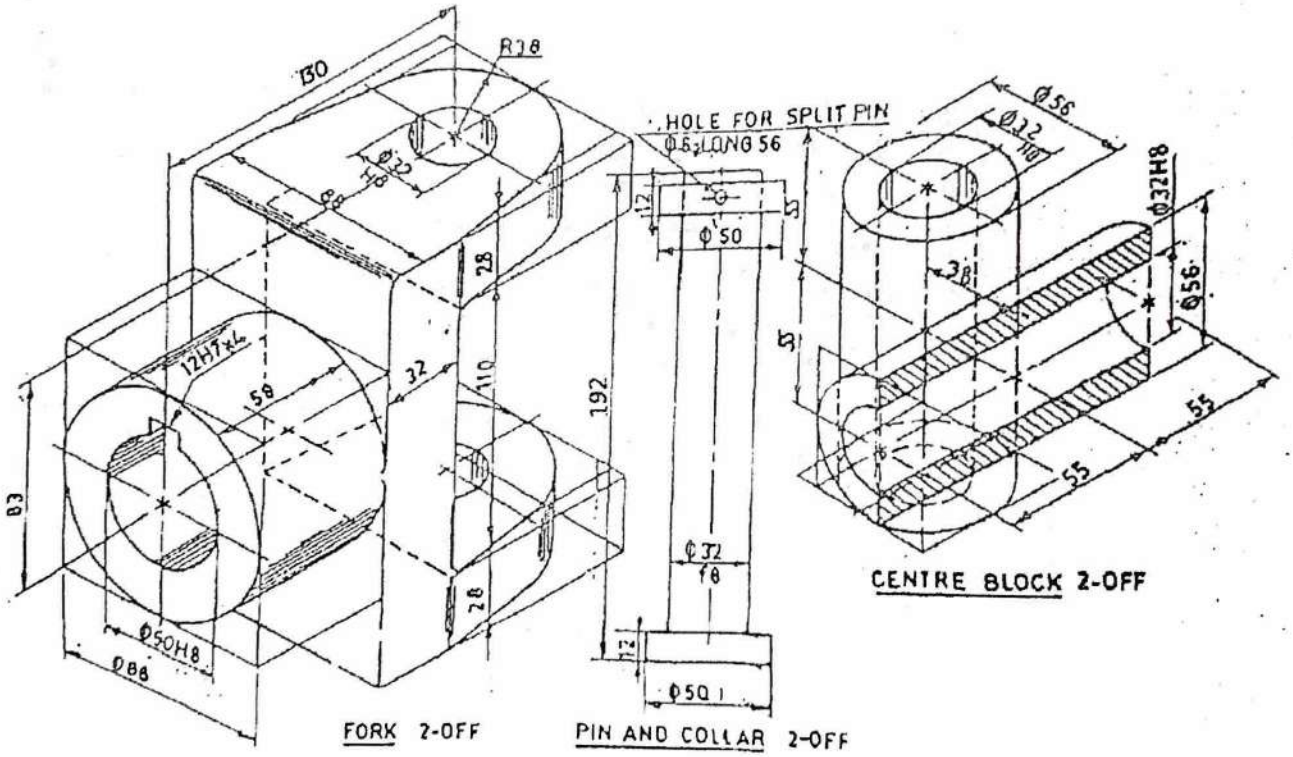

Fig 1: Universal Coulping

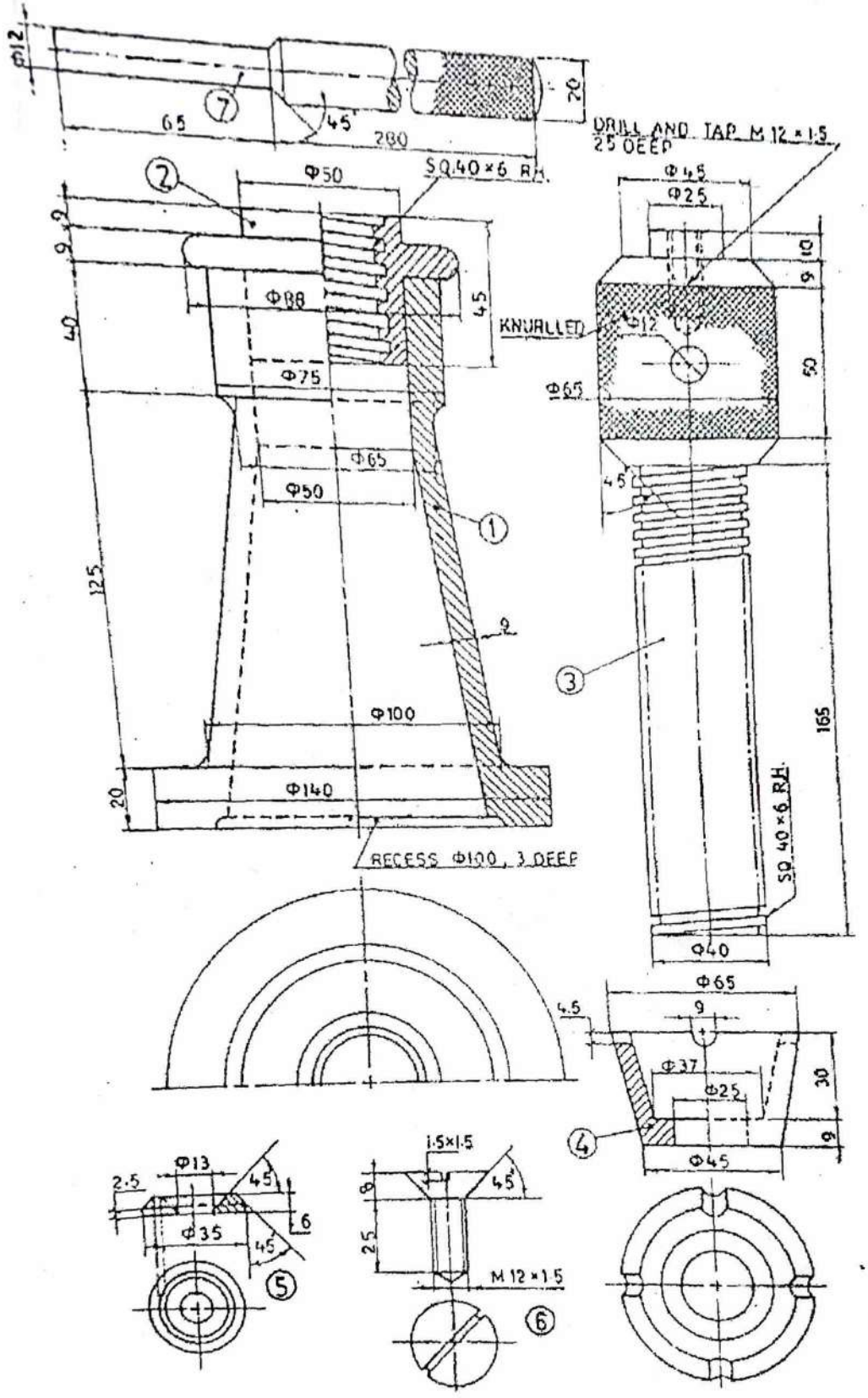

Fig 2. Detail of screw jack

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B.Tech. (ME) (ds) (Sem. – 4)

STRENGTH OF MATERIALS-II

M Code: 59129

Subject Code: BTME-401

Paper ID: [A1211]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) Explain the concept of energy of dilation.

   b) What is the threshold geometric limit of a cylinder to become thick cylinder?

   c) What are open coiled springs? What is the use of these springs?

   d) Explain the importance of shear centre.

   e) Differentiate between a thin cylinder and thick cylinder.

   f) Discuss about Lame's equations.

   g) What do you mean by disc of uniform strength?

   h) Write down the expression for Winker-Bach formula.

   i) What is meant by stiffness of spring?

   j) For a crane hook, locate the plane which is severely stressed.

SECTION B

2. Drive the general formula for distribution of shear stresses in beams.

3. A curved beam of circular section of diameter 100 mm is subjected to pure bending moment of +11.5 kNm. The radius of curvature is 100 mm. Determine the position of neutral axis.

4. The principal stresses at a point in an elastic material are 100N/mm^2(tensile), 80 N/mm^2(tensile) and 50N/mm^2(compression). If the stress at the elastic limit in simple tension is 200N/mm^2, determine whether the failure of material will occur according to maximum principal stress theory. If not, then determine factor of safety.

5. What do you mean by a disc of uniform strength? Find an expression for the thickness of a disc of uniform strength.

6. "The hoop stress is minimum at the outer surface and is maximum at the inner surface of a thick cylinder", prove this statement.

SECTION C

7. Prove that the circumference stress (σ_1) and longitudinal stress (σ_2) are given by,

   $\sigma_1 = \frac{p*d}{2t}$, and $\sigma_2 = \frac{p*d}{4t}$, where p = Internal fluid pressure, d = Internal dia. of thin cylinder and t = Thickness of wall of thin cylinder.

8. A close coiled helical spring is to carry a load of 5000N with a deflection of 50 mm and a maximum shearing stress of 400 N/mm^2. If the number of active turns or active coils is Eight. Taking modulus of rigidity as 83,000 N/mm^2 and assuming density of the spring material as 7700 kg/m^3, Find out the following:

   a) Wire diameter

   b) Mean coil diameter

   c) Weight of the spring

9. a) State and explain Maxwell's theorem of reciprocal deflection.

   b) A simply supported beam of span 'L' is carrying a concentrated load 'W' at the center and a uniformly distributed load of intensity 'ω' per unit length. Show that Maxwell's reciprocal theorem holds good at the center of the beam. UDL is on the entire length of the beam.

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B.Tech.(AE) / (ME) (2010 Batch) (Sem.– 4)

MATHEMATICS-III

M Code: 54035

Subject Code: AM-201

Paper ID: [A0865]

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) State Dirichlet's conditions for expansion of f(x) in Fourier series.

b) Examine whether $f(x) = \cos\frac{1}{x}$ can be expanded in Fourier series in $(-\pi, \pi)$

c) Find Laplace transform of $e^t t\sin^2 t$

d) Define unit step function and find its Laplace transform.

e) Find the value of $\int_{-1}^{1} P_0(x)dx$

f) Define ordinary and regular singular point of the differential equation

$$\frac{d^2y}{d\,x^2} + P(x)\frac{dy}{dx} + \theta(x)y = 0$$

g) Form a partial differential equation from the following:

$Z = f(x^2 - y^2)$

h) A string is stretched and fastened to two points 'l' apart. Motion is started by displacing the string in the form $y = f(x)$ from which it is released at time t= 0. Write down the differential equation for the motion and boundary conditions.

i) Show that cos z satisfies Cauchy-Reimann Equations.

$(D-D'-1)(D-D'-2)Z = e^{\quad} + x$, where $\frac{\partial}{\partial x}$, $\frac{\partial}{\partial y}$

5. Expand $f(z) = \frac{1}{z(z-1)(z-2)}$ in a Laurent's series for $|z-1|<1$.

6. Prove that $xJ'_n(x) = -xJ_n(x) + xJ_{n-1}(x)$, J_n is Bessel's function of first kind of

SECTION C

7. A rectangular plate with insulated surfaces is 8 cm wide and so long com that it may be considerd infinite in length without introducing an apprec temperature along one short edge $y = 0$ is given by

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B.Tech. (ME) (2011 Onwards) (Sem. – 4)

FLUID MECHANICS

M Code: 59131

Subject Code: BTME-403

Paper ID: [A1213]

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) Define compressibility and bulk modulus.

   b) What is metacentric height?

   c) State different types of fluid flow.

   d) Write Bernoulli's equation.

   e) Define stream function and potential function.

   f) What is the significance of dimensionless numbers.

   g) What are various losses in pipes.

   h) Show stable equilibrium of floating body with diagram.

   i) Define Euler number.

   j) What is Archimede's Principle.

SECTION B

2. Derive an expression for the time period of oscillation of a floating body in terms of radius of gyration and meta-centric height of floating body.

3. An open tank contains water up to depth of 2m and above it an oil of specific gravity 0.9 for a depth of 1m. Find the pressure intensity at the interface of two liquids and at the bottom tank.

4. Derive continuity equation in cartesian coordinates.

5. The stream function for a two dimensional flow is given by 2xy, calculate the velocity at the point (2,3). Find the velocity potential function also.

6. A pipe of diameter 400mm carries water at a velocity of 25m/s. The pressure at the points A and B are given as 29.43 N/cm^2 and 22.563 N/cm^2 respectively while the datum head at A and B are 28m and 30m. Find the loss of head between A and B.

SECTION C

7. Find the head lost due to friction in a pipe of diameter of 300mm and length 50m through which water is flowing at a velocity of 3m/s using Darcy equation and Czezys formula for which C= 60. Given kinematic viscosity 0.01 stokes.

8. Derive an expression for the rate of flow of fluid through venturimeter.

9. The pressure difference in a pipe of diameter D and length l due to turbulent flow depends upon the velocity V, viscosity, density, and roughness k. Using Buckingham's pi theorem obtain an expression for pressure difference.

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B.Tech. (ME) (2011 Onwards) (Sem. – 4)

APPLIED THERMODYNAMICS – II

M Code: 59132

Subject Code: BTME-404

Paper ID: [A1214]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. Write briefly:

   a) Classify air compressors.

   b) What is slip factor and power input factor.

   c) What are the factors that affect the performance of axial flow compressor?

   d) List out merit of gas turbines over steam turbines?

   e) Define propulsion efficiency.

   f) Write down the methods of cooling the turbine blades.

   g) Define thrust power.

   h) What is the need of multistage of gas turbine unit?

   i) What are the advantages of multistage compressor?

   j) What is the principle of jet propulsion?

SECTION B

2. Differentiate between centrifugal and axial compressors.

3. A single stage compressor with double acting draws in $17m^3/min$ of air at 1 bar and 15°C. The pressure and temperature at the end of suction are 0.98 bar and 30°C. Delivery pressure is maintained at 6.5 bar. Assuming a clearance factor of 5% and expansion and compression to follow the law $PV^{1.31} = C$. Calculate the strokes volume of compressor neglect the effect of rod.

4. A gas turbine plant works between the temperature limits of 1152°K and 288°K, isotropic efficiencies for compressor and turbine are 0.85 and 0.8 respectively. Determine the optimum ratio for maximum work output and also for maximum cycle thermal efficiency.

5. Air enters at the rate of 900 kg/min into a compressor of jet aircraft travelling at 241m/s. The air fuel ratio is 60:1 and the compression pressure ratio is 6:1. The calorific value of the fuel is 10,000 kcal/kg. Neglecting all losses, calculate the thrust, the specific fuel consumption and the propulsive power.

6. Define polytropic efficiency of compression with the help of T-S diagram. Obtain an expression for polytropic efficiency.

SECTION C

7. Derive the expression for thrust, thrust power, propulsion power, propulsive efficiency and thermal efficiency for a system.

8. Show that axial flow compressor with 50% reaction has symmetrical blading.

9. The first stage of an axial compressor is designed on free vortex principles, with no inlet guide vanes. The rotational speed is 6000 rpm and the stagnation temperature rise is 20K. The hub-tip ratio is 0.60, work done factor is 0.93 and isentropic efficiency of the stage is 0.89. Assuming an inlet velocity of 140 m/s and ambient conditions of 1.01 bar and 288 K, Calculate

   a) tip radius and corresponding rotor air angles, if the mach number relative to the tip is limited to 0.95

   b) mass flow entering the stage

   c) stage stagnation pressure ratio and power input

   Assume $c_p = 1.005$ kJ/kgK and $\gamma = 1.4$

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B.Tech. (ME) (Sem. – 4)

APPLIED THERMODYNAMICS- II

M Code: 59016

Subject Code: ME-208

Paper ID: [A0811]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) What is octane number?

   b) What are the objectives of supercharging in I.C. Engines?

   c) What is the purpose of lubrication in I.C. Engines?

   d) Define polytropic efficiency.

   e) Define degree of reaction used in centrifugal compressors.

   f) Explain chocking used in centrifugal compressor.

   g) State different components of axial flow compressors.

   h) Explain stalling used in case of axial flow compressors.

   i) List four different applications of rotary air compressors.

   j) State the assumptions made in ideal cycle analysis of gas turbines.

SECTION B

2. Explain in brief various stages of combustion in internal combustion engines.

3. What do you understand by Jet propulsion system? Discuss the advantages and disadvantages of Jet propulsion system.

4. Explain with neat sketch working of a root blower.

5. Discuss the phenomena of surging in the case of axial flow compressor.

6. What are the various methods which are used to improve the efficiency and output of gas turbine?

SECTION C

7. a) Explain with neat sketch working of ramjet engine. (7)

   b) Explain the term thrust power and thrust of jet propulsive system. (3)

8. Air at a temperature of 290k, flows in a centrifugal compressor running at 20,000 rpm. Slip factor 0.8, $\eta_c = 0.8$, $d_2 = 0.60$m. Assume that the absolute velocities at the inlet and outlet are the same. Calculate:

   a) The temperature rise of air passing through the compressor.

   b) The stage pressure ratio.

9. In an air standard regenerative gas turbine cycle the pressure ratio is 5. Air enters the compressor at 1 bar, 300 K and leaves at 490 K. The maximum temperature in the cycle is 1000 K. Calculate the cycle efficiency, given that the efficiency of the regenerator and the efficiency of the turbine are each 80%. Assume for air the ratio of specific heats as 1.4. Also show the cycle on a T-S diagram.

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B.Tech. (ME) (2011 Onwards) (Sem. – 4)

MANUFACTURING PROCESSES-II

M Code: 59133

Subject Code: BTME-405

Paper ID: [A1215]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. a) What is metal forming?

   b) Write the various applications of extrusion process.

   c) List the advantages of forging of metals.

   d) What is explosive forming?

   e) What is 'tool signature'?

   f) How is piercing different form blanking?

   g) Write the name of lathe accessories.

   h) List down the various types of milling cutters.

   i) What is spot facing drilling operation?

   j) What is broaching?

SECTION B

2. Explain tube drawing process with the help of suitable diagrams.

3. Explain forging defects, their causes and remedies.

4. Enumerate the factors affecting tool life. Briefly explain the effect of each factor.

5. Sketch the geometry of a single point cutting tool and mark the important angles on it.

6. A 160 mm long 15 mm diameter rod is reduced to 14 mm diameter in a single pass straight turning. If the spindle speed is 450rpm and feed rate is 225 mm/min, determine material removal rate and cutting time.

SECTION C

7. a) Discuss various methods used to produce metal powders.

   b) Classify and explain various types of rolling mills.

8. a) Explain the various coolants used in machining? Give their applications.

   b) Explain the composition, advantages and limitations of high carbon steels, cemented carbides, high speed steel and ceramics cutting tool materials.

9. a) Differentiate between up milling and down milling.

   b) Sketch and explain the various methods of surface grinding.

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B.Tech. (ME) (2011 Onwards) (Sem. – 4)

THEORY OF MACHINES – II

M Code: 59130

Subject Code: BTME-402

Paper ID: [A1212]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. Write briefly:

a) Write equations of equilibrium of forces acting in a single plane for a planar mechanism.

b) State D'Alembert's principle.

c) Write the phenomenon of dynamic balancing.

d) What do you mean by Hammer blow?

e) Write relationship between module and pitch of a gear.

f) Give two advantages of an Involute gear profile.

g) State the three applications of epicyclic gear train.

h) What do you mean by Gyroscope?

i) What is the meaning of number synthesis in a mechanism?

j) Write about addendum of a gear.

SECTION B

2. Explain the static force analysis of a Journal bearing considering frictional forces.
3. Write two point mass Dynamically Equivalent System considering analytical & graphical method.
4. Explain the analytical and graphical methods for balancing of several masses rotating in the same plane.
5. Write various methods to avoid interference in gears.
6. Write in detail about two position synthesis for four bar mechanism.

SECTION C

7. Calculate: a) Length of path of contact b) arc of contact c) the contact ratio when a pinion having 23 teeth drives a gear having teeth 57. The profile of the gear is involute with pressure angle 20°, module 8 mm and addendum equal to one module.
8. In a reverted epicyclic gear train, the arm F carries two wheels A and D and a compound wheel B-C. The wheels A meshes with wheel B and the wheel D meshes with wheel C. The numbers of teeth on wheel A, D and C are 80, 48 & 72 respectively: Find the speed & direction of wheel D when wheel A is fixed and arm F makes 200 rpm clockwise.
9. Explain the Gyroscopic effect on the stability of four wheel vehicle while taking a turn.

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B.Tech. (ME) (Sem. – 4)

STRENGTH OF MATERIALS-II

M Code: 59013

Subject Code: ME-202

Paper ID: [A0808]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) Show that in a bar, subjected to an axial load, the instantaneous stress due to sudden application of a load is twice the stress caused by the gradual application of load.

   b) Show graphically two theories of failure – 'Max. shear stress' and 'Max. Strain Energy' theory on same graph in overlapping mode.

   c) For springs of stiffness K_1 and K_2 installed in series what is their resultant spring stiffness.

   d) What is proof load as applicable to leaf springs? How is it related to camber?

   e) Write the assumptions made in Lame's theory for thick cylinders.

   f) In bending of curved beams find the nature of stress at extrados and intrados in case of simple chain link.

   g) What is the profile of a disc of uniform strength rotating at speed of 'w' red/sec.

   h) Graphically show the shear stress distribution for a beam with rectangular cross-section.

   i) How do shearing stresses in beam come on application of bending load?

   j) Give two usages of open coiled helical spring.

SECTION B

2. An unknown weight falls through 10mm on a collar rigidly attached to the lower end of a vertical bar, 3m long and 600 mm^2 in section. If the maximum instantaneous extension is known to be 2mm, what is the corresponding stress and the value of unknown weight. Take E $= 200\ kN/mm^2$

3. For leaf springs prove that maximum bending stress in the plates 'f' is $\frac{3Wl}{2nbt^2}$; symbols have their usual meaning.

4. A beam of square section is used as a beam with one diagonal horizontal. Find the maximum shear stress in the cross section of the beam. Also sketch the shear stress distribution across the depth of the section.

5. Explain 'shear strain energy' and 'strain energy' theories of failure.

6. A closely coiled helical spring of round wire of steel with diameter 5mm having 12 complete coils of 50mm mean diameter is subjected to an axial load of 100N. Find the deflection of the spring and the maximum shearing stress in the material. Modulus of rigidly 'C' = $80kN/mm^2$.

SECTION C

7. Derive analytically and show graphically the radial stress developed at extrados for a simple chain link.

8. A bonding moment 'M' applied to a solid shaft of dia 'd' results in elastic failure of shaft at maximum direct stress of 'σ'. Determine twisting moment 'T' in terms of 'M' when 'T' acts alone on the shaft and causes elastic failure according to
   i) max. principal strain theory
   ii) max. strain energy theory
   iii) shear strain energy theory.

   ν = poisson's ratio = 0.3

9. A cast iron pipe of 40cm internal diameter and 10cm thickness carries water under a pressure of 80 kg/cm^2. Determine the maximum and minimum intensities of loop stress across the section. Also sketch the radial pressure distribution and loop stress distribution across the section.

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Total No. of Quest

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Tech.(ME) (Sem.– 5)

NU METHODS IN ENGINEERING

M Code: 59028

Subject Code: ME-309

Paper ID: [A0818]

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) If the number 1000000 is approximated by 999996, then find the number of significant digits.

   b) What are the sources of errors?

   c) State the conditions under which Newton's Raphson method fails.

   d) Give Newton's forward differentiation formula.

   e) Give Newton Cotes integration formula.

   f) State Cayley-Hamilton theorem.

   g) Give predictor-corrector formula for numerical solution of ODEs.

   h) State Taylor's method for solving ODEs.

   i) Give Euler's modified formula and its order of error.

   j) How PDEs are classification as Hyperbolic, Parabolic and Elliptic PDEs.

SECTION B

2. If $u = xyz^3 + \frac{3}{2}x^3y^5$ and errors in x, y and z are 0.005, 0.001 and 0.001 at (3, 1, 1) respectively. Compute the maximum absolute and relative errors in u.

3. Find a root of $2x - \cos x = 3$, using iteration method upto 2 decimal places.

4. Find the cubic polynomial for the data:

x	0	1	2	3
$f(x)$	1	2	1	10

Hence evaluate $f(4)$.

5. Consider the function: $f(x) = \begin{cases} -\frac{11}{2}x^3 + 26x^2 - \frac{75}{2}x + 18, & 1 \le x \le 2 \\ \frac{11}{2}x^3 - 40x^2 + \frac{189}{2}x - 70, & 2 \le x \le 3 \end{cases}$.

Show that $f(x)$ is a cubic spline.

6. The velocity v (km/mm) of a moped which starts from rest is given at different t (sec) as follows:

t	2	4	6	8	10	12	14	16	18	20
v	10	18	25	29	32	20	11	5	2	0

Estimate the distance covered in 20 minutes.

SECTION C

7. a) Fit $y = ce^{nx}$ using the data

x	1	2	3	4	5	6	7	8
y	15.3	20.5	27.4	36.6	49.1	65.6	87.8	117.6

b) Find $\frac{dy}{dx}, \frac{d^2y}{dx^2}$ at $x = 1.6$ using the data:

x	1.0	1.1	1.2	1.3	1.4	1.5	1.6
y	7.989	8.403	8.781	9.129	9.451	9.750	10.031

8. a) Apply Runge Kutta method of order 4 to find the value of y at $x = 1.25$ (0.05) 1.3 given that $\frac{dy}{dx} = \sqrt{2x + y}$, $y(1.25) = 2.107329$.

b) Using finite difference method, find the solution of the BVP $y'' = xy$, subject to boundary conditions $y(0) + y'(0) = 1$ and $y(1) = 1$. (Take $h = 1/3$).

9. Solve $u_{xx} + u_{yy} = 0;\ 0 \le x \le 4;\ 0 \le y \le 4$ using the conditions

$u(x,0) = \frac{1}{2}x^2, u(x,4) = x^2,\ u(0,y) = 0\ \ u(4,y) = 8 + 2y$. (Take $h = k = 1$).

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Total No. of Pages: 02

Total No. of Questions: 09

B.Tech. (ME) (2011 Onwards) (Sem. – 5)

MATHEMATICS-III

M Code: 70601

Subject Code: BTAM-500

Paper ID: [A2127]

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) Find the Fourier series of the function $f(x) = |x|$, where $-2 \le x \le 2$.

   b) Determine half-range sine series for the function $f(t) = t^2 + t$, $0 \le t \le \pi$.

   c) Find Laplace transform of $t^2 e^{-2t} \cos t$.

   d) Find inverse Laplace transform of $\frac{e^{-7s}}{(s-3)^3}$.

   e) Show that $J_0^2 + 2(J_1^2 + J_2^2 + \ldots\ldots\ldots\ldots) = 1$.

   f) Find power series solution of $xy' - y = 0$ about $x_0 = 1$.

   g) Form a partial differential equation from the relation $xyz = f(x + y + z)$.

   h) Solve $x(y - z)p + y(z - x)q = z(x - y)$.

   i) Show that the function $f(z) = \bar{z}$ is not analytic at any point.

   j) State Cauchy Residue Theorem.

SECTION B

2. Obtain the Fourier series of $x \sin x$ as a Cosine series in the interval $(0, \pi)$. Also show that

$$\frac{1}{1.3} - \frac{1}{3.5} + \frac{1}{5.7} - \ldots\ldots = \frac{\pi - 2}{4}$$

3. Using Convolution theorem for Laplace transform, solve $y'' - 5y' - 6y = e^{-1}$, $y(0) = 1$, $y'(0) = 1$.

4. Solve the Bessel's equation $x^2y'' + xy' + (x^2 - n^2)y = 0$, where n is a non-negative real number and also discuss the case when n is integer.

5. Using method of separation of variables, solve $4\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = 3u$ subject to the condition

$u(0, y) = 3e^{-y} - 5e^{-5y}$.

6. Using Cauchy integral formula, evaluate the integral $\int_C \frac{e^{2z}}{(z-1)(z-2)} dz$, where C is the circle $|z| = 3$.

SECTION C

7. a) Using Fourier series, solve the wave equation $\frac{\partial^2 u}{\partial t^2} = a^2 \frac{\partial^2 u}{\partial x^2}, 0 < x < L, t > 0$, where 'a' is a constant related to tension in the vibrating string of length L having fixed ends. The boundary conditions and initial conditions are

$u(0, t) = u(L, t) = 0, t \geq 0,$

$u(x, 0) = f(x), 0 \leq x \leq L,$

$u_t(x, 0) = 0, 0 \leq x \leq L.$

b) State and prove convolution theorem for Laplace transform.

8. a) For Legendre polynomials $P_n(x)$ show that $\int_{-1}^{1} P_m(x) P_n(x) dx = \frac{2}{2n+1}$, when $m = n$.

b) A tightly stretched flexible string has its ends fixed at $x = 0$ and $x = l$. At time $t = 0$, the string is given a shape defined by $f(x) = a\, x(l - x)$, where a is a constant and then released. Find the displacement of any point x of the string at any time $t > 0$.

9. a) Find all Taylor and Laurent series of $1/(z^2 + 1)$ about $z_0 = i$.

b) Using Cauchy Residue theorem, evaluate $\int_C \frac{dz}{z^2(z+1)(z-1)}$, where C: $|z| = 3$.

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Total No. of Pages: 02

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B.Tech.(ME) (Sem. – 5)

AUTOMOBILE ENGINEERING

M Code: 59023

Subject Code: ME-305

Paper ID: [A0816]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) Explain the functions of the transmission system in an automobile.

   b) Draw a diagram showing various engine performance curves.

   c) Name main components of fuel injection system for automotive diesel engines.

   d) Compare the pump circulation system and the thermosyphon system of engine cooling.

   e) State the advantages and disadvantages of the independent and the conventional rigid-axle suspension systems.

   f) Explain clearly the necessity of the gear box in an automobile.

   g) State various factors of wheel alignment.

   h) Describe the advantages of the disc brakes over the drum brakes.

   i) Compare preventive maintenance and breakdown maintenance.

   j) Write requirements of a good spark plug.

SECTION B

2. Explain in detail modern Common Rail Fuel Injection System, discussing the function and working of the main system components, using a neat diagram.

3. Describe pressure system of engine lubrication with the help of a neat diagram. Discuss in particular the construction and working of oil pump.

4. Explain the function, construction and working of a hydraulic telescopic double acting shock absorber.

5. Explain the necessity of a differential in an automobile. Discuss in detail, the construction and operation of a differential.

6. Discuss in detail various tests for ascertaining the fitness of a battery to be used in a vehicle.

SECTION C

7. Explain the terms CAMBER, CASTOR, STEERING ANGLE INCLINATION and TOE-IN. Discuss the effects of each on the steering characteristics of an automobile.

8. Draw a diagram showing the layout of complete air pressure system of brakes and explain the working of its main units in detail.

9. Discuss the possible causes of the following engine problems due to faulty ignition system:

   a) Starting trouble

   b) Engine missing

   c) Rapid burning of Contact Breaker points

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Total No. of Questions: 09

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B.Tech.(ME) (2011 Onwards) (Sem. – 5)

COMPUTER AIDED DESIGN AND MANUFACTURING

M Code: 70603

Subject Code: BTME-502

Paper ID: [A2129]

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) Explain the basic CAD design process.

   b) Give the benefits of Geometric Transformation.

   c) Define a solid model.

   d) What is an Interpolant Curve?

   e) Give difference between synthetic and analytical curve.

   f) Explain the general procedure of FEM.

   g) Define NC machining Centers.

   h) Give benefits of GT.

   i) Explain the data selection system for CAPP.

   j) Explain CIMS in terms of Flexibility.

SECTION B

2. Discuss various CAD input devices with suitable diagrams.
3. Discuss the application of various geometric transformation using suitable examples.
4. Discuss the concept of hidden line removal method and shading.
5. Discuss the concept of adaptive control and also explain its types.
6. Discuss various part classification and coding systems.

SECTION C

7. Discuss the concept and benefits of CAPP and also explain its types.
8. Explain different layout concept of FMS with their benefits.
9. Explain the concept of concatenation of transformation of matrices using suitable 2D example.

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Total No. of Questions: 09

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B.Tech. (ME) (Sem. – 5)

HEAT TRANSFER

M Code: 59022

Subject Code: ME-303

Paper ID: [A0815]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. Write briefly:

   a) How does heat transfer differ from thermodynamics?

   b) Compare black and gray bodies.

   c) Explain the criteria of selection of fins.

   d) Discuss film wise and drop wise conduction?

   e) What is difference between natural and forced convection?

   f) What is the physical significance of Newton Law?

   g) Define coefficient of thermal conduction?

   h) What type of boundary conditions are used for various types of fins?

   i) Why is heat transfer rate higher in turbulent flow inside a tube?

   j) Define hydrodynamic boundary layer?

SECTION B

2. Derive an expression for mean temperature difference for parallel flow heat exchanger.

3. By using dimensional analysis develop a generalised empirical relation between Nusselt number, Reynolds number and Prandtl number for free convection heat transfer.

4. A surface at 250°C exposed to the surroundings at 110°C convects and radiates heat to the surroundings. The convection coefficient and radiation factor are 75 $W/m^2°C$ and unity respectively. If the heat is conducted to surface through a solid of conductivity 10 W/m°C. What is the temperature gradient at the surface in the solid?

5. A restaurant grill 1.0 m x 0.8 m is maintained at 135°C, while the room temperature is 25°C. Calculate the heat load generated by the grill. Nusselt number is given by

$$Nu = 0.14(Gr.\ Pr)^{1/2}$$

And the relevant properties at mean film temperature of 80°C are:

$K = 0.0304$ W/mk, $u = 21.09 \times 10^{-6}$ m^2/s and $Pr = 0.692$.

6. Derive an expression for the rate of heat transfer by conduction and convection through a composite plane wall consisting of three heterogeneous layers having thermal conductivity k_1, k_2, k_3 respectively.

SECTION C

7. Derive the expression of effectiveness in terms of capacity ratio and number of transfer units (NTU) in case of parallel flow of heat exchanger.

8. Steam at 0.065 bar condenses on a vertical plate 0.6 m square. If the surface temperature of the plate is maintained at 15°C. Estimate the rate of condensation.

$T_s = 37.7°C$, hfg (at 0.065 bar) $= 2412 \times 10^3$ J/Kg

Properties of water at mean temperature are:

$\rho = 1000$ Kg/m^3, $\mu = 864 \times 10^{-6}$ Kg/ms, $K = 0.913$ W/m°K.

9. Explain:

a) Radiosity

b) Irradiation

c) Lambert's cosine law

d) Wein's displacement law

e) Planck's Law

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B.Tech. (ME) (2011 Onwards) (Sem. – 5)

DESIGN OF MACHINE ELEMENTS-I

M Code: 70602

Subject Code: BTME-501

Paper ID: [A2128]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.
3. The machine design data book is allowed.

SECTION A

1. a) What is meant by hole basis system?

   b) How grey cast iron designated in Indian standard?

   c) State the functions of coupling.

   d) What types of stresses are induced in shafts?

   e) What is meant by endurance strength of a material?

   f) What do you understand by term riveted joint?

   g) Define the term "Empirical Design".

   h) What is leg and throat thickness of a fillet weld?

   i) Give the composition of 40C8 plain carbon steel.

   j) What is first and second type lever? Give their examples.

SECTION B

2. Explain the factors which are considered in the selection of material for a machine component.

3. Design the shaft, flange and bolt for a protected type flange coupling used to transmit 20.25 kW at 900 rev/minute from an engine to a machine. Assume following permissible stresses for the components of a coupling,

   Shear stress for shaft and bolt 40 MPa

   Shear stress for cast iron 8 MPa

4. Design a muff coupling which is used to connect two steel shafts transmitting 40 kW at 350 rpm. The material for the shafts and key is plain carbon steel for which allowable shear and crushing stresses may be taken as 40 MPa and 80 MPa respectively. The material for the muff is cast iron for which the allowable shear stress may be assumed as 15 MPa.

5. A solid circular shaft is subjected to a bending moment of 3000 Nm and a torque of 10000 Nm. The shaft is made of 45C8 steel having ultimate tensile stress of 700 MPa and an ultimate shear stress of 500 MPa. Assuming a factor of safety as 6, determine the diameter of the shaft using maximum shear stress theory.

6. Design a cotter joint for socket and spigot type to sustain an axial load of 100 kN. The allowable stresses for material are 120 MPa, 160 MPa and 80 MPa in tension, crushing and shear respectively.

7. Explain how the strength of transverse & parallel fillet weld joints is determined?

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B. 2011 Onwards) (Sem. – 6)

D MACHINERY

Code: 71187

ject Code: BTME-603

Paper ID: [A2363]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) Classify turbines on the basis of head available.

   b) What is the function of braking jet in Pelton turbine?

   c) State advantages of Kaplan turbine over Propeller Turbine.

   d) What is Cavitation, List down cavitation susceptible areas in turbines and pumps?

   e) Why Jet pumps have been phased out?

   f) What is the function of draft tube?

   g) Differentiate between fluid coupling and Torque converter.

   h) Define specific speed of a turbine.

   i) What is the need of Priming of a centrifugal pump?

   j) Define Net Positive Suction Head (NPSH) and write its expression.

SECTION B

2. State "Impulse momentum equation", also give its applications. Why the case of jet striking single moving vane is not feasible?

3. A Pelton wheel is to be designed for the following specifications: Power (BP) 9560 kW, Head = 350 m, speed = 750 r.p.m., overall efficiency = 85%, jet diameter not to exceed $1/6^{th}$ of wheel diameter. Determine i) wheel diameter, ii) diameter of jet, iii) number of jets required.

4. Derive an expression for the minimum speed for starting a centrifugal pump.

5. Derive expressions for model relationships in case of a hydraulic turbine.

6. With the help of neat diagram, explain the working principle of fluid coupling. Also, describe the slip and the efficiency of the fluid coupling.

SECTION C

7. What are performance curves? Discuss importance and plotting of these curves in detail for impulse and reaction turbines.

8. What is negative slip in Reciprocating pump? Explain with sketches the function of an air vessel in a reciprocating pump.

9. A Francis turbine supplied through a 6m diameter penstock has following specifications: output of installation = 63500kW, Flow = $117m^3/s$, speed 150 r.p.m., hydraulic efficiency = 92%, mean diameter of turbine at entry = 4m, mean blade height at entry = lm, entry diameter of draft tube = 4.2m, velocity in tail race = 2.4m/s. The static pressure head in the penstock measured just before entry to runner is 57.4m, the point of measurement is 3m above tail race level. The loss in draft tube is equivalent to 30% of the velocity head at entry to it. The exit plane of the runner is 2m above tail race level, and flow leaves the runner without swirl. Determine (i) overall efficiency, (ii) direction of flow relative to runner shaft, (iii) pressure head at entry to draft tube.

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Total No. of Questions: 09

Total No. of Pages: 03

B.Tech. (ME) (2011 Onwards) (Sem.– 6)

STATISTICAL AND NUMERICAL METHODS IN ENGINEERING

M Code: 71188

Subject Code: BTME-604

Paper ID: [A2364]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. a) Define standard deviation.

   b) Let two fair dice be rolled. If the sum of 7 is obtained, find the probability that at least one of the dice shows 2.

   c) Derive the formula for mean of binomial distribution.

   d) $Sin\,x = x - \frac{x^3}{\angle 3} + \frac{x^5}{\angle 5} - ..... + \frac{(-1)^n x^{2n-1}}{\angle 2n-1}$. Find its approximate value if $x = 0.2$, using three terms of the expansion.

   e) Derive sufficient condition for convergence of Newton-Raphson method.

   f) By using Power method calculate the dominant eigen values of $\begin{bmatrix} 4 & 1 \\ 1 & 3 \end{bmatrix}$

   g) Find a polynomial P(x) of degree 2 such that P(1) = 1, P(3) = 27 and P(4) = 64.

   h) Write Adam's Predictor- Corrector Formulas.

   i) Using Lagranges interpolation formula express $\frac{x^2 + 6x - 1}{(x-1)(x-4)(x-6)}$ as a sum of partial fractions.

   j) Using Stirling's formula to find y_{35} given that $y_{20} = 512$, $y_{30} = 439$, $y_{40} = 346$ and $y_{50} = 243$.

8. a) Show that the order of convergence of Newton-Raphson method is quadratic.

   b) Find the value of x for which $y = f(x)$ is minimum in the given range of x, using the following data. Find also the minimum value of $f(x)$.

x:	0	1	2	3	4	5	6
$f(x)$:	769	668	541	389	401	462	495

9. a) Using Milne's method to find y(1.4) given $dy/dx = x^2 (1 + y)$, y(1) = 1, y(1.1) = 1.233, y(1.2) = 1.548 and y(1.3) = 1.979.

   b) Using finite difference method, solve the equation $y'' - 4y' + 4y = e^{3x}$ with conditions y(0) = 0, y(1) = 2, by taking n = 4.

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Total No. of Questions: 09

Total No. of Pages: 02

B.Tech. (ME) (E-I 2011 onwards) (Sem. – 6)

NON TRADITIONAL MACHINING

M Code: 71252

Subject Code: DE/ME-2.0

Paper ID: [A2411]

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) What is the need for non-traditional machining processes?

   b) Define flexible manufacturing systems.

   c) Enumerate various types of thermal non-traditional machining processes.

   d) Enumerate the limitations of abrasive flow machining processes.

   e) Explain the material removal mechanism in ultrasonic machining process.

   f) Explain the material removal mechanism in electron beam machining process.

   g) How taper cut can be avoided in EDM process?

   h) What are various types of transducers used in USM process?

   i) What is the function of diffusion pump in EBM process?

   j) Enumerate the properties of maskants used in chemical machining.

SECTION B

2. Discuss advantages, limitations and applications of non-traditional machining processes.

3. With the help of a neat sketch, explain the elements of Water Jet Machining setup, giving the mechanism of material removal in WJM.

4. Describe the working, schematics, applications and limitations of hot machining process with the help of a neat sketch.

5. Explain the material removal mechanism and working of solid state laser machining process giving a neat sketch.

6. What do you understand by hybrid machining processes? Give example of hybrid machining processes suggesting their applications.

SECTION C

7. Describe the working and schematics of electro chemical honing machining process with the help of a neat sketch.

8. a) Explain the working and construction of photochemical machining process giving a neat sketch.

   b) Explain the working and construction of gas shielded (dual gas) plasma arc machining process giving a neat sketch.

9. Explain the mechanism of material removal in electric discharge machining process with the help of a neat sketch. Also explain the process parameters involved in EDM process.

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Total No. of Questions: 09

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B.Tech. (ME) (E-I 2011 onwards) (Sem. – 6)

NON-CONVENTIONAL ENERGY RESOURCES

M Code: 71245

Subject Code: DE/ME-1.3

Paper ID: [A2404]

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) What are non-renewable energy resources?

   b) What do you mean by concentrating collector?

   c) Define solar cell.

   d) What are the various sources of Bio-mass?

   e) List the applications of solar energy.

   f) What is geothermal energy?

   g) What are the main types of MHD (Magnetic Hydrodynamic) systems?

   h) Define double basin tidal power plants.

   i) Explain working principle of fuel cell.

   j) Name different types of bio gas plants.

SECTION B

2. List various Non-conventional energy resources. Give their availability, relative merits and demerits.
3. Describe various types of Flat Plate collectors with the help of suitable diagrams.
4. Define wind energy. What are the basic components of wind energy conversion systems?
5. a) Define operating principle of magnetic hydrodynamic generator (MHD).

   b) Discuss thermo-electric refrigeration.
6. What are the main sources of geothermal energy?

SECTION C

7. What are different sources of bio-mass? Explain functioning and constructional features of any one bio gas plant.
8. a) Discuss any two applications of solar energy.

   b) Explain design procedure of flat plate collectors.
9. Write short Note on any two of the following:

   a) Thermionic generator.

   b) Site selection for wind mills.

   c) Tidal energy.

Roll No. | | | | | | | | | | | | | Total No. of Pages: 02

Total No. of Questions: 07

B.Tech. (ME) (2011 Onwards) (Sem. – 6)

DESIGN OF MACHINE ELEMENTS-II

M Code: 71185

Subject Code: BTME-601

Paper ID: [A2361]

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.**
3. **Use of a standard Design data book is permitted.**

SECTION A

1. a) Describe the various stages of friction in the case of plain bearings.

   b) What is meant by 'Self-contained bearings'?

   c) What is meant by creep of a belt and what is its effect?

   d) What is meant by nipping of a leaf spring?

   e) Why Wahl's factor is to be considered in the design of helical compression or tension springs?

   f) List the advantages and disadvantages of chain drive.

   g) What are the thermal considerations to be considered in brake design?

   h) What is meant by wear load of a gear tooth?

   i) Describe the principle of operation of a centrifugal clutch.

   j) What is a positive clutch?

SECTION B

2. Design a helical compression spring, which is subjected to a static load of 5 kN and a fluctuating load of ± 2 kN. The mean diameter of the spring is 100 mm, and the stiffness of the spring is 50 N/mm. Use a factor of safety of 2. Take τ_y =700 MPa and τ_e=300 MPa.

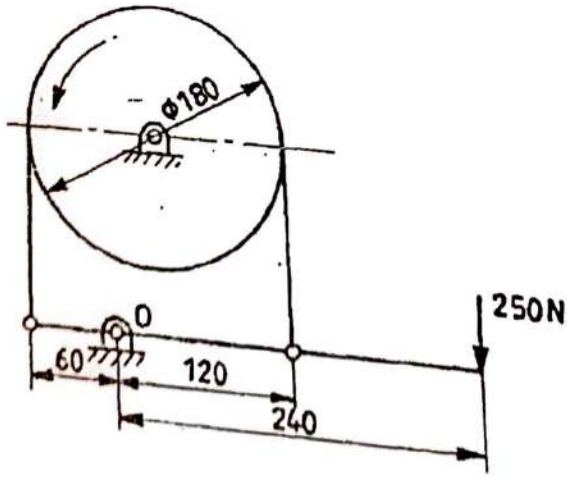
3. Design a journal bearing, required to resist a radial load of 8 kN. The oil used has a viscosity of 0.0087 kg/m-s at the operating temperature of 80°C. Shaft speed is 720 rpm. Bearing diameter clearance may be assumed as 0.00025 mm per mm diameter and ambient temperature is 30°C. If heat radiating capacity of the bearing is 150 N-m per second per square meter of projected area of bearing per °C; determine whether artificial cooling is necessary?

4. Design a belt pulley for transmitting 10 kW at 180 rpm. The velocity of the belt is not to exceed 10 m/s, and the maximum tension is not to exceed 15 N/mm width. The tension on the slag side is one half of that on the tight side. Determine all the principle dimensions of the pulley.

5. A 25 kW motor running at 1200 rpm, drives a compressor at 780 rpm, through a 90° bevel gearing arrangement. The pinon has 30 teeth. The pressure angle of the teeth is 14.5°. The face width may be taken as one fourth of the cone distance. Both the pinion and gear are made of heat treated cast steel, with static strength of 200 MPa. Determine the module, pitch and face width of the gears.

6. A cone clutch transmits a power of 5 kW at 240 rpm. The smaller radius of the cone is 200 mm and the face width is 50 mm. The cone has a face angle of 15°. Determine the axial force necessary to engage the clutch, if the coefficient of friction at the contact surfaces is 0.25. Also, determine the maximum pressure on the contact surfaces, assuming uniform wear.

7. A differential band brake has a force of 250 N applied at the end of a lever as shown in figure below. The coefficient of friction between the band and drum is 0.35, and angle of lap is 180°. Determine the maximum torque that the brake can resist for counter-clockwise rotation of the drum.



Roll No. | | | | | | | | | | | |

Total No. of Pages: 02

Total No. of Questions: 09

B.Tech. (ME) (Sem. – 6)

FLUID MACHINERY

M Code: 59055

Subject Code: ME-306

Paper ID: [A0821]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) What is meant by degree of reaction?

   b) Define Thoma cavitation number. What is its importance?

   c) In what respect does torque converter for differ from fluid coupling?

   d) Which thrust is zero in case of pelton turbine and why?

   e) What are the various losses in hydro power plants?

   f) Write the efficiency of jet propulsion with inlet orifice at right angle to motion of ship.

   g) Draw operating characteristics of Propeller and Kaplan turbine.

   h) Draw velocity triangle diagram at inlet for pelton turbine and mark the velocities.

   i) Define specific speed of turbine. What are the units?

   j) What are the uses of intensifier and accumulator?

SECTION B

A Jet of water with a velocity of 40m/sec strikes a curved vane moving at 20m/sec. The jet makes an angle of 30^0 with the direction of motion of vane at inlet and leaves at 90^0 to motion of direction of vane at outlet. Find vane angle at inlet.

3. Show that in a Pelton turbine where the buckets deflect the water through (180-θ), the hyd. η is given by

$$\eta_{hyde} = \frac{2k_v^{\,2}(v-u)(1+\cos\theta)u}{V^2}$$ with usual notations.

4. The external and internal dia of inward flow reaction turbine are 1.2 and 0.6m respectively. The head of turbine is 22m and velocity of flow through the runner is constant and equals 2.5m/s. The guide blade angle is 10^0 and runner vanes are radial at inlet. If water discharges radial at outlet find a) speed of turbine b) vane angle at outlet.

5. Prove that work done/sec per unit weight of water in a reaction turbine is equal to

$$w = \frac{1}{g}\left[V_{w_1}u_1 \pm V_{w_2}U_2\right]$$ With usual notation

6. The cylinder dia of a single acting reciprocating pump is 150mm and stroke length 300mm. The pump runs at 50 rpm and lifts water through 25m. The delivering pipe is 22m long and 100mm in dia. Find theoretical discharge and theoretical power to run the pump. It actual discharge is 4.2 liters/sec. Find %age slip. Also find accelerating head at middle of stroke.

SECTION C

7. Prove that the manometric head of a centrifugal pump running at N rpm and discharging Q can be written as

$$H_{mano} = AN^2 + BNQ + CQ^2$$

Where A, B and C are constants

8. a) By means of a neat sketch explain the working of air lift pump.

   b) Explain the function of surge tank with the help of diagram.

9. The internal and external dia of impeller of a centrifugal pump are 30cm and 60cm respectively. The pump runs at 1000 rpm. The vane angles at inlet and outlet are 20^0 and 30^0 respectively. The water enters the impeller radially and velocity of flow is constant. Find the work done by impeller/unit weight of water.

Roll No. | | | | | | | | | | | | |

Total No. of Questions: 09

Total No. of Pages: 02

B.Tech. (ME) (Sem. – 6)

MACHINE DESIGN-II

M Code: 59053

Subject Code: ME-302

Paper ID: [A0819]

Time: 4 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. a) How do you designate wire ropes? Decode some specification of a wire rope of your choice. Give two usages of the rope you have chosen.

   b) How do you equalize the stress in full length and graduated leaves?

   c) What are all different stresses the helical spring under axial load is subjected to. Superimpose these stresses graphically.

   d) When does a brake become self-locking? Show it with the help of a diagram.

   e) What is the origin of Lewis equation as applied to Gears?

   f) What are number of starts as applied to worm gears?

   g) What is condition of hydrodynamic lubrication for sliding contact bearings? What is the origin of this condition?

   h) Designate technically any heavy duty roller bearing. Decode it completely.

   i) What is chordal action in chain drive? What does its optimization result in?

   j) What is self-energizing and self-locking brake?

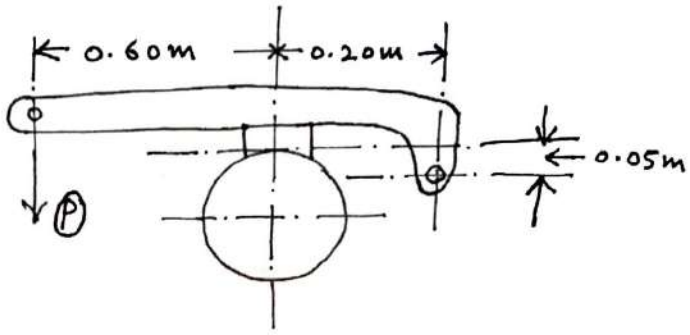
SECTION B

2. A Single cylinder, single acting, four stroke oil engine develops 18.75 kW indicated power at 300 rpm. The work done by the gases during the expansion stroke is 2.3 times the work done on the gases during compression stroke and work done during suction and exhaust strokes is negligible. The speed is to be maintained within 1% of the mean speed. Find the mass of the flywheel if diameter is limited to 60 cm.

3. A gas engine valve spring is to have a mean diameter of 37.5 mm. The maximum load it will have to sustain is 450N with a corresponding deflection of 12.5 mm. The spring is to be designed taking stresses due to curvature and direct loading by some standard factor by an established designer. Determine the size of the wire and no. of turns if fs = 300N/mm^2.

4. For the block-brake shown in the fig. the data is $\mu = 0.3$. Brake drum diameter = 0.36 m.

   Find 'P' for clockwise and counter clockwise rotation. Where must the pivot be placed to make the brake self-energizing for counter clockwise direction?



5. Explain basic theory and structure of CAD software.

6. Prove that for leaf springs 'Nip' = $\dfrac{2pl^3}{EZ\ bt^3}$

   Where symbols have specific meaning.

SECTION C

7. Determine the safe power which can be transmitted by a pair of helical gears, 20^0 full depth and 25^0 helix having a normal module of 5 mm. Both the gears are made of forged C-30 steel with a face width of 76.2 mm. The pinion speed is 2000 rpm and it has 20 teeth. The velocity ratio is to be 5 to 1. Fes, i.e. surface endurance limit = 350 x 10^6 N/m^2; Ep = Eg = 210 GPa.

8. A journal bearing is proposed for a centrifugal pump. The diameter of the journal is 0.15 m and the load on it is 40 kN and its speed is 900 rpm. Design the journal bearing completely.

9. Give complete general design procedure for chain drive.

Roll No. | | | | | | | | | |

Total No. of Questions: 09

Total No. of Pages: 04

B.Tech. (ME) (2010 Batch) (Sem. – 7, 8)

OPERATIONS RESEARCH

M Code: 59081

Subject Code: ME-406

Paper ID: [A0840]

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. Answer the following questions:

a) Discuss different environments under which decisions are made.

b) Name different types of mathematical models used in O.R.

c) What is meant by decision variables?

d) Define degenerate and non-degenerate basic feasible solutions.

e) Explain significance of slack variables.

f) Why is Vogel's approximation method preferred over other methods of finding initial basic feasible solution of a transportation problem?

g) Define total elapsed time and idle time in a sequencing problem.

h) Define dynamic programming.

i) Explain two situations in which replacement of items is necessary.

j) Write the various functions performed by inventory.

SECTION B

n the essential characteristics of O.R. problem.

nce in km from each of the cities A, B, C, D and E to each of the cities 1, 2, 3, 4, 5 and given in the matrix below. Find the optimal assignment policy that results in the mum total distance travelled.

To City

From City	1	2	3	4	5	6
A	12	10	15	22	18	8
B	10	18	25	15	16	12
C	11	10	3	8	5	9
D	6	14	10	13	13	12
E	8	12	11	7	13	10

A steel manufacturing company is concerned with the possibility of a strike. It will cost an extra Rs. 20,000 to acquire an adequate stockpile. If there is a strike and the company has not stockpiled, management estimates an additional expense of Rs. 60,000 on account of lost sales. Should the company stockpile or not if it is to use :

a) Optimistic criterion

b) Wald criterion

c) Savage criterion

d) Hurwicz criterion for $\alpha = 0.4$

e) Laplace criterion.

A company manufactures 30 items per day. The sale of these items depends upon demand which has the following distribution :-

Sales (units)	27	28	29	30	31	32
Probability	0.10	0.15	0.20	0.35	0.15	0.05

The production cost and sale price of each unit are Rs. 40 and Rs. 50 respectively. Any unsold product is to be disposed of at a loss of Rs.15 per unit. There is a penalty of Rs. 5 per unit if the demand is not met. Using the following random numbers, estimate total profit / loss for the company for the next 10 days: - 10, 99, 65, 99, 95, 01, 79, 11, 16 and 20.

6. Auto vehicles arrive at a petrol pump, having one petrol unit, in poisson fashion with an average of 10 units per hour. The service time is distributed exponentially with a mean of 3 minutes. Find the following :

   a) Average number of units in the system.

   b) Average waiting time for customer.

   c) Average queue length.

   d) Probability that a customer arriving at the pump will have to wait.

   e) Probability that the number of customers in the system is 2.

SECTION C

7. Food X contains 6 units of vitamin A per gram and 7 units of vitamin B per gram and costs 12 paise per gram. Food Y contains 8 units of vitamin A per gram and 12 units of vitamin B per gram and costs 15 paise per gram. The daily minimum requirement of vitamin A and vitamin B is 80 units and 100 units respectively. Find the minimum cost product mix by the simplex method.

8. a) A firm is thinking of replacing a particular machine whose cost price is Rs. 12,200. The scrap value of this machine is only Rs. 200. The maintenance costs are found to be as follows:-

Year	1	2	3	4	5	6	7	8
Maintenance Cost (Rs.)	220	500	800	1,200	1,800	2,500	3,200	4,000

Determine when the firm should get the machine replaced.

b) Assume that the following quantity discount schedule for a particular bearing is available to a retail store :

Order size (units)	Discount
0-49	0%
50-99	5%
100-199	10%
200 and above	12 %

The cost of a single bearing with no discount is Rs. 30. The annual demand is 250 units, ordering cost is Rs. 20 per order and annual inventory carrying cost is Rs. 4 per unit. Determine the optimal order quantity and the associated minimal total cost if shortages are not allowed.

9. The details of a project are as follows :

Activity	Immediate predecessor	Duration (weeks)
A	-	4
B	-	3
C	-	2
D	A,B,C	5
E	A,B,C	6
F	D	7
G	D,E	6
H	D,E	9
I	F	4
J	G	6
K	H	8

Find the critical path and the corresponding project completion time. Find also the total float of each activity.

Roll No. | | | | | | | | | | | | | Total No. of Pages: 02

Total No. of Questions: 09

B.Tech. (ME) (2011 Onwards) (Sem. – 7, 8)

REFRIGERATION AND AIR CONDITIONING

M Code: 71995

Subject Code: BTME-802

Paper ID: [A3063]

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) Define the terms: Energy efficient ration and EPR of a heat pump.

   b) Write the applications of Gas cycle refrigeration.

   c) Draw P-H and T-S diagrams for a vapour compression cycle with dry vapours after compression.

   d) What is the function of flash intercooler and liquid sub-cooler in compound vapour compression system?

   e) Why Lithium Bromide refrigeration system is also called water absorption system?

   f) What do you mean by the term Cryogenics? Write its applications.

   g) Distinguish between Relative humidity and Specific humidity.

   h) Define the terms: Sensible heat factor, and By-pass factor.

   i) Distinguish between sensible and latent heat load.

   j) Why fans and dampers are used in air conditioning systems?

SECTION B

2. A refrigeration system operates on the reversed Carnot cycle. The higher temperature of the refrigerator in the system is 35°C and the lower temperature is -15°C. The capacity is to be 12 tonnes. Determine: COP, Heat rejected from the system per hour and Power required.

3. Describe, with the help of schematic and p-h diagrams, the working of a two stage compression system with water intercooler, liquid intercooler and a liquid flash chamber.

4. Explain the working of Electrolux refrigeration system with the help of a neat sketch.

5. Explain the working of a steam jet refrigeration system with the help of a neat sketch. Also draw its temperature-entropy and enthalpy-entropy diagrams.

6. Explain in brief as to how the human body reacts to changes in temperature of environment. Also explain the effect of activities on the heat load calculations for comfort applications.

SECTION C

7. A simple air cooled system is used for an aeroplane having a load of 10 tonnes. The atmospheric pressure and temperature are 0.9 bar and 10°C respectively. The pressure increases to 1.013 bar due to ramming. The temperature of the air is reduced by 50°C in the heat exchanger. The pressure in the cabin is 1.01 bar and the temperature of air leaving the cabin is 25°C. Determine: Power required to take the load of cooling the cabin and C.O.P. of the system. Assume all expansions and compressions are isentropic. The pressure of the compressed air is 3.5 bar. For air c_p=1 kJ/kgK and c_p/c_v=1.4.

8. The saturated air leaving the cooling section of an air conditioning system at 14°C at the rate of 50 m^3/min is mixed adiabatically with the outside air at 32°C and 60% relative humidity at a rate of 20 m^3/min. Show the process on skeleton psychometric chart. Assuming the mixing occurs at a pressure of 1 atmosphere; determine the specific humidity, relative humidity, dry bulb temperature and the volume flow rate of the mixture.

9. Write short notes on the following:

   a) Leak detection and charging of refrigerants.

   b) Room air conditioners

Roll No. | | | | | | | | | | | | |

Total No. of Pages: 02

Total No. of Questions: 09

B.Tech. (ME) (2011 Onwards) (Sem. – 7, 8)

INDUSTRIAL ENGINEERING AND MANAGEMENT

M Code: 71994

Subject Code: BTME-801

Paper ID: [A3062]

Time: 3 Hrs. Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) List functions of Industrial Engineering Department.

   b) Write a brief history of management.

   c) What system of layout will you recommend to the following?

      i) Cotton mill ii) Ordinance unit manufacturing tanks

   d) Distinguish between management and administration.

   e) List the objectives of work-study.

   f) Distinguish between production and productivity.

   g) Define the concept of standard time.

   h) Write a brief comment on the following:

      "What the value engineering is and what it is not".

   i) Define planning. Write reasons for failure of planning.

   j) State the principles of control.

SECTION B

2. Describe briefly the historical background of Industrial Engineering down the decades and clearly bring out the details of achievements of stalwarts of I.E.

3. Describe Taylor's Scientific Management.

4. What is an organization chart? Explain the concept of span of control with reference to organizing.

5. What is meant by delegation of authority? Discuss the benefits and means of effective delegation of authority.

6. What are the differences between functional and product layout of machine. How a cellular layout does differ from a process layout?

SECTION C

7. a) Describe the role of Work Study in improving plant productivity and safety.

   b) Describe various principles of motion economy

8. a) Discuss the various reasons of low productivity in industry.

   b) Describe the methods to improve productivity.

9. a) Explain the basic procedural steps in conducting work-study.

   b) Explain the following statement "Value Engineering is more of human relation, team building and motivation programme than anything else.

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Total No. of Questions: 09

Total No. of Pages: 02

B.Tech. (ME) (2011 Onwards Elective-II) (Sem. – 7, 8)

I.C.ENGINES

M Code: 71997

Subject Code: DE/ME-1.1

Paper ID: [A3065]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) Draw port Timing diagram for a 2-stroke engine.

   b) What is air standard efficiency and relative efficiency?

   c) Why Petrol injection is better to carburetor?

   d) What is brake specific fuel consumption?

   e) Explain the phenomenon of Dissociation.

   f) What is the difference between fixed geometry and variable geometry turbochargers?

   g) What is ignition lag, how it affects combustion phenomenon?

   h) Why pre combustion chamber is not required in CRDI system?

   i) What is the function of butterfly valve in Vacuum Governor?

   j) Why Carnot cycle cannot be practiced in an actual engine?

SECTION B

2. Discuss working of a Two-stroke engine and plot the cycle on P-V chart.

3. Define formation of flame front. Explain various factors influencing flame speed, ignition lag.

4. The dry exhaust analysis from an I.C. engine is given as follows:

   $CH_4 = 4\%$, $H_2 = 1\%$, $CO = 2\%$, $CO_2 = 12\%$, $O_2 = 4.5\%$, $N_2 = 76.5\%$ by difference. Find the proportions by mass of C to H_2 in the fuel. Assume fuel is a pure hydrocarbon.

5. From the point of view of fuel-air cycle analysis how does fuel-air ratio affect efficiency, maximum power, temperature and pressure in cycle.

6. What do you mean by a supercharger. Discuss its effect on (i) power output (ii) thermal efficiency (iii) fuel consumption.

SECTION C

7. Describe with suitable sketches following systems of a modern carburetor: (a) main metering system (b) idling system (c) Economizer system (d) acceleration system

8. Explain with neat sketches the working diesel fuel injection system comprising distributor pump, also explain construction and working of distributor injection pump.

9. The following observations were made during a trial of a single cylinder, four stroke gas engine having cylinder diameter of 18cm and stroke 24cm. Duration of trial = 30min., Total number of revolutions = 9000, total number of explosions = 4450, Mean effective pressure = 5bar, Net load on brake wheel = 40kg., Effective diameter of brake wheel =1 m, total gas used at NTP =2.4m^3, LCV of gas 19MJ/m^3, Total air used = 36m^3, pressure of air = 720mm Hg, temperature of air =17°C, specific heat of exhaust gas = 1 kJ/kgK, cooling water circulated = 80kg, rise in temperature of cooling water =30°C. Draw up a heat balance sheet and estimate the mechanical and indicated thermal efficiencies of the engine. Take R = 287J/kg K.

Roll No. | | | | | | | | | | | |

Total No. of Questions: 09

Total No. of Pages: 02

B.Tech. (ME) (Sem. – 7, 8)

MECHANICAL VIBRATIONS

M Code: 59077

Subject Code: ME-408

Paper ID: [A0841]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) What do you mean by vibration?

   b) What is difference between discrete system and continuous system?

   c) Differentiate between deterministic and random vibrations.

   d) What are three elementary parts of a vibrating system?

   e) Define logarithmic decrement.

   f) Define Forced vibrations.

   g) Mention the uses of vibrometers.

   h) What do you mean by torsionally equivalent shaft?

   i) Define the flexibility and stiffness influence coefficient.

   j) Define D'Alemberts Principle.

SECTION B

2. Draw a neat sketch of centrifugal pendulum absorber and explain its working.

3. A harmonic motion has amplitude of 0.05m and a frequency of 25 Hz. Find the time period, maximum velocity and maximum acceleration.

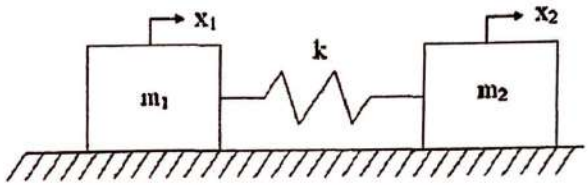
4. A torsional pendulum has a rod of 4mm diameter. Find its length if its natural frequency is 15 Hz. The inertia of mass fixed at free end is 0.015 kg.m^2. Take G = 0.84 x 10^{11} N/m^2.

5. A compressor weighing 600 N and operating at 1000 rpm, is mounted on six parallel springs of stiffness 6000 N/m each. Determine the maximum permissible unbalance in order to limit the steady state deflection to 2.5 mm peak-to-peak.

6. Draw a neat sketch of dry friction damper and explain its working.

SECTION C

7. Two blocks of mass m_1 and m_2 connected together by a spring of stiffness k, are resting on a frictionless horizontal surface as shown in figure below. Find an expression for the natural frequencies of the system.



8. Derive suitable expression for longitudinal vibrations for a rectangular uniform cross sectional bar of length *l* fixed at one end and free at the other end.

9. Write a short note on the following:

   a) Accelerometers

   b) Eddy current damping

Roll No. | | | | | | | | | | |

Total No. of Questions: 09

Total No. of Pages: 02

B.Tech. (ME) (2011 Onwards Elective-II) (Sem. – 7, 8)

TOTAL QUALITY MANAGEMENT

M Code: 72011

Subject Code: DE/ME-2.5

Paper ID: [A3079]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) Define Quality.

   b) Specify salient features of total quality control.

   c) Define Quality of conformance to design.

   d) Differentiate between MRP and just-in time system.

   e) How does TQM propagate customer satisfaction?

   f) Define functional benchmarking.

   g) Quality function deployment is an integrated approach to a new product or service. Comment.

   h) How design of experiments is helpful in improving the quality?

   i) Define employee empowerment.

   j) Define quality circle.

SECTION B

2. Describe briefly key elements of Total Quality Management.
3. How rewards and recognition can ensure employee involvement with organization's goals?
4. Enumerate the elements of TQM policy formulation.
5. Define benchmarking. Elaborate upon the steps of benchmarking study?
6. How does Quality function deployment study effectively capture the voice of the customer? Discuss.

SECTION C

7. a) Describe the Deming's 14 postulates to achieve quality at workplace.
   b) Define Just-in-time (JIT) system. Describe key elements of JIT manufacturing system.
8. a) Discuss the elements of ISO 9001 quality standards.
   b) How do organizations deploy suggestion schemes for improving quality?
9. a) Write a short note on Taguchi Methods.
   b) How can management achieve total employee involvement at workplace?

Roll No. | | | | | | | | | | | | |

Total No. of Questions: 09

Total No. of Pages: 03

B.Tech. (ME) (2011 Onwards) (Sem.– 7, 8)

MECHANICAL VIBRATIONS

M Code: 71996

Subject Code: BTME-803

Paper ID: [A3064]

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. Write briefly:

   a) If the motion of a particle is represented by $x = A\sin(\omega t) + B\sin(2\omega t)$; determine its velocity at time, $t = 0.2$s, given: $A = 2$mm, $B = 3$mm and $\omega = 10$ rad/s.

   b) Calculate the number of samples (2k) that will be recorded per cycle of 400 Hz periodic signal by a 40 kHz data recorder.

   c) Given $x_1 = 2\sin(5t)$ and $x_2 = 2\sin(5t + \pi/2)$; Determine analytically the phase-angle β of the resultant, x_R with the first SHM x_1.

   d) For a vehicle of mass 100kg, determine the critical damping coefficient, c_c of the suspension system, if it undergoes static deflection of 98mm under its dead weight.

   e) The natural frequency of a 1DoF system is 20 rad/s, which drops to 16 rad/s upon adding a viscous dashpot. Determine the peak amplitude frequency.

   f) Determine the damped natural frequency (ω_d) of a system having undamped natural frequency (ω_n) of 10 rad/s and damping ratio, $\zeta = 0.5$.

   g) State the design criteria for amplitude / velocity measuring instruments.

   h) The damped natural frequency of a system is 9.8Hz, while the maximum amplitude occurs at an exciting frequency of 9.6 Hz., find the damping factor and the undamped natural frequency.

i) Neglecting friction and inertia forces, determine all nine (flexibility) influence coefficients for the system shown in figure pertaining to Q. No. 8.

j) Determine the critical speed of a vertical shaft of stiffness $k = 7200$N/m, if it is carrying a disc of mass $m = 2$kg.

SECTION B

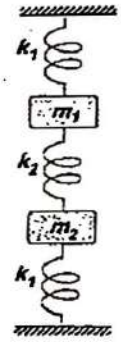
2. Determine the instantaneous magnitude (X_R) and angle (θ_R) w.r.t. x-axis at time t = 0.1s of the resultant of two vectors representing harmonic motions:

   $x_1 = 2 \sin 5t$ and $x_2 = 5 \sin 10t$

3. A mass, m = 10kg is supported on a suspension of stiffness, k = 1 kN/m and damping coefficient, c = 40 N/m/s. If the mass is given an initial displacement, X_0 = 200mm, determine the residual amplitude of free damped oscillations after three cycles (X_3).

4. Determine actual displacement, Y of a machine operating at 1200 rpm, if a vibrometer having natural frequency, ω_n = 4Hz placed on the machine shows a relative displacement, Z = 0.04mm. Assume damping ratio, $\zeta = 0$ for vibrometer.

5. For the 2DoF spring-mass system shown in figure constrained at both ends, the two springs on side have a stiffness of k_1 = 4000 N/m, while the spring in the middle has a stiffness of k_2 = 6000 N/m. If $m_1 = m_2$ = 10kg, determine the natural frequencies of the system. Also draw the corresponding mode-shapes if the system is released from maximum displacement at time t = 0.



6. State and prove Maxwell's reciprocal theorem.

SECTION C

7. Using analytical method, determine the harmonics of the periodic function for output of full-wave rectifier, given by:

   $f(t) = A \sin(100\pi t)$ for $0 \le t \le 0.01$ and $f(t) = -A \sin(100\pi t)$ for $0.01 \le t \le 0.02$

SECTION D

7. a) What is IOS? Is it an operating system or programming language? Which programming language is used to develop an application in IOS? Explain. (6, 4)

   b) What are some do's and don'ts in IOS market?

8. Discuss in detail about windows phone platform. List steps for building Windows Phone application. (10)

SECTION E

9. Write short notes on following with help of example/diagram if needed:

   a) Scalability of mobile application

   b) JavaSE

   c) Difference between an SDK and SDK Manager?

   d) App Widget

   e) Swift

   f) Difference between process and threads.

   g) List Design Principles for mobile applications.

   h) Advantages of IOS.

   i) Downsides of Windows Phone Platform.

   j) Future of Android.

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B.Tech.(AE / BME / CHE / ME) (Open Elective) /
B.Tech.(CHE / ME) (2011 Onwards O.E.) /
B.Tech.(IE) (2009 & Onward Batches OE) /
B.Tech.(PE) (D.E.-II)
(Sem. – 7, 8)

HUMAN RESOURCE MANAGEMENT

M Code: 54067
Subject Code: AE-414/DE-1.3/HU-251/DE/ME-2.5
Paper ID: [A0878]

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) What is the importance of HRM in companies?

   b) Explain the term HRM planning.

   c) What do you mean by job description?

   d) How quality of worker life affects the employee satisfaction?

   e) Differentiate between human relations and employee relations.

   f) Enlist the objectives of Factories Act, 1948.

   g) Why Minimum Wages Act 1948 is implemented in companies?

   h) How Labour Court is helpful in solving industrial disputes?

   i) Define the term Employees' safety.

   j) How absenteeism can be minimized?

SECTION B

2. Describe the purpose of discipline, its prerequisites. How discipline affects the working environment in companies?

3. What steps are involved in workers grievance handling procedure? Explain

4. Explain the objectives of trade unions in maintaining co-cordial industrial relations.

5. What are the main causes of industrial disputes? Explain.

6. Explain the guidelines of Employee Insurance Act 1948.

SECTION C

7. a) State and explain the factors to be considered to establish a good Human Relation policy in industry.

   b) Discuss the commonly used methods of recruitment followed in Indian companies. (7+3)

8. What do you understand from employee safety and social security? Explain them with a purpose to improve the job satisfaction. Explain the major accident causes and their prevention possible to take place in heavy mechanical industry. (10)

9. a) Why communication is very important for the smooth functioning of the organizations? List out the barriers to successful communication and discuss the techniques to overcome the barriers and improve communication.

   b) Describe the provisions of Workmen's Gratuity Act 1972. (6+4)

May 2018 B.Tech ECE

Roll No. | | | | | | | | | | |

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B.Tech.(Electronics Engg.) (2012 Onwards) / B.TECH.(ECE)/(ELECTRONICS & COMPUTER ENGG./ ETE) (2011 Onwards) (Sem. – 3)

ANALOG DEVICES & CIRCUITS

M Code: 57583

Subject Code: BTEC-301

Paper ID: [A1130]

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) Which configuration of Bipolar Transistor is called as Emitter Follower? For what purpose it is used?

   b) What is an Oscillator? How does it differ from an Amplifier?

   c) What are the different types of configurations used in multistage amplifier circuits?

   d) Explain the effect of coupling capacitor on low frequency response of BJT amplifiers.

   e) What are the Barkhusain conditions of oscillations in electronic systems? What is their significance?

   (f) What is the Miller Effect?

   g) Why do we need three RC networks for a phase - shift oscillator?

   h) What are the Physical origins of resistances in hybrid -p1 model of CE Transistor amplifier at high frequencies?

   i) What is meant by 'Cross-over Distortion'?

   j) Define T model of a Bipolar Transistor.

SECTION B

2. An amplifier has voltage gain with feedback of 100. If the gain without feedback changes by 20% and the gain with feedback should not vary more than 2%, determine the values of open loop gain A and feedback ratio β.

3. What are the different types of negative feedback? Explain each with block diagram.

4. A CE connected amplifier has C_{cb} = 5 pF, C_{be} = 12pF, h_{fe} = 100, h_{ie} 1.5 kΩ. Find the input capacitance to the circuit for a circuit collector resistance of 12kΩ.

5. Explain bow device Capacitances plays dominant role in CE Amplifier in high frequency region.

6. Draw and explain the working of push pull class-B Amplifier. What are its advantages & disadvantages?

SECTION C

7. In a Transistor Colpitt's oscillator we have L = 100 μH, L_{RFC} 0.6mH, C_1 = 0.001 μF, C_2=10 μF Find a) operating frequency b) feedback fraction c) minimum gain to sustain oscillations & Emitter Resistance if R_c = 2.5k Q.

8. Draw and explain the working of R-C phase shift oscillator and also derive an expression for its frequency of oscillations.

9. a) Determine the value of ripple factor in the full-wave rectifier operating at 50 Hz with a 100 μF capacitor filter and 100Ω load.

   b) Draw and explain the complementary symmetry amplifier and discuss its advantages.

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Total No. of Questions

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B.Tech. (2011 Onwards) (Sem. – 4)

PULSE WAVE SHAPING AND SWITCHING

M Code: 57597

Subject Code: BTEC-405

Paper ID: [A1193]

Time: 3 Hrs. Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.
4. Any missing data can be assumed appropriately.

SECTION A

1. a) The voltage ($V_m \sin\omega t$) applied to a pure capacitor, write the output voltage expression and draw input and output waveform.

   b) What do you mean by bistable multivibrator?

   c) What type of triggering is used in monostable multivibrator?

   d) Define resolution time in multivibrator.

   e) If the diode is made from silicon, how it will work as ideal switch.

   f) Name the semiconductor devices that can be used as switch.

   g) Differentiate between linear and non-linear wave-shaping circuits.

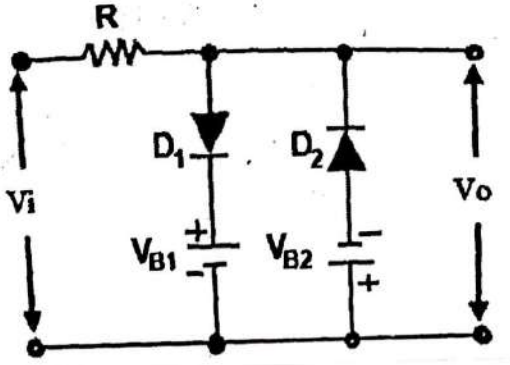
   h) Draw the response of high pass RC circuit to step wave input voltage.

   i) List the applications of clipper circuits.

   j) How does a Schottky Diode can be used for reducing Storage time?

SECTION B

2. The fig. shows double Clipper circuit. Determine its output waveform. Assume diode drop of 0.3 V with sinusoidal input with ±15 V. Also V_{B1} and V_{B2} are 8V and 7V respectively.



3. State and prove Clamping Circuit Theorem.
4. Explain how a high pass RC circuit works as a differentiator.
5. With the help of circuit diagram and waveforms, explain the working of monostable multivibrator.
6. Explain the working of Schmitt trigger.

SECTION C

7. With waveforms, derive the expression for the frequency of oscillation of an astable multivibrator.
8. What is diode comparator and describe the application of comparator.
9. Explain any two with necessary diagrams:
   a) Bistable multivibrator.
   b) Operation of a diode as switch with its switching characteristics.
   c) Positive and negative clamper.

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Total No. of Pages: 02

Total No. of Questions: 09

B.Tech. (ECE)/(ETE) (2011 Onwards) /
B.Tech. (Electronics Engg) (2012 Onwards) (Sem. – 4)

ANALOG COMMUNICATION SYSTEMS

M Code: 57593
Subject Code: BTEC-401
Paper ID: [A1189]

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) Derive the formula of total Power in AM system.

   b) Draw frequency spectrum of FM modulated wave, and how many side bands are there in FM?

   c) Define the term modulation index for AM and write its formula's in terms of Vmax and Vmin.

   d) What do you mean by the term instantaneous frequency in terms of Angle modulation?

   e) What do you mean by vestigial side band?

   f) What is function of sample and hold circuit in pulse modulation?

   g) Why we prefer SSB instead of DSB in AM?

   h) Write draw backs of Direct methods for FM generation.

   i) What is Time Division multiplexing?

   j) What do you mean by tracking and alignment in superheterodyne receiver?

SECTION B

2. In a FM system a 7KHz modulating signal modulates 107.8MHz carrier wave with frequency deviation of 50KHz. Determine modulation index and carrier swing in FM signal. What are the highest and lowest frequencies attained by the FM signal?

3. Explain Square law modulation and justify square law equation.
4. Write the advantage of using a RF amplifier in super heterodyne receiver. What is the function of frequency mixer?
5. With the help of block diagram explain FM stereo transmitter and reception.
6. State and prove sampling theorem in time domain.

SECTION C

7. Give comparison of Instantaneous sampling, Natural sampling and Flat top sampling techniques.
8. Explain foster seeley discriminator with circuit diagram and characteristics.
9. Explain the following:
   a) Ratio detector
   b) Envelop detector

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Total No. of Questions: 09

Total No. of Pages: 03

B.Tech.(Electronics Engg.) (2012 Onwards) /
B.Tech.(ECE/ETE/Electronics & Computer Engg.) (2011 Onwards)
(Sem. – 4)

SIGNAL AND SYSTEMS

M Code: 57594
Subject Code: BTEC-402
Paper ID: [A1190]

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) Is the following continuous-time signal periodic? If periodic, find its fundamental period:

$$x(t) = 10\cos\left(10t - \frac{\pi}{2}\right) - 4\sin\left(4t - \frac{\pi}{5}\right)$$

b) When is a system said to be linear?

c) Show that if $x_1[n]$ is odd signal and $x_2[n]$ is even signal, then their product is odd signal.

d) Identify the natural response for the given system:

$$\frac{d}{dt}y(t) + 10y(t) = 2x(t),\ x(t) = u(t)$$

e) Define sampling theorem.

f) What are Dirichlet conditions?

g) What is meant by signum function? Explain.

h) What is the significance of PSD?

i) Define ergodic process.

j) Explain the relationship between joint PDF and Probability.

SECTION B

2. Find the Fourier transform of a rectangular pulse given by

$$x(t)=\begin{Bmatrix}1 & for\, 0\le t\le T\\ 0 & elsewhere\end{Bmatrix}$$

3. Discuss the importance of convolution in signal and systems. Find the output y[n] of the system if the input x[n] = u[n-4] and impulse response is given by:

$$h[n]=\begin{Bmatrix}0 & for\, n<0\\ 1 & for\, 0\le n\le 3\\ -2 & for\, 4\le n\le 5\\ 0 & for\, n>5\end{Bmatrix}$$

4. Explain the properties of z- transform.

5. a) The PDF of a random variable X is defined as:

$$f_x(x)=\begin{Bmatrix}kx^2 & : & 1\le x\le 2\\ kx & : & 2<x\le 3\\ 0 & : & otherwise\end{Bmatrix}$$

Then find:

(i) value of k

(ii) P (X > 2), P (X≤2), P $\left(\frac{1}{2}<X\le\frac{3}{2}\right)$

(b) Determine whether the following systems are (i) stable, (ii) causal, (iii) linear, (iv) time-invariant:

(i) y(t)=x(2-t)

(ii) y(t) =x(t/2) (3 +2)

6. From a well shuffled pack of cards, two cards are drawn simultaneously at random. Find the probability that they form a queen-ace combination.

SECTION C

7. A discrete-time signal is given by the expression

$$x(n)=n\left(\frac{-1}{2}\right)^{n}u(n)\otimes\left(\frac{1}{4}\right)^{-n}u(-n)$$

Find the z-transform and also draw its ROC.

8. Draw the block diagram representation in direct form and parallel form for a discrete-time LTI system expressed by the following transfer function:

$$H(z)=\frac{1}{\left(1+\frac{1}{3}z^{-1}\right)\left(1-\frac{1}{6}z^{-1}\right)}$$

9. Write short notes on:

   a) Random variables

   b) Statistical averages.

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Total No. of Questions: 09

Total No. of Pages: 02

B.Tech. (ETE / ECE / Electronics & Computer Engg) (2011 Onwards) / B Tech. (Electronics Engineering) (2012 Onwards)

(Sem. – 4)

ELECTRONIC MEASUREMENT AND INSTRUMENTATION

M Code: 57596

Subject Code: BTEC-404

Paper ID: [A1192]

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) What are standards? Classify them.

   b) What are different methods of measurement?

   c) Define accuracy and sensitivity.

   d) What is drift?

   e) What is loading effect?

   f) What is basic principal of galvanometer?

   g) What is the working of strain gauge?

   h) Explain general specifications of a DVM.

   i) Draw the block diagram of radio telemetry system.

   j) Explain working of Wheatstone bridge.

SECTION B

2. Explain Working Principle of LVDT.
3. Is galvanometer Electromechanical instrument? Explain how and list its various uses?
4. Explain the working of a function generator. Elaborate square and pulse generator in detail.
5. What are piezoelectric and photoelectric transducers? Explain their working in detail.
6. Describe the CRO's operation in brief.

SECTION C

7. a) Give the detail of spectrum analyser and harmonic distortion analyser.
   b) Explain the fixed and variable oscillator.
8. Write a short note on:
   a) Kelvin Double bridge
   b) Data acquisition system
9. a) Explain the working principal and diagram of magnetic tape recorders.
   b) Describe the seven segment display.

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Total No. of Pages: 02

Total No. of Questions: 09

B.Tech.(ECE)/(ETE) (2011 Onwards) /
B.Tech.(Electronics Engg.) (2012 Onwards)
(Sem. – 4)

ELECTROMAGNETICS AND ANTENNAS

M Code: 57595
Subject Code: BTEC-403
Paper ID: [A1191]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. Write briefly

a) What are smith charts? Briefly explain.

b) Why EM waves are called guided waves?

c) Differentiate between TE and TM mode.

d) Differentiate between conduction current and displacement current.

e) Define Polarization.

f) Define lowest usable high frequency.

g) What are the applications of aperture antenna?

h) Ground wave communication is most effective in what frequency range?

i) Define virtual height.

j) The critical frequency at a particular time is 11.6 MHz. what is the MUF for a transmitting station if the required angle of incidence for propagation to a desired destination is 70°.

SECTION B

2. Write and explain Maxwell's equation for static and time varying fields in both differential and integral form.
3. State and prove Poynting Vector Theorem. Also explain the significance of each term.
4. Discuss the use of low loss RF and UHF transmission lines.
5. Derive the Friis Transmission formula. Discuss its significance.
6. Explain the mechanism of ionosphere propagation.

SECTION C

7. Explain the special features of Reflector antenna and discuss on different types of feed used with neat diagram.
8. For an array of n isotropic point sources radiating in broad side direction derive and obtain the maxima and minima direction for major and minor lobes. Sketch the pattern.
9. Design a Dolph Tschebyscheff broadside array of 10 elements with spacing d between elements and with a major to minor lobe ratio of 26dB. Calculate the excitation coefficients and form the array factor.

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Total No. of Pages: 03

Total No. of Questions: 09

B.Tech. (Electronics Engg. / Electrical Engineering & Industrial Control) (2012 Onwards) / B.Tech. (ECE/EE/Electrical & Electronics / Electronics & Computer Engg. / Electronics & Electrical / ETE) (2011 Onwards)

(Sem. – 4)

LINEAR CONTROL SYSTEMS

M Code: 57105

Subject Code: BTEE-402

Paper ID: [A1188]

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) Explain the importance and need of compensation.

   b) Find the restriction of K so that closed loop system given by the following characteristic equation is absolutely stable.

$$s^3 + 6.5s^2 + 10s + 10K = 0$$

   c) Define Nyquist criterion.

   d) Explain how a closed loop response is obtained from a open loop system.

   e) Differentiate between break away and break in points.

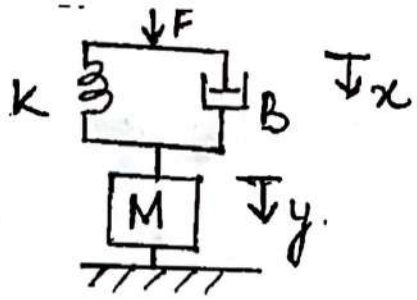
   f) Describe the output response of type-I and type-II systems for ramp input.

   g) Derive the mathematical model of a series RLC circuit.

   h) Evaluate the static error coefficients for unit step input for the system having:

$$G(s) = \frac{50}{s(s+10)}$$

i) Give the F-V and F-I analogy for the following system:



j) What are tacho-generators?

SECTION B

2. Derive the frequency domain specifications M_r and ωr for a second order system and correlate them with their time domain specifications.

3. For the system represented by the given equations find C/R using SFG technique only.

$X_2 = G_1X_1 - H_1X_3 - H_2X_4 - H_3X_5$

$X_3 = G_2X_2 - H_4X_5$

$X_4 = G_3X_3 + G_5X_4$

$X_5 = G_4X_3 + G_6X_4$

4. Design a lead compensator for a plant $G(s) = \dfrac{1}{s(s+1)}$

Assume that the specifications for the transient response and such that $\xi = 0.707$ and $\omega_n = 2$ rad/sec for the desired closed loop poles will give a satisfactory response.

5. The open loop transfer function of a unity feedback control system is:

$$G(s) = \frac{K}{s(1+sT)}$$

By what factor the amplifier gain K should be reduced so that Mp of unit step response of the system is reduced from 75% to 25%.

6. Explain how synchros can work as an error detector.

SECTION C

7. Construct the bode plot for the system whose open loop transfer function is given below and determine a) gain margin b) phase margin c) closed loop stability.

$$G(s)H(s) = \frac{4}{s(1+0.1s)(1+0.2s)}$$

8. Sketch the root locus for the open-loop transfer function of a unity feedback control system given below and find: a) value of K for marginal stability b) frequency of oscillations.

$$G(s) = \frac{K}{s(s^2+4s+8)}$$

9. Draw the circuit of a lag and lead compensator and derive their transfer function. State the difference between the two.

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Total No. of Pages: 02

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B.Tech. (ECE/ETE/EE) (20 rds)/(EE) (PT) / B.Tech.(Electronic Engg./Electrical Engineering & Industrial Control) / (2012 Onwards) / B.Tech. (Electrical & Electronics) (2011 & 2012 Batch) (Sem. – 5)

DATA STRUCTURES

M Code: 70544

Subject Code: BTCS-304

Paper ID: [A2102]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) Define a pointer.

   b) What is an AVL tree?

   c) Define linked list.

   d) What is priority queue?

   e) What is a heap?

   f) List the operations on stack.

   g) What is Recursion? Explain with an example.

   h) What are the various types of recursion?

   i) What is the worst-case complexity of Shell sort?

   j) State the algorithmic technique used in Quick sort.

SECTION B

2. Write ADT operations for array implementation of polynomial addition.
3. Write ADT operations for heap sort. Using the above algorithm sort the following:

   35, 45, 25, 11, 6, 85, 17, 35.

4. Write a function to insert a node at front and rear end in a circular linked list. Write down a sequence of steps to be followed.
5. What is a binary search tree? Draw the binary search tree for the following input:

   14, 5, 6, 2, 18, 20, 16, 18, 9, 21.

6. Explain the functions supported by C/C++ to carryout dynamic memory allocation.

SECTION C

7. Write an algorithm to convert infix to postfix expression and apply the same to convert the following expression from infix to postfix:

   a) (a * b) + c / d

   b) (((a / b) – c) + (d *e)) – (a * c)

8. Convert the binary tree for the given expressions:

   i) Pre-order: / + * $ 2 3 4 5

   A B D G C E H I F

   ii) In-order: 1+2 * 3 $ 4 - 5

   D G B A H E I C F.

9. Explain the collision resolution techniques in hashing.

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Total No. of Pages: 02

Total No. of Questions: 09

B.Tech.(Electronics Engg.) (2012 Onwards) / B.Tech (ECE/ETE) (2011 Onwards) (Sem. – 5)

DIGITAL SIGNAL PROCESSING

M Code: 70546

Subject Code: BTEC-502

Paper ID: [A2104]

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) Determine whether the system is linear or non-linear $y(n) = x(n) + 3u(n + 1)$.

   b) Why the ROC of Z-transform can not contain any pole?

   c) What is the difference between energy and power signal?

   d) In the implementation of a digital system what are the effects of quantization of coefficients?

   e) What is frequency warping effect?

   f) Give the computational efficiency of FFT over DFT.

   g) Give the various steps involved in the design of FIR filter.

   h) Give the advantages of digital filter over analog filter.

   i) What are the advantages of representing the digital filter in the block diagram form?

   j) What is the function of accumulator unit in DSP processor?

SECTION B

2. Compute the convolution $y(n) = h(n) * x(n)$ for the values of $x(n)$ and $h(n)$ as given below $x(n) = (1/2)^n u(n)$ and $h(n)=(1/4)^n u(n)$

3. Obtain inverse Z-transform of $X(z) = \frac{1}{1 - 1.5z^{-1} + 0.5z^{-2}}$

   when

   i) ROC: $|z| > 1$

   ii) ROC: $|z| < 0.5$

4. Explain the direct form realization of FIR filter

5. The system function of analog filter is as given

   $$H_a(s) = \frac{s+0.1}{(s+0.1)^2+9}$$

   Obtain the system function of IIR digital filter using impulse invariance method.

6. With the help of a block diagram, explain the architecture of a TMS processor.

SECTION C

7. Compute the 8-point DFT of the sequence

   $x(n) = (0, 1, -1, 0, 0, 2-2, 0)$

   using the radix-2 decimation-in-time algorithm.

8. Explain the different types of structures for the realization of IIR filter.

9. Obtain the coefficients of a linear phase 13 order FIR filter to meet the specifications given below using the window method:

   stopband attenuation = 20 dB

   Transition width = 0.5KHz

   Sampling frequency = 8 KHz

   Passband edge frequency = 1.5 KHz

Roll No. | | | | | | | | | | | | |

Total No. of Pages: 02

Total No. of Questions: 09

B.Tech. (ECE)/(ETE) (2011 Onwards) /
B.Tech. (Electronics Engg.) (2012 Onwards) (Sem. – 5)

DIGITAL COMMUNICATION SYSTEM

M Code: 70545
Subject Code: BTEC-501
Paper ID: [A2103]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) An analog signal band limited to 10 KHz is quantized in 8 levels of a PCM system with probabilities of $\frac{1}{4}, \frac{1}{5}, \frac{1}{5}, \frac{1}{10}, \frac{1}{10}, \frac{1}{20}, \frac{1}{20}, \frac{1}{20}$ respectively. Find the entropy and information rate.

   b) Define Midtread and Midriser quantizer.

   c) Write advantages and disadvantages of MSK.

   d) What is quantization error?

   e) Through signal space representation of orthogonal BFSK system, Show that distance $d = \sqrt{2Eb}$.

   f) Compare power spectral density and band width requirements of QPSK with BPSK.

   g) Draw wave form of data 10110101 using Manchester code.

   h) Write disadvantages of delta modulation.

   i) Write a note on A-law of companding.

   j) Write Nyquist first criterions for pulse shaping.

SECTION B

2. Why do we prefer ADM instead of DM? How Slope over load distortion and Granular noise are avoided in ADM?

3. Represent the given data 1100111010 using following digital formats. Unipolar RZ format, Manchester format, HDB signalling, B8ZS signalling.

4. With block diagram and derivation, explain Intersymbol interference and eye pattern.

5. Write a short note on QAM. For a 16-QAM modulator with an input data rate f_b equals to 10 Mbps and a carrier frequency of 70 MHz, determine the minimum double sided Nyquist frequency f_N and the baud rate.

6. The possible outputs of an information source are {m0, ml, m2, m3, m4} with probability of occurrences {1/2, 1/4, 1/8, 1/16, 1/16} respectively. Find the Huffman Codes for the outputs. Also find the coding efficiencies for PCM coding and Huffman coding.

SECTION C

7. Apply the Shannon-Fano coding procedure for the given message ensemble:

   $[X] = [x_1, x_2, x_3, x_4, x_5, x_6, x_7]$

   $[P] = [0.4, 0.2, 0.12, 0.08, 0.08, 0.08, 0.04]$

   Assume $M = 2$

8. For a QPSK system, the given parameters are $C = 10^{-12}$ W, $f_b = 60$kbps, $N = 1.2 \times 10^{-14}$ W, B =120kHz, determine

   a) Carrier power in dBm

   b) Noise power in dBm

   c) Noise power density in dBm

   d) Energy per bit

   e) Carrier to Noise power ratio in dB

   f) $\frac{E_b}{N_o}$ ratio

9. Write note on any two of following:

   a) With derivation, Explain Coherent BPSK Receiver in detail.

   b) CDMA and TDMA

   c) Codec and Combo Chips

Total No. of Pages: 02

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Total No. of Questions: 09

B.Tech. (ECE)/(onwards) (Sem. – 6)

OPERATING SYSTEMS

M Code: 71120

Subject Code: BTCS-401

Paper ID: [A2314]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1 a) Define virtual memory.

b) Define the terms Multitasking and multithreading.

c) Explain the term dual mode operation.

d) What is the Kernel?

e) What is a Thread?

f) What is a Dispatcher?

g) Define Dynamic Loading.

h) What are the various File Operations?

i) Define Spooling.

j) What criteria should be used in deciding which strategy is best utilized for a particular file?

SECTION B

2. What are the system components of an Operating System and explain them?
3. Write a note on Descriptor?
4. Write a short note on distributed operating system.
5. Explain page replacement algorithm.
6. What is the need of virtual memories?

SECTION C

7. Explain briefly:
   a) LINUX operating system
   b) Unix operating system
   c) Windows XP
8. Discuss various scheduling algorithms in detail.
9. What is a process? Explain different states of a process with diagram. Also explain in detai the contents of PCB of a process.

Roll No. | | | | | | | | | | | | | Total No. of Pages: 02

Total No. of Questions: 09

B.Tech. (ETE)/(ECE) (2011 Onwards) (Sem. – 6)

MICROWAVE & RADAR ENGINEERING

M Code: 71121

Subject Code: BTEC-601

Paper ID: [A2315]

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. Write briefly:

   a) Name the high frequency limitations of conventional tubes.

   b) What is tunneling effect?

   c) What are the properties of s-matrix?

   d) What is the difference between E-plane tee and H-plane tee?

   e) What is the value of VSWR for open circuit and short circuit?

   f) Define PRF.

   g) Name the various scanning techniques.

   h) What are the different applications of radar?

   i) What is Faraday rotation?

   j) What is MASER?

SECTION B

2. Explain the working of isolator with the help of neat and clean diagram.
3. Derive the equation for efficiency of two cavity klystron amplifier.
4. Explain the working of Varactor diode in detail.
5. Explain the angle tracking system.
6. An IMPATT diode has drift length of 10 μm. Determine the operating frequency of IMPATT diode if drift velocity for Si is 10^7 cms/sec.

SECTION C

7. With the help of suitable diagram, explain the operation of radar. Explain each and every block in detail.
8. Differentiate between reflex klystron and magnetron in detail.
9. Write note on:
   a) CW radar
   b) Crossed field Amplifier
   c) S.S Tuner
   d) Gyrator

Roll No. | | | | | | | | | | | | |

Total No. of Pages: 02

Total No. of Questions: 09

B.Tech.(ECE)/(ETE) (2011 Onwards) (Sem. – 6)

WIRELESS COMMUNICATION SYSTEMS

M Code: 71122

Subject Code: BTEC-602

Paper ID: [A2316]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) What is foot print?

   b) Define dwell time.

   c) What is propagation model?

   d) What is frequency selective fading?

   e) What are the techniques used to improve the received signal quality?

   f) What are the nonlinear effects in FDMA?

   g) Define efficiency of TDMA.

   h) Write advantages of 2G over 1G.

   i) Define burst formatting in GSM.

   j) What is the need of pilot channel?

SECTION B

2. Explain the working principle of RAKE Receiver?
3. Compare the performance of TDMA, FDMA, CDMA, SDMA techniques.
4. Explain the different handoff strategies used in wireless communication.
5. Explain in detail cell splitting.
6. Explain the working principle of Linear predictive coder.

SECTION C

7. Explain the diversity techniques used for mobile wireless radio system.
8. Explain in detail the CDMA multiple access technique.
9. Explain in detail the Bluetooth and Zig Bee technology.

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Total No. of Pages: 02

Total No. of Questions: 09

B.Tech. (EE / Electrical & Electronics / Electronics & Electrical) (2011 Onwards) / B.Tech. (Electrical Engg. & Industrial Control) (2012 Onwards Batch) / B.Tech (Electronic Engg.) (2012 Onwards)

(Sem. – 6)

NON-LINEAR AND DIGITAL CONTROL SYSTEMS

M Code: 71149

Subject Code: BTEE-603

Paper ID: [A2336]

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) Give significance of zero order hold device.

   b) Define the problem of aliasing.

   c) How is Routh's Hurwitz criterion extended to discrete time systems?

   d) Define controllability and observability. Also give the test matrix.

   e) Describe the use of describing function for stability analysis.

   f) Find the z-transform of $t \sin \omega t$.

   g) Explain the conditions to be satisfied for reconstruction of sampled signal into continuous signal.

   h) What are the advantages of modern control theory over classical control theory?

   i) Define coulomb friction.

   j) Define dead-zone and backlash.

SECTION B

2. Explain the Jury's test of stability.

3. The output $y(t)$ of a non linear device is related to the input $x(t)$ through the following differential equation:

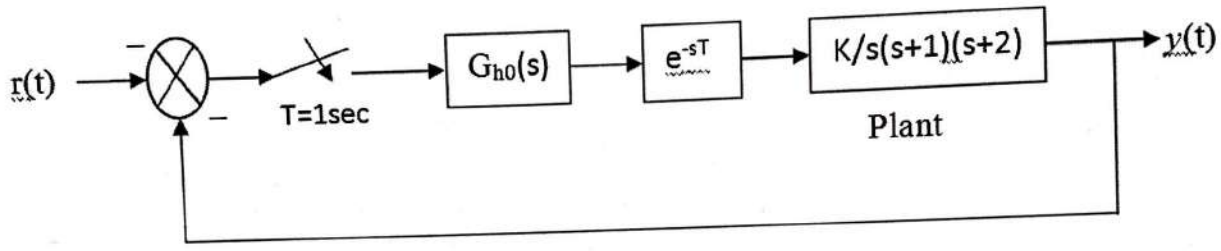
$$y(t) = 4x^2 + 6x + 3x^2x$$

Determine the describing function of this device.

4. Write a short note on dead zone and saturation.

5. Explain the isoclines method for analyzing stability of non linear systems graphically.

6. Find the range of K for the system to be stable.



SECTION C

7. Explain the method to find state transition matrix through z-transform technique.

8. Write short notes on the following:

   a) Variable gradient method

   b) Krasovskii's Theorem

9. Write a short note on ideal relay and relay with dead zone and hysteresis and draw its characteristics.

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Total No. of Pages: 02

Total No. of Questions: 09

B.Tech. (ECE/ETE) (2011 onwards) (Sem. – 6)

ENGINEERING ECONOMICS & INDUSTRIAL MANAGEMENT

M Code: 71123

Subject Code: BTEC-603

Paper ID: [A2317]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. Write in brief on following items with examples:

   a) Effect of changes in fixed and variable costs.

   b) Factors to be considered in replacement.

   c) Types of Depreciation.

   d) Cost estimation and Cost Accounting.

   e) Economic Life of Project.

   f) Rate of Return Method.

   g) Delegation of Authority.

   h) Inventory Control Systems.

   i) Purchase Management.

   j) Industrial Ownership.

SECTION B

2. What do you mean by Discounted Cash Flow Analysis? Write its objectives with proper justification and add examples.
3. Illustrate Economics Order Quality (EOQ) with suitable examples.
4. What are the major factors responsible for effect of taxation on Economic studies?
5. Comment on Taylor's Scientific Management with examples.
6. Write about the theory of International trade. Explain this theory with real life example having competitive advantage.

SECTION C

7. State in detail 'Maslow's Hierarchy of Human Needs'. Give relevant examples also.
8. Describe concept of 'Material management' based on its objectives, inventory functions, types, associated costs and add examples.
9. Explain and mention the various components of Designing Organizational Structures w.r.t. focus of organization characteristics. Add examples also.

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Total No. of Pages: 02

Total No. of Questions: 09

B.Tech. (ECE) / (ETE) (2011 Onwards) (Sem. – 6)

VLSI DESIGN

M Code: 71124

Subject Code: BTEC-604

Paper ID: [A2318]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. a) What is an entity? Give one example.

   b) What is transport delay? How it differs from inertial delay?

   c) Explain subtype for any data type with an example.

   d) What is the significance of process statement?

   e) What is configuration declaration?

   f) Define constant voltage scaling.

   g) Why NMOS is called as pull-down network?

   h) What is resolution function?

   i) Why NMOS technology is preferred more than PMOS technology?

   j) Perform the following using *sra2* and *sll3* shift operators:

      i) 10101101

      ii) 01011110

SECTION B

2. Differentiate between concurrent and sequential statements in VHDL with examples.
3. Derive the current equation for a p-channel MOS transistor operating in the linear region, i.e., for $V_{SG} + V_{TP} > V_{SD}$.
4. Write a VHDL code in structural style of modeling for SOP for the following expression:

   $$F = \sum m\,(1,4,6,8,9,11,12,14,15) + \sum d(2,5,7)$$

5. What are data objects? Explain any two with example.
6. Describe the CZ method for wafer formation in CMOS process.

SECTION C

7. Sketch the cross section and explain the operation of n-channel enhancement type MOS transistor. Draw the characteristics of the device. How many diffusion steps are required to form it?
8. Describe various logic operators used in VHDL language with two examples of each.
9. Write a VHDL code for 4-bit Binary to Gray code converter using behavioral style of modeling.

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Total No. of Pages: 02

Total No. of Questions: 09

B.Tech. (ECE) (2011 Onwards Elective–I)/
B.Tech. (ETE) (E-I 2011 Onwards) (Sem. – 6)

INFORMATION THEORY AND CODING

M Code: 71236
Subject Code: BTEC-907
Paper ID: [A2395]

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) Define i) Joint entropy; and ii) Conditional entropy.

   b) What are instantaneous codes?

   c) What is meant by constraint length and free distance of a convolution code?

   d) How syndrome is calculated in Hamming codes and cyclic codes?

   e) State the channel coding theorem for a discrete memoryless channel.

   f) Define mutual information.

   g) Find entropy of a source emitting symbols x, y, z with probabilities of 1/5, 1/2, 1/3 respectively.

   h) What is meant by cyclic code?

   i) What is the difference between block codes and convolutional codes?

   j) What is meant by stop-and-wait ARQ? Explain.

SECTION B

2. Define Mutual Information. Explain how it is related to entropy for a lossless channel, prove that $H(X/Y)=0$.
3. Define BCH code and brief about Reed-Solomon code.
4. Write the steps involved in Huffman coding algorithm.
5. State Hartley -Shannon Law.
6. Given an AWGN channel with 4kHz bandwidth and the noise power spectral density $\eta/2 = 10^{-12}$ W/Hz. The signal power required at the receiver is 0.1mW. Calculate the capacity of this channel.

SECTION C

7. A DMS X has five symbols x_1, x_2, x_3, x_4 and x_5 with $P(x_1) = 0.4$, $P(x_2) = 0.19$, $P(x_3) = 0.16$, $P(x_4) = 0.15$ and $P(x_5) = 0.1$.
   a) Construct Shannon-Fano code for X, and calculate the efficiency of the code.
   b) Repeat for the Huffman code and compare the results.
8. For a systematic linear block code, the three parity check digits, C_4, C_5 and C_6 are given by:

$$C_4 = m_1 \oplus m_2 \oplus m_3$$

$$C_5 = m_1 \oplus m_2$$

$$C_6 = m_1 \oplus m_3$$

   a) Construct generator matrix.
   b) Construct code generated by this matrix.
   c) Determine error detecting probability.
   d) Prepare decoding table.
   e) Decode the received word 101100 and 000110.
9. Explain ARQ strategies and Hybrid ARQ schemes in detail.

Total No. of Pages: 02

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Total No. of Questions: 09

B.Tech. ...11 Batch) /
B.Tech. (ETE) (2... ...ards) (Sem. – 7, 8)

COMPUTER NETWORKS

M Code: 71909
Subject Code: BTCS-403
Paper ID: [A2999]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) What do you mean by flow control?

   b) What is OSI-ISO?

   c) What is the need of ARP?

   d) How does router differ from a bridge?

   e) What are the metrics used by routing protocol?

   f) What is jitter control?

   g) What do you understand by CDMA technology?

   h) Write the connecting devices in internetworking.

   i) What is slotted ALOHA?

   j) What is the length of an IP address?

SECTION B

2. Explain briefly about one-bit sliding window protocol.
3. Explain briefly the working of TCP/IP reference model?
4. What are virtual-circuit subnets? Explain congestion control methods in virtual-circuit subnets.
5. What is the use of ARP protocol? Explain its working?
6. What do you mean by peer to peer networking? Explain.

SECTION C

7. Write about IPv6 in detail. What are its new features and improvements?
8. With a suitable example explain Distance Vector Routing algorithm. What is the serious drawback of Distance Vector Routing algorithm? Explain.
9. Explain with a neat sketch, the functions of the protocols used in each layer of the OSI model and illustrate how communication is taking place between two end systems.

Roll No. [redacted] Total No. of Pages: 02

Total No. of Questions: 09

B.Tech. (Automation & Robotics)/(ECE) (2011 Batch Elective II)

(Sem. – 7, 8)

HUMAN RESOURCE MANAGEMENT

M Code: 71813

Subject Code: BTEC-813

Paper ID: [A2926]

Time: 3 Hrs. Max. Marks: 50

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Explain briefly:

a) Role of HR Manager

b) Collective Bargaining

c) Factors influencing Industrial Relation

d) Quality of Work-life

e) Job Specification

f) Placement

g) Significance of HRM

h) Career Planning

i) Selection

j) Training Needs

[redacted]

SECTION B

2. Explain the concept of Human Resource Planning. Discuss the factors affecting HR Planning.
3. What do you mean by HRM? Discuss the changing role of HR Managers.
4. Discuss merits and demerits of various methods of training.
5. What do you mean by job satisfaction? Discuss its importance.
6. Discuss the various forms of worker's participation in management.

SECTION C

7. "Motivation is the core of management". Explain the importance of motivation in the light of this statement.
8. Explain the process of collective bargaining. Bring out the major collective bargaining issues of today.
9. What is the relationship between selection, recruitment and job analysis?

Roll No. | | | | | | | | | | | | |

Total No. of Pages: 02

Total No. of Questions: 09

B.Tech. (ECE) (2011 Batch Elective-III) /
B.Tech. (ETE) (2011 onwards Elective-III)
(Sem. – 7, 8)

MOBILE COMPUTING

M Code: 71924
Subject Code: BTEC-919
Paper ID: [A3014]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. Write briefly:
   a) How does frequency reuse help channel allocation in cellular systems?
   b) Write the types of Handoff used in cellular communication.
   c) How can DHCP be used in mobility and support of mobile IP?
   d) List the advantages and disadvantages of Snooping TCP.
   e) Define tunneling.
   f) What is the requirement of fast retransmit and fast recovery?
   g) What is the difference between cellular network and adhoc network?
   h) Define and mention the key features of wireless multiple access protocols.
   i) Define routing.
   j) Define Mobile agents.

SECTION B

2. Explain location management in mobile computing. Mention various phases of location management.
3. Define freezing. Why is time-out freezing required in case of mobile nodes?
4. Explain the transmission mechanism of Indirect TCP using suitable diagram.
5. Draw the protocol stack of Bluetooth and explain the core protocols.
6. Discuss the major security issues of MANET and explain how security issues in MANET differ from that in wired networks.

SECTION C

7. Discuss the goals and layers of mobile IP. Explain the procedure of agent discovery and registration in detail. Use suitable diagram.
8. Define wireless application protocol (WAP). Describe its Architecture, Protocol stack and Applications.
9. Write a short note on following:
   a) GSM
   b) IEEE 802.11

Roll No. | | | | | | | | | | | | |

Total No. of Pages: 02

Total No. of Questions: 09

B.Tech. (ECE) (2011 Batch) (Sem. – 7, 8)

EMBEDDED SYSTEMS

M Code: 71910

Subject Code: BTEC-701

Paper ID: [A3000]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) What is THUMB architecture?

   b) Define the pipeline stages in a 5-stage pipeline of ARM processor.

   c) What are debugging tools?

   d) Explain the instructions LDC and MRC with an example.

   e) Explain process status register (PSR) for ARM.

   f) Compare little and big-endian modes in ARM processor.

   g) Which assembly instruction would you use to load 4 words starting from the memory location 0x80000000 into the registers r0-r3?

   h) Explain use of each control bit of I^2C bus protocol.

   i) What is the role of linker in arm processors?

   j) How assembly routine is called in C?

SECTION B

2. Write a Program in ARM assembly language to find the sum of 3X+4Y+9Z where X=6, Y=4, Z=5.

3. Explain program status register in detail. Also differentiate between CPSR and SPSR.

4. What are the various data types supported in C for ARM processor, explain with example?

5. Explain how memory is organised in ARM processor.

6. Differentiate between 3-stage and 5-stage pipeline processors.

SECTION C

7. Explain in detail different operating modes of ARM processor.

8. What are addressing modes? Explain various addressing modes with two examples of each used for ARM processors.

9. Write a program to display "HELLO WORLD" on LCD using LPC2148 ARM processor. Also draw interfacing diagram.

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Total No. of Questions: 09

B.Tech. (ECE) (2011 Batch)/(ETE) (2011 Onwards) (Sem. – 7, 8)

OPTICAL COMMUNICATION

M Code: 71911

Subject Code: BTEC-702

Paper ID: [A3001]

Time: 3 Hrs. Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. Write briefly:

a) What you understand by fifth generation of WDM lightwave systems.

b) Give importance of DFB lasers used in optical transmitters.

c) Define optical receiver sensitivity and give its units also.

d) Differentiate between SPM and XPM nonlinear effects.

e) Why generally III-V alloys type semiconductor materials are used in fabrications of optical sources.

f) Give source limitations becoming obstacles in transmitter circuit design.

g) What is the importance of normalized frequency? Define it.

h) What are merits & demerits of preamplifiers circuits used in receiver circuits.

i) A photodiode has a quantum efficiency of 50% at a wavelength of 0.9 μm. Calculate its responsivity at 0.9 μm, received optical power if the mean photocurrent is 10^{-6} A, the corresponding number of received photons at this wavelength.

j) Explain spectral efficiency of WDM optical communication systems.

SECTION B

2. Define attenuation coefficient. Explain material absorption fiber loss mechanism in optical fibers.

3. Discuss with the aid of a block diagram, the function of an optical fiber receiver. In addition, describe possible techniques for automatic gain control in APD receivers.

4. Describe III-V alloys type semiconductor materials generally used for fabrications of optical sources. Suggest some names of materials for typical wavelengths.

5. Describe briefly optical TDM transmitter design for channel multiplexing of WDM lightwave systems.

6. Discuss light wave systems used for local area networks.

SECTION C

7. Explain optical transmitter design by considering various issues and components used in it.

8. Explain reasons for optical sensitivity degradation by considering various parameters and power penalty mechanisms for them.

9. Explain high capacity point to point WDM lightwave systems.

May 2018

Total No. of Pages: 02

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B.Tech (Information & Graphics)(CSE/IT) (2012 Onwards) (Sem. – 3)

MATHEMATICS – III

M Code: 70808

Subject Code: BTAM-302

Paper ID: [A2143]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) State and prove first shifting theorem for Laplace transforms.

   b) Show that an analytic function of constant absolute value is constant.

   c) Discuss modified Euler's method.

   d) Find the half-range cosine series for the function $f(x) = x^2$ in the range $0 \leq x \leq \pi$.

   e) Solve $\sqrt{p} + \sqrt{q} = 1$

   f) Prove linearity property of Laplace transforms.

   g) Find the inverse Laplace transform of $(6 + s)/(s^2 + 6s + 13)$.

   h) Write Cauchy-Riemann equations in polar form.

   i) Six coins are tossed 6400 times. Using the Poison distribution, determine the approximate probability of getting six heads x times.

   j) State Cayley-Hamilton theorem.

SECTION B

2. Find Fourier series expansion of $f(x) = x - x^2$ from $x = -\pi$ to $x = \pi$.

   Hence show that $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \_\_\_\_\_ = \frac{\pi^2}{12}$

3. Show that if L(f(t)) = F(s) then $L\left(\frac{f(t)}{t}\right) = \int_s^\infty F(s')\, ds'$ provided the integral exists.

   Hence evaluate $L\left(\frac{e^{-at} - e^{-bt}}{t}\right)$

4. Show that the function $u(x,y) = e^{ax} \cos by$ is harmonic. Find its conjugate harmonic function $v(x, y)$ and the corresponding analytic function $f(z)$.

5. Using Gauss elimination method solve

   $x - y + z = 1$, $2x + y - z = 2$ and $5x - 2y + 2z = 5$.

6. Two independent samples of sizes 7 and 6 had the following values:

Sample A	28	30	32	33	31	29	34
Sample B	29	30	30	24	27	28	–

   Examine whether the samples have been chosen from normal population having the same variance.

SECTION C

7. Solve $(p^2 + q^2)y = qz$.

8. Find the eigen values and the corresponding eigen vectors of $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$

9. Use Runge's method of order four to find an approximate value of y when $x = 0.8$, given that

   $\frac{dy}{dx} = \sqrt{x + y}$; $y(0.4) = 0.4$. (Take $h = 0.2$)

Total No. of Pages: 02

Roll No.

Total No. of Questions: 09

B.Tech.(IT) (2011 Onwards) (Sem. – 5)

SYSTEM ANALYSIS AND DESIGN

M Code: 70594

Subject Code: BTIT-501

Paper ID: [A2122]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. a) What are the basic principles of successful systems? Discuss.

   b) Explain in brief about Real-time systems.

   c) What is the need of system analyst? Explain.

   d) What is the difference between analysis and design? Can one begin to design without analysis? Why?

   e) Write two advantages of Interview technique for data and fact gathering.

   f) Differentiate between Top-down and bottom-up design.

   g) Explain in brief about system acceptance criteria.

   h) Explain the term Audit trails.

   i) Explain in brief about structured charts.

   j) Differentiate between object modeling and dynamic modeling.

SECTION B

2. Write a detailed note on Systems environment and boundaries.
3. Explain the principles of systems documentation. Also explain in brief the types of documentation.
4. Write a brief note on following data and fact gathering techniques.
   a) Presentations
   b) Site visits
5. Explain in detail about the User-interface design.
6. Explain in brief about dynamic modeling.

SECTION C

7. Write a detailed note On the DFD and ERD diagrams.
8. a) Discuss the various procedures and norms for utilization of Computer equipment.
   b) Explain in detail about Maintenance activities and issues.
9. a) Write a brief note on following:
      i) Module specifications
      ii) Module coupling and cohesion
   b) Discuss the case study for developing prototype for Inventory Control.

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Total No. of Questions: 09

Total No. of Pages: 02

B.Tech.(IT) (2011 Onwards) (Sem. – 5)

DATABASE MANAGEMENT SYSTEM

M Code: 70596

Subject Code: BTIT-503

Paper ID: [A2124]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. a) What is DBMS?

   b) What are different types of database users?

   c) What do you mean by open database connectivity?

   d) What is the difference between primary key and candidate key?

   e) Write the syntax of query representation in calculus.

   f) What is functional Dependency?

   g) What is the full form of XML? Write its application.

   h) Discuss the different transaction states.

   i) Define data Farming.

   j) What is OLAP?

SECTION B

2. Consider the following database schema for supplier-parts-projects database (suppliers(Sno) supply parts(Pno) to projects(Jno)):

   Supplier(Sno,Sname,date_of_Birth,birth_place)

   Parts(Pno,Pname,color,weight,city)

   Project(Jno,Jname,city)

   Shipment(Sno,Pno,Jno,qty)

Draw the E-R model. Also specify: the different entities, cardinalities and degrees of the relationships in the above model. Write the applications of E-R model.

Consider the database schema given in Q 2, write queries/statements in SQL to:

a) Create a Supplier Table.

b) Retrieve the minimum quantity supplied by each Sno.

c) Add a new constraint on parts color: color should be pink.

d) Retrieve the supplier nos (Sno) of the suppliers who were born in Amritsar.

e) Display the total qty supplied by supplier 'Hari'.

4. Normalize the following database upto 3NF:

Student (course_code, CName, TeacherName, Rollno, SName, Sys_used, Hrly_rate, Total_ Hrs) Also, explain the delete and update anomalies of 1NF, 2NF and 3NF. How these can be rectified. [Assumptions: each student studies number of courses, Only one system is assigned to each student. Cname, Sname stands for Course name and student name respectively].

5. Explain structure of XML document with suitable example.

6. Why concurrency control is needed in database system? Explain, any One concurrency control technique?

SECTION C

7. a) Discuss how Database Systems differs from File System.

b) What is the difference between relational algebra and relational calculus?

8. Write short note on following:

a) Integrity constraints

b) Scripting

c) Object Relational Database

9. Explain the terms:

a) Data warehouse

b) Spatial and Geographical databases

c) Temporal Databases

d) NoSQL databases

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B.Tech (IT) (2011 Onwards) (Sem. – 5)

PROGRAMMING IN JAVA

M Code: 70595

Subject Code: BTIT-502

Paper ID: [A2123]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. a) What is the meaning of first line of java program "public static void main (String args[])?

   b) JVM is a platform dependent (T/F). Justify your answer.

   c) What is the use of "this" keyword?

   d) What is a Wrapper Class?

   e) What is use of final keyword?

   f) Define run time Exception.

   g) Difference between application and applet.

   h) Define type casting.

   i) What is difference between interface and abstract class?

   j) What is meaning of final class?

SECTION B

2. Write programs to demonstrate the difference between method overloading and method overriding in Java?
3. Explain Multithreading. Demonstrate with the help of example that how we set priorities in threads.
4. Write a program to implement the Factorial of a number using recursion in Java?
5. What is string handling? Write a program to append two strings in java.
6. What is inheritance? Demonstrate the use of Super keyword in inheritance with the help of example.

SECTION C

7. Explain in detail that makes java the most popular, preferable language over the years.
8. What is exception handling? How multiple exceptions are caught in a single program? WAP to demonstrate the use of custom exception.
9. Write Short note on
   a) Thread synchronization
   b) Socket programming
   c) JIT Compilation
   d) Applets

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B.Tech. (IT) (2011 onwards) (Sem. – 6)

NETWORK PROGRAMMING

M Code: 71171

Subject Code: BTIT-601

Paper ID: [A2351]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. a) What is difference between half duplex and full duplex?

   b) When race condition occurs?

   c) List various job control signals.

   d) What is a shell?

   e) What is the purpose of ping command?

   f) Difference between select and poll functions.

   g) Define fork () system call.

   h) List some limitations of pipes.

   i) What is shared memory?

   j) What is a raw socket?

SECTION B

2. Explain socket functions for TCP client server model.
3. Explain how inter-process communication takes place using message queues with the help of diagram.
4. How semaphores help in process synchronization? Give example
5. Explain the fundamental differences between the operation of TCP and UDP protocols.
6. Explain in detail about the working of UNIX file system.

SECTION C

7. Explain about:
   a) POSIX signal handling
   b) Port numbers and its categories.
8. Briefly discuss about the TCP echo server and client.
9. Write a Short note on:
   a) IPV4 vs IPV6
   b) Xerox Network System
   c) Shell
   d) Select and Poll functions

Total No. of Pages: 02

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Total No. of Questions: 09

B.Tech. (IT) (2011 Onwards) (Sem. – 6)

INFORMATION SECURITY AND RISK MANAGEMENT

M Code: 71172

Subject Code: BTIT-602

Paper ID: [A2352]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. Write in brief:

   a) Explain ethical hacking.

   b) What is a Worm?

   c) What is Cyber Crime?

   d) What is a message digest?

   e) What is Confidentiality?

   f) Explain Triple DES Algorithm.

   g) What do you mean by term "risk management"?

   h) What is DDoS?

   i) Explain use of digital signature.

   j) What is risk assessment?

SECTION B

2. Explain various Cyber Crimes. What are the various ways to make yourself secure?
3. Differentiate between 'penetration testing' and 'threat assessment'.
4. Explain use of firewall in any organization.
5. What is Email Security?
6. Explain various modes of risk analysis.

SECTION C

7. Explain Information Security Life Cycle in detail.
8. What is difference between 'MD5' and 'SHA-l Algorithm'.
9. Explain RSA Algorithm mathematically.

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B.Tech. (IT)(E-I 2011 onwards) (Sem. – 6)

STORAGE MANAGEMENT

M Code: 71175

Subject Code: BTIT-901

Paper ID: [A2355]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. Write a short note on the following:

   a) Local replicas

   b) Storage management activities

   c) Backup granularity

   d) RAID

   e) ISE (intelligent storage environment)

   f) Asserts in storage environment

   g) Firewall

   h) NAS components

   i) CAS

   j) Intrusion Detection

SECTION B

2. What are the components of NAS? Explain NAS Implementations.
3. Explain object storage and retrieval in CAS.
4. Difference between RAID 0 and RAID 1.
5. Explain various fiber channel ports with neat diagram.
6. Explain remote replication technologies with neat diagrams.

SECTION C

7. What is meant by Business continuity, information availability, disaster recovery and recovery point objective?
8. a) Explain storage security domains with reference to threats availability controls and examples.

   b) Explain the architecture of intelligent storage system in detail.
9. Write note on the following:

   a) Failure analysis

   b) Parts of intelligent storage system

   c) Multiple replicas

Total No. of Pages: 02

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B.Tech. (IT) (E-I 2011 Onwards) (Sem. – 6)

CLOUD COMPUTING

M Code: 71179

Subject Code: BTCS-912

Paper ID: [A2359]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. a) Define Cloud Computing.

   b) Define Grid Computing.

   c) What do you understand by Elasticity?

   d) Define the term Multitenancy.

   e) List Examples of SaaS applications.

   f) What do you understand by Community Cloud?

   g) Define the term Cloud Security Breach.

   h) Define the purpose of Authentication.

   i) List purpose of Application Programming Interfaces.

   j) What do you understand by Digital Signatures?

SECTION B

2. What are the driving factors for Migration toward Cloud?
3. Explain Virtualization in Cloud in detail.
4. List some Trade-offs in Installing Cloud.
5. Explain in detail the process of Cloud Migration.
6. Explain the role of Secure Socket layer in Cloud.

SECTION C

7. Explain in detail Cloud Management Platform Reference Architecture.
8. a) What do you understand by Hypervisor? Explain its various available types and their Working.

   b) How Identity management is done in Cloud?

9. a) Explain in detail various Cloud deployment Models.

   b) List various steps to reduce cloud security breaches.

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Total No. of Pages: 02

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B.Tech.(IT)(E-I 2011 Onwards) (Sem. – 6)

MULTIMEDIA DATABASES

M Code: 71176

Subject Code: BTIT-902

Paper ID: [A2356]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) How oriented database object differs relational database?

   b) What is the purpose of MX-Quadtrees?

   c) Define frequency table.

   d) How image is represented with relation?

   e) What is the objective of video segmentation?

   f) Write the full form of SMD.

   g) Define temporal constraint.

   h) What is the use of ER Model?

   i) What do you mean by query relaxation?

   j) Define spatial data.

SECTION B

2. Discuss in detail about TV Trees.
3. Explain the architecture of Multimedia database.
4. What are different Video standards, explain?
5. How ER model is extended to represent spatial concepts? Explain by using suitable example.
6. Write any five SQL queries that emphasise Spatial data.

SECTION C

7. Compare the different multidimensional data structures: K-d tree, MX-quadtree and R- trees.
8. Discuss in detail about Audio database: how these are represented, indexed and retrieved.
9. Write short note on following:
   a) Image retrieval
   b) Object oriented data model using UML

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B.Tech. (IT) (2011 Onwards) (Sem. – 6)

WEB TECHNOLOGIES

M Code: 71173

Subject Code: BTIT-603

Paper ID: [A2353]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) Explain the term WWW.

   b) Explain the term HTTP.

   c) What is MySQL. Explain

   d) How to declare HTML5 forms.

   e) List various features of HTML5.

   f) What is URL? Explain

   g) Which java script operator calculates the remainder by dividing two integers? Explain with example.

   h) Discuss the procedure to set cookies in JavaScript.

   i) What is AJAX? Explain

   j) Write short note on J2EE.

SECTION B

2. Write a brief note on Web Applications.
3. Write a short note on creating tables in HTML5.
4. Write a short note on AJAX server Script.
5. Write a detailed note on Jquery.
6. Write a brief note on JSP.

SECTION C

7. Write a detailed note on different types of operators available in JavaScript.
8. Explain different types of statements available in PHP.
9. Write a short note on the following
   a) Web Browsers
   b) Cascading Style Sheets in HTML5

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B.Tech. (IT) (2011 Onwards) (Sem. – 7, 8)

SOFTWARE PROJECT MANAGEMENT

M Code: 71980

Subject Code: BTIT-702

Paper ID: [A3050]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. Write briefly:

   a) What are Checkpoints?

   b) How are the project, process and product related to each other? Explain.

   c) Concept of Planning.

   d) List various characteristics of SPM.

   e) Explain Stress and its causes.

   f) Explain about the various Activity Plan Networks associated with SPM.

   g) Write about the Brainstorming Techniques.

   h) Name different costs involved in Activity planning of a project.

   i) Define Work Breakdown Structure.

   j) What is Change Control?

SECTION B

2. What are Activity networks? Explain how do the Forward networks and Backward Networks different from each other by citing the relevant difference between these two.
3. Give detailed overview of PERT and GANTT charts with a suitable example. Discuss their merits and demerits over each other.
4. Explain about the Change Control and the procedural methodology used in it for SPM.
5. Project a detailed overview of Risk Evaluation and hence explain how does the Decision Trees help in Risk handling?
6. Elaborate the statement "Project Monitoring plays vital role in controlling risk of a project".

SECTION C

7. Explain various steps involved in SDLC based upon their applications along with its merits and demerits.
8. Give detailed overview about the role of an organisation in building the TEAM structure by focusing upon its merits and demerits.
9. Write short notes upon:
   a) Cost Monitoring.
   b) Motivational Theories.

B.Tech Sem

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B.Tech. (I.T.) (...Onwards) (Sem. – 7, 8)

BUILDING ENTERPRISE APPLICATIONS

M Code: 71979

Subject Code: BTIT-701

Paper ID: [A3049]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) Define the term relational design.

   b) Describe the role of actor in use case model.

   c) What is requirements validation?

   d) What is ERP?

   e) What are the challenges in building enterprise applications?

   f) What are communication protocols?

   g) Define enterprise application.

   h) State different technical layers in a business application.

   i) What is user acceptance testing?

   j) What is code coverage?

SECTION B

2. What is configuration management plan? How development environment affects it?

3. What are the skills required to build an enterprise application? How the success of an enterprise application is measured?

4. Explain software engineering methodologies.

5. Explain logical architecture of enterprise application.
6. Differentiate between functional and non-functional requirements.

SECTION C

7. a) Explain why software reliability is important in software engineering?
   b) Why documentation of application architecture and design is needed?
8. Compare various SDLC models. Why spiral model is known as meta model?
9. Describe the different levels of testing that need to be performed before rolling out the application. Which of these can be done on client side?

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B.Tech. (IT) (2011 onwards Elective-III) (Sem. – 7, 8)

ADVANCED JAVA

M Code: 71990

Subject Code: BTIT-906

Paper ID: [A3158]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. a) How do we set the priority of a thread?

   b) What are the benefits of Multithreading in Java?

   c) Explain the term API in brief.

   d) Explain the term Semaphore in brief.

   e) Define the term Stream. List various types of streams.

   f) What are Callable Statements? Explain.

   g) Define the term Java Bean. What is the use of Java Bean?

   h) What is the importance of Bean Serialization?

   i) What are Java Database Connectivity Drivers? List various types of JDBC drivers.

   j) Explain the concept of Erasure.

SECTION B

2. What is a daemon thread. Explain with an example.
3. Write a detailed note on Database interaction using Statement interface.
4. Explain in detail about the concept of Serialization in Java.
5. Write a detailed note on reflection API in Java.
6. Define the term Annotations in Java. What is the use of Annotations? Explain in brief Build in Annotations.

SECTION C

7. Write a brief note on following
   a) Creating threads in Java (5+5)
   b) Thread Synchronization in Java
8. Write a detailed note on the following in relation to Java Database Connectivity
   a) Transaction Management (5+5)
   b) Result Set interface
9. What do you mean by Generics in Java. What is its importance? Explain in detail the implementation of various types in Generics. (10)

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B.Tech. (IT) (2011 Onwards Elective-III) (Sem. – 7, 8)

MULTIMEDIA AND APPLICATIONS

M Code: 71991

Subject Code: BTCS-910

Paper ID: [A3059]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. a) Define Multimedia.
   b) What is the difference between Hyper text and hypermedia? Illustrate with example.
   c) Write the full form of SGML and MHEG.
   d) What is the advantage of Nyquist's Sampling theorem.
   e) What is the storage size required to store binary image of size 1024 x 1024.
   f) What is MP3?
   g) What is the significance of Run Length coding?
   h) Why frequency Domain coding is useful?
   i) Write the difference between BMP and PDF file formats?
   j) Identify the Hardware requirements for deploying any multimedia application

SECTION B

2. Explain the characteristics of a Multimedia system.
3. Define multimedia authoring tool? Explain briefly any two multimedia authoring tools.
4. Explain briefly the different components of a MIDI System.
5. Explain Huffman coding Algorithm by using suitable example.
6. Discuss about different Color Models.

SECTION C

7. Give the basic principle of video compression. Explain MPEG based video compression technique.
8. a) What is RAID and write its key benefits? Which levels of the RAID standards are used very frequently for Commercial systems and Why?

   b) Discuss in detail the various CD standards used for storing multimedia data.
9. Write short note on following:

   a) Distributed Multimedia systems

   b) MHEG

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B.Tech. (IT) (2011 Onwards Elective-III) (Sem. – 7, 8)

ENTERPRISE RESOURCE PLANNING

M Code: 71992

Subject Code: BTCS-916

Paper ID: [A3060]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. Explain the following in brief:
   a) Need of business intelligence.
   b) History of data mining.
   c) Advantages of data migration.
   d) Process vs Project.
   e) Characteristics of business modules in ERP.
   f) Parameters of quality management in ERP system.
   g) Major reasons for growth of ERP market.
   h) Features of Lawson software.
   i) Future scope of ERP.
   j) Limitations of e-business.

SECTION B

2. Draw a well labeled diagram to illustrate the concept of ERP implementation lifecycle. Discuss the various phases involved in it.
3. List out the various ERP system packages available in market. Which one occupies the top most position and why?
4. Differentiate between conventional application packages and ERP packages.
5. Explain the growth and popularity of internet and its impact on ERP systems.
6. Differentiate between ERP and ERP-II.

SECTION C

7. What are the pre-purchasing activities in materials management? List any two Indian ERP software. What is Enterprise Application Integration?
8. How has e-business changed the definition of enterprise systems? Explain.
9. Discuss various ERP modules. Explain the various parameters of materials management in ERP system.

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May 2018

B.Tech CSE

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B.Tech.(CSE/IT) (2

s) / B.Tech.(3D Animation & Graphics) (2012

vards) (Sem. – 3)

COMPUTER ARCHITECTURE

M Code: 56591

Subject Code: BTCS-301

Paper ID: [A1123]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. a) What is meant by RTL?

   b) What is three address instruction format?

   c) Compare RISC with CISC architecture.

   d) What is write-through cache?

   e) Discuss shift micro operations.

   f) Name the registers generally contained in the processor.

   g) What are memory reference instructions?

   h) Discuss addressing modes.

   i) What is Inter processor communication?

   j) Write the use of Priority Interrupt.

SECTION B

2. List and explain the steps involved in the execution of a complete instruction?
3. What is the difference between a hardwired control unit and a micro programmed control unit? Explain the relative advantages of each.
4. List the advantage of cache in computer architecture. Discuss write through and write back cache techniques.
5. Explain the operation of DMA using a block diagram. Give an example application of DMA data transfer.
6. Explain direct and indirect register addressing mode with suitable example.

SECTION C

7. What is meant by associative memory? Explain briefly the hardware organization of such a memory.
8. Write short note on following
   a) Vector processors
   b) Instruction format
9. What do you understand by Instruction Pipeline? Mention the stages of Pipeline.

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Total No. of Questions: 09

B.Tech.(CSE / IT) (2010 Batch) (Sem. – 3)

DIGITAL CIRCUITS AND LOGIC DESIGN

M Code: 56503

Subject Code: CS-205

Paper ID: [A0453]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. a) Perform $(73\text{-}32)_{10}$ using 2's complement.

   b) Convert $(678)_{10}$ into octal format.

   c) What are universal gates and why they are so called?

   d) What is a flip-flop?

   e) How sequential circuit is different from combinational circuit?

   f) How bipolar logic families are different from unipolar logic families?

   g) A 4-bit weighted-resistor Analog to Digital converter uses the resistance of 4kΩ for MSB. What is the resistance value for LSB?

   h) What is a shift register?

   i) List the two applications of multiplexer.

   j) What is the purpose of line termination?

SECTION B

2. Simplify the following Boolean expression

   $F = x'y'z + xyz + x'y'z + xy + xyz'$

3. What is ROM? Explain briefly the different types of ROM.

4. Design 8:1 MUX using two 4:1 MUX.

5. Write a short note on TTL logic family.

6. What is the largest value of the output value of the output voltage in an 8-bit Digital to Analog converter that produces 4.0V for a digital input of $(00100100)_2$?

SECTION C

7. How asynchronous counters are different from synchronous counters? Design mod-8 up asynchronous counter using J-K flip-flop.

8. Explain briefly the different types of multivibrators.

9. What is VLSI design? Write a short note on Custom and semi-custom design.

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Total No. of Questions: 09

B.Tech. (CSE / IT) (2011 Batch) (Sem. – 3)

DISCRETE STRUCTURES

M Code: 56592

Subject Code: BTCS-302

Paper ID: [A1124]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. a) Define a partial order relation on a set A.

   b) Give an example of an equivalence relation on a set.

   c) State the necessary conditions for an integral domain to be a field.

   d) Give an example of a Boolean ring.

   e) Let A ={a, b, c]. Find all permutations on A.

   f) Find the generating function for the numeric function $a_n = 2^{n+3}$, $n \geq 0$.

   g) Define i) a subgroup and ii) a normal subgroup of a group.

   h) Let F(A) be the free semigroup on a set A and let Z be the semigroup of integers under addition. let f: F(A) $\rightarrow$ Z be defined by f(w) = l(w), w$\in$F(A). Prove that f is a homomorphism of semigroups.

   i) Define an i) Euler graph ii) Hamiltonian graph.

   j) Find the smallest possible simple graph which is not bipartite.

SECTION B

3. In how many ways can five physics books, four mathematics books, three history books and two Chemistry books be arranged on a shelf so that all books of the same subject are together?

4. Prove that every ideal of a ring R is a kernel of some ring homomorphism.

5. Let D_{36} denote the set of all divisors of 36. Considering the partial order of divisibility in D_{36}, draw its Hasse diagram.

6. Prove that the product HK of two subgroups H and K of a group G is a subgroup of G if and only if HK = KH.

7. Give an example of a graph which has all vertices of even degree but is not a Euler circuit.

SECTION C

8. Consider a population of 2,00,000 people. How many people in this population are born at the same time (hour, minute, second) of the day?

9. Let G be a connected planar graph with e edges, v vertices and r regions, prove that

$$v - e + r = 2.$$

10. a) In a survey of 80 people, it was observed that 30 read Hindustan times, 25 read Times of India, 28 read The Tribune, 15 read both the Hindustan Times and The Tribune, 18 read both Times of India and The Tribune, 20 read both Hindustan Times and Times of India and 5 read all the newspapers. Find the number of people

i) who read at least one of the three newspapers.

ii) who read no newspaper at all.

b) Solve the recurrence relation

$d_n = 2d_{n-1} - d_{n-2}$ with initial conditions.

$d_1 = 1.5$ and $d_2 = 3$.

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B.Tech. (CSE)/(IT) (2011 Onwards) (Sem. – 3)

DIGITAL CIRCUITS & LOGIC DESIGN

M Code: 56593

Subject Code: BTCS-303

Paper ID: [A1125]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. Write briefly:

   a) Weighted BCD

   b) Principle of Duality

   c) Exclusive-NOR versus Exclusive-OR

   d) Multiplexer versus Demultiplexer

   e) Uses of Shift Registers

   f) FPGA

   g) Convert 10101_2 to decimal

   h) TTL and CMOS

   i) Number of Gate inputs required for expression: $ABC + A\overline{B}CD + E\overline{F} + AD$

   j) MOSFET

SECTION B

2. Evaluate Following:
   a) Multiply $2A8_{16}$ by $B6_{16}$
   b) Subtract 14 from 46 using 8-bit 2's complement arithmetic.
3. State and prove De-Morgan's Theorems.
4. Explain the Operation of two input TTL NAND gate.
5. Design and implement a 4-bit binary to gray convertor.
6. Distinguish between combinational and sequential switching circuits.

SECTION C

7. Write short note on following
   a) Successive approximation A to D conversion technique
   b) Ripple Carry Adder
8. What are programmable logic devices? What are their advantages? Explain in detail the architecture of a programmable logic device.
9. Using Boolean algebra show that
   a) $AB + \overline{A}C + BC = AB + \overline{A}C$
   b) $AB + \overline{A}C = (A+C)(\overline{A}+B)$

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B.Tech. (CSE / IT) (2011 Onwards) (Sem. – 4)

COMPUTER NETWORKS-I

M Code: 56606

Subject Code: BTCS-403

Paper ID: [A1185]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. a) Explain in brief about network topologies.

   b) What is the need of Protocols?

   c) What are the advantages of Optic fiber as a transmission media?

   d) Explain in brief the term Noise in reference to transmission impairments.

   e) Explain the term checksum in reference to error detecting codes.

   f) Discuss IEEE 802.3 frame format.

   g) What do you mean by congestion control? Explain in brief.

   h) Differentiate between Distance vector and Link State routing algorithms.

   i) Explain the term Flow control in brief.

   j) What do you mean by FTP? Discuss.

SECTION B

2. Differentiate between Wired and Wireless Networks in detail. (5)
3. Differentiate between Circuit Switching, Packet Switching and Message switching. (5)
4. a) Write a brief note on transmission medium. (2.5)
   b) Explain in brief about the term computer network and its goals. (2.5)
5. Explain in detail the concept of flow control and buffering in reference to transport layer. (5)

(3+2=5)

6. Write a brief note on following terms:
   a) Domain Name System
   b) World Wide Web

SECTION C

7. Write a detailed note on the following sliding window protocols (3+4+3=10)
   a) Stop & wait ARQ
   b) Go-back-N ARQ
   c) Selective repeat ARQ
8. Explain the Distance Vector Routing Algorithm with an example. (10)
9. Write a detailed note on following protocols: (5+5=10)
   a) ALOHA
   b) CSMA

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B.Tech. (CSE/IT) (2010 Batch only) (Sem.– 4)

MATHEMATICS – III

M Code: 56514

Subject Code: CS-204

Paper ID: [A0495]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) Find the area common to the parabola $y^2 = 4x$ and $x^2 = 4y$ using double integration.

   b) Explain briefly the term conformal mapping.

   c) Explain briefly the Taylor's series method for the numerical solution of the differential equation: $\frac{dy}{dx} = f(x,y)$

   d) State Cauchy's mean value Theorem.

   e) Define analytical function. Give one example of an analytical function.

   f) Under what conditions the general linear partial differential equation of second order is:

      i) Parabolic ii) Elliptical iii) hyperbolic

   g) Expand: $\frac{1}{Z^2-3Z+2}$ in the region $|z| < 1$

   h) Using Picard's process of successive approximation, obtain a solution upto fourth approximation of the equation $\frac{dy}{dx} = y + x$, such that $y = 1$, when $x = 0$

   i) For the function $f(z) = \frac{Z}{(z-1)(z+1)^2}$, find the residue at the "pole of order 2".

   j) Write the three possible solutions for the Laplace equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$

SECTION B

2. Expand $f(z) = \frac{1}{(z+1)(z+3)}$ in a Laurent's series valid for the regions (i) $|z| < 1$ (ii) $1 < |z| < 3$.

3. State and prove Cauchy's theorem.

4. Solve the equation $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$ by the method of separation of variables.

5. Evaluate $\iiint_R (x^2 + y^2 + z^2)\,dxdydz$, where R denotes the region bounded by $x = 0$, $y = 0$ and $x+y+z = a$. $(a > 0)$

6. Solve the partial differential equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ which satisfies the conditions:

$u(0, y) = u(l, y) = u(x, 0) = 0$ and $u(x, a) = \sin \frac{ux\,\pi}{l}$

SECTION C

7. Solve the wave equation $\frac{\partial^2 u}{\partial t^2} = a^2 \frac{\partial^2 u}{\partial x^2}$, under the condition: u=0 when x=0 and x=π, $\frac{\partial u}{\partial t} = 0$ when t=0 and $u(x, 0) = x$, $0 < x < \pi$.

8. Apply Range-Kutta method of fourth order to find an approximate value of y when x=0.2 given that $\frac{dy}{dx} = x+y^2$ and $y = 1$ when $x = 0$.

9. Evaluate $\int_{-\infty}^{\infty} \frac{x^2 dx}{(x^2+1)(x^2+4)}$, Using the concept of contour integration.

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B.Tech. (CSE/IT) (2011 Onwards) (Sem. – 4)

OPERATING SYSTEMS

M Code: 56604

Subject Code: BTCS-401

Paper ID: [A1183]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) Explain the function of Shell in brief.

   b) Explain in brief about process synchronization.

   c) Define the term Waiting time and Turnaround time in reference to scheduling algorithms.

   d) Differentiate between Internal and External Fragmentation.

   e) Write at least two advantages of virtual memory concept.

   f) Define the term Disk Bandwidth.

   g) Differentiate between seek time and rotational latency.

   h) Explain the term file system in brief.

   i) Explain various goals of Protection.

   j) Define the term Distributed Operating Systems.

SECTION B

2. Explain in detail the role of Operating system as a resource Manager.

3. Explain in detail the following CPU scheduling algorithms:

   a) Priority Scheduling

   b) Round Robin

4. Explain the role of I/O traffic controller in detail.

5. Define the term security. Explain various goals of security.

6. Differentiate between UNIX and Windows based operating systems.

SECTION C

7. a) Explain the different views of an operating system in brief.

   b) Define the term deadlock. Explain various necessary conditions for a deadlock to occur. Explain in brief about deadlock prevention.

8. Write a detailed note on secondary storage structure.

9. What is the need of Page replacement? Consider the following reference string

   7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1

   Find the number of Page Faults with FIFO, Optimal Page replacement and LRU with four free frames which are empty initially. Which algorithm gives the minimum number of page faults?

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Total No. of Questions: 09

B.Tech. (CSE / IT) (2011 Batch) (Sem.– 4)

MATHEMATICS – III

M Code: 56605

Subject Code: BTCS-402

Paper ID: [A1184]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. a) Find Fourier series to represent $f(x) = x^2 - 2$ when $-2 \le x \le 2$.

   b) Find Laplace transformation of $sin\ 2t\ cos\ 3t$.

   c) State first shifting theorem for Laplace transformation.

   d) Solve $2p + 3q = 1$.

   e) Define analytic function.

   f) Find all the values of $(-1)^{1/4}$.

   g) Check whether function $f(z) = \sqrt{|xy|}$ is regular at origin.

   h) Sample of sizes 10 and 14 were taken from two normal populations with standard deviations 3.5 and 5.2. The sample means were found to be 20.3 and 18.6. Test whether the means of two populations are the same at 5% level.

   i) What are the applications of F-test.

   j) Form the differential equation of all circles of radius a.

SECTION B

2. Find the Fourier cosine series of function $f(x)=\begin{cases}x^2, & 0\le x\le 2\\ 4, & 2\le x\le 4\end{cases}$

3. Solve $\frac{\partial^2 z}{\partial x^2}-\frac{3\partial^2 z}{\partial x\partial y}+2\frac{\partial^2 z}{\partial y^2}=e^{2x+3y}+\sin(x-2y)$

4. Using Gauss seidal iteration method to solve the system of equations

$$10x-2y-z-w=3,\quad -2x+10y-z-w=15,\quad -x-y+10z-2w=27,$$
$$-x-y-2z+10w=-9$$

5. Find the mean of binomial distribution.

6. A sample of 100 dry battery cells tested to find the length of life produced the following results mean = 12 hrs. σ = 3hrs. Assume that the data to be normally distributed, what % age of battery cells are expected to have life.

   a) more than 15 hrs

   b) less than 6hrs

   c) between 10 and 14hrs.

SECTION C

7. Find all values of z such that $\sin hz=e^{\frac{i\pi}{3}}$.

8. Solve $\frac{dy}{dx}=y-\frac{2x}{y}, y(0)=1$ in range $0 \le x \le 0.2$ using Euler and modified Euler method.

9. A coin was tossed 400 times and head turned up 216 times. Test the hypothesis that coin is unbiased.

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B.Tech. (CSE/IT) (2012 Onwards) (Sem.– 4)

DISCRETE STRUCTURES

M Code: 71106

Subject Code: BTCS-402

Paper ID: [A2305]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. Explain the following in brief:

   a) What is indegree and outdegree of a graph?

   b) Show the identity element in a group G is unique.

   c) Define abelian group.

   d) Differentiate between an ordered and unordered partition of a finite set.

   e) What is power set?

   f) State DeMorgan's laws in Boolean algebra.

   g) What is ternary relation?

   h) Discuss recurrence relations.

   i) Define lattice with example.

   j) What do you mean by chromatic number?

SECTION B

2. Let R and S be the following relations on A = {1, 2, 3}:

   R = {(1, 1), (1, 2), (2, 3), (3, 1), (3, 3)}, S = {(1, 2), (1, 3), (2, 1), (3, 3)}

   Find a) $R \cup S$, $R \cap S$, R^c; b) $S^2 = S \circ S$.

3. Suppose 32 students are in an art class A and 24 students are in a biology class B, and suppose 10 students are in both classes. Find the number of students who are:

   a) In class A or in class B; b) only in class B;

4. Let f: R→R be defined by $f(x) = 3x - 7$. Find a formula for the inverse function $f^{-1}: R \to R$

5. Consider G = {1, 5, 7, 11} under multiplication modulo 12.

   a) Is G cyclic? b) Find all subgroups of G.

6. Find the general solution for third-order homogeneous recurrence relation

$$a_n = 6a_{n-1} - 12a_{n-2} + 8a_{n-3}.$$

SECTION C

7. Show that the edge chromatic number of a graph must be at least as large as the maximum degree of a vertex of the graph.

8. Consider the algebraic expression $E = (x + 3y)^4(a - 2b)$.

   a) Draw the corresponding 2-tree.

   b) Write E in Polish prefix form.

9. a) Use a Karnaugh map to find a minimal sum for the Boolean expression

$$E = x + x'yz + xy'z'.$$

   b) Find the truth table T= T (E) for the Boolean expression E = E (x, y, z) where: $E = xyz' + y + xy'$.

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B.Tech. (CSE) / (IT) (2010 Batch) (Sem. – 4)

OPERATING SYSTEM

M Code: 56513

Subject Code: CS-202

Paper ID: [A0458]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. Write briefly:

   a) Define operating system.

   b) Differentiate between symmetric and asymmetric multiprocessing.

   c) What is a system call?

   d) List the process states.

   e) What is long term scheduling?

   f) What is semaphore?

   g) Define deadlock.

   h) What is address binding?

   i) What is page fault?

   j) What is circular wait?

SECTION B

2. What is LRU scheme? Explain with example.
3. Explain the various criteria used for comparing CPU scheduling.
4. Explain the critical section problem in brief.
5. Explain the FCFS disk scheduling algorithm in brief.
6. Explain the user view and system view of operating system.

SECTION C

7. Explain the FCFS and SJF CPU scheduling algorithms and compare their performance with suitable example.
8. Explain the various deadlock prevention and deadlock avoidance techniques in brief.
9. Describe the important features and applications of Linux operating system.

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B.Tech. (CSE/Electronics & Computer Engg. / IT) (2011 Onwards)

(Sem.– 4)

MICROPROCESSOR & ASSEMBLY LANGUAGE PROGRAMMING

M Code: 56607

Subject Code: BTCS-404

Paper ID: [A1186]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. a) Synchronous buses are faster or asynchronous buses? Explain with reasons.

   b) What are vectored interrupts? Explain with suitable example.

   c) What is the last instruction executed by every interrupt?

   d) Discuss the interrupt handling of 68000.

   e) If the memory chip size is 1024x4 bits, how many chips are required to make up 2k bytes of memory?

   f) Give the sum and flag settings for AF, SF, ZF, CF, OF and PF after hexadecimally adding 62A0 to each of the following:

      a) 1234

      b) 4321

   g) Start: IN F2H

      CMA

      ORA A

      JZ: start

      What will be the result for this program?

   h) How many interrupt sources are available in 8051? What are they?

i) What are various components of emulator?

j) What is the use of LATCH signal on AD0-AD15 bus in 8086 system?

SECTION B

2. Describe in flow chart the interfacing of 8085 microprocessor with matrix keyboard and also write the assembly language program to implement the function.
3. Write an assembly language program that reads number from the users until the user types 5.
4. Explain the function of ALE and IO/M signals of the 8085 microprocessor.
5. What do you mean by DMA? Explain its working.
6. Explain the addressing modes of 8086.

SECTION C

7. Describe the traffic light system using stepper motor interface.
8. What is micro controller? Discuss the architecture of 8051 microcontroller.
9. Differentiate between following instructions:
   a) STA address and STAX rp
   b) LXI, H 2000H and LHLD 2000H

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B.Tech.(CSE) (2011 O... Sem. – 5)

RELATIONAL DATABASE MANAGEMENT SYSTEMS–I

M Code: 70535

Subject Code: BTCS-502

Paper ID: [A2098]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. a) Define Database Schema and database state.

   b) What are weak Entities? How are they represented in database?

   c) Define Referential Integrity constraints.

   d) Define Full Functional Dependency.

   e) What is Deadlock during concurrent processing?

   f) Explain Variable Length Record.

   g) What predicate is used in Natural Join?

   h) Explain Exclusive Lock. Why we use it?

   i) What is dense index?

   j) List different DAC privilege.

SECTION B

2. Discuss three-tier architecture of the database and use of mapping between schema levels.
3. What is the difference between procedural and nonprocedural DML's?
4. Discuss different integrity constraints with example.
5. Implement following relation using SQL query where roll no is in 5 digits and each subject of 70 marks.

   Student (rollno, name, sub1, sub2, sub3, totalmarks, percentage)

   Create the table, add 5 records and display name, roll no and percentage as data
6. Discuss lost update problem with an example.

SECTION C

7. What is normalization? Explain first, second, third and BCNF Normal forms with suitable example.
8. Consider the following relational database:

   employee(employee-name, street, city)

   works(employee-name, company-name, salary)

   company(company-name, city)

   manages(employee-name, manager-name)

   Give an expression in SQL for each of the following queries:

   a) Find the names, street address and cities of residence for all employees who work for 'First Bank Corporation' and earn more than Rs. 10,000.

   b) Find the names of all employees in the database who live in the same cities as the companies for which they work.

   c) Find the names of all employees in the database who live in the same cities and on the same streets as do their managers.
9. Define data model. Explain record based data models using diagrams.

Roll No. | | | | | | | | | | | |

Total No. of Pages: 02

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B.Tech.(CSE) (2011 Onwards) (Sem. – 5)

COMPUTER GRAPHICS

M Code: 70537

Subject Code: BTCS-504

Paper ID: [A2100]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. a) What is aspect ratio in display?

   b) Explain Random Scan System.

   c) Discuss about homogeneous coordinates.

   d) What is shearing transformations?

   e) What is the role of computer graphics in animation?

   f) Write about windows and view port.

   g) Discuss boundary fill algorithm.

   h) What is scan line algorithm?

   i) Define composite Transformations.

   j) Define the Phong shading.

SECTION B

2. Explain about different circle drawing algorithms.
3. Differentiate parallel and perspective projections and derive their projection matrices.
4. Write a short note on Midpoint Ellipse Algorithm.
5. With suitable examples explain all 3D transformations.
6. How surfaces are sorted using Depth sort algorithm?

SECTION C

7. Give the syntax of drawing a line in computer graphics using various algorithms.
8. a) Discuss hidden surface removal problem.
   b) What is z buffer technique? Write the use of depth and frame buffer.
9. a) Give the introduction of rendering technique for generating an image from 2D models.
   b) What is the significance of formula in computer graphics Fractals?

Total No. of Pages: 02

Roll No. | | | | | | | | | | |

Total No. of Questions: 09

B.Tech. (CSE) (2011 Onwards) (Sem. – 5)

DESIGN AND ANALYSIS OF ALGORITHMS

M Code: 70536

Subject Code: BTCS-503

Paper ID: [A2099]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. a) What is Pattern matching?

   b) What is the time complexity of Merge sort?

   c) Give an example of dynamic programming approach.

   d) What do you understand by algorithm evaluation?

   e) What is NP-complete problem?

   f) What is asymptotic time complexity?

   g) What is the basic principal of divide-and-conquer?

   h) List various applications of DFS and BFS.

   i) What are the advantages of Merge sort over the quick sort algorithm?

   j) What is the time complexity of the matrix multiplication and Strassen's algorithm?

SECTION B

2. Prove that if $f1(n)=O(g1(n))$ and $f2(n)=O(g2(n))$, then $f1(n) + f2(n) = O(g1(n) + g2(n))$.
3. What is the relationship among P, NP and NP complete problems? Show with the help of a diagram.
4. What is the significance of Big-oh, Omega and theta?
5. Explain FFT and its applications.
6 Write an algorithm based on divide-and-conquer strategy to search an element in a given list. Assume that the elements of list are in sorted order.

SECTION C

7. Define spanning tree. Write Kruskal's algorithm for finding minimum cost spanning tree. Describe how Kruskal's algorithm is different from Prim's algorithm for finding minimum cost spanning tree.
8. Extend the Dijkastra's algorithm to find All-pairs-shortest-path (APSP) problem.
9. Compare the various programming paradigms such as divide-and-conquer, dynamic programming and greedy approach.

Roll No.

Total No. of Questions: 08

Total No. of Pages: 02

B.Tech. (CSE) (2011 Onwards) (Sem. – 6)

SIMULATION AND MODELING

M Code: 71107

Subject Code: BTCS-601

Paper ID: [A2306]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. a) What are the major advantages of simulation?
   b) What are the applications of queuing model?
   c) What are the properties of the random numbers?
   d) Distinguish between biased and unbiased estimators.
   e) What do you mean by stochastic nature of the output data?
   f) Why is the simulation needed?
   g) List different methods for generating random numbers.
   h) What is multiple linear, regression?
   i) What do you mean by simulation of computer networks?
   j) Compare process orientation with event orientation.

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Total No. of Questions: 09

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B.Tech. (CSE) (2011 Onwards) (Sem. – 6)

SIMULATION AND MODELING

M Code: 71107

Subject Code: BTCS-601

Paper ID: [A2306]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. a) What are the major advantages of simulation?

   b) What are the applications of queuing model?

   c) What are the properties of the random numbers?

   d) Distinguish between biased and unbiased estimators.

   e) What do you mean by stochastic nature of the output data?

   f) Why is the simulation needed?

   g) List different methods for generating random numbers.

   h) What is multiple linear, regression?

   i) What do you mean by simulation of computer networks?

   j) Compare process orientation with event orientation.

SECTION B

2. What are the different types of system simulation? Explain with examples.
3. What are random numbers? Explain any method for generating them.
4. Explain the list processing in detail.
5. Explain identifying the distribution with data with example.
6. What do you mean by goodness of fit tests? How are they applied to the simulation inputs? Explain.

SECTION C

7. Explain the following:
   a) Discrete and continuous simulation languages
   b) Calibration and validation
8. Explain in detail queuing models with non exponential distributions.
9. Write an algorithm for simulating token passing protocol in any of the simulation languages.

Total No. of Pages: 02

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B.Tech. (CSE) (2011 Onwards Elective-I) (Sem. – 6)

WEB TECHNOLOGIES

M Code: 71110

Subject Code: BTCS-901

Paper ID: [A2309]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. Explain the following:

a) URLS

b) PHP

c) XML

d) AJAX

e) ISP

f) Dialog Box

g) Cookies

h) CSS

i) DHTML

j) Style Sheets

SECTION B

2. Describe various tools for website creation.
3. What is the use of functions and dialog boxes in java script?
4. How tables and graphics are created in HTML?
5. What are the various control statements used in Java? Explain.
6. How to send an email in PHP?

SECTION C

7. Discuss with the help of an example the use of style sheets.
8. What are various Internet Addressing modes? Explain.
9. Write a detailed note on AJAX.

Roll No. | | | | | | | | | | |

Total No. of Questions: 09

B.Tech. (CSE/IT) (O.E. 2011 Onwards) (Sem. – 6)

TOTAL QUALITY MANAGEMENT

M Code: 71553

Subject Code: ME-251

Paper ID: [A2641]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. a) Define MRP?

   b) What are the different elements of Just-i n-Time?

   c) What do you mean by customer satisfaction?

   d) Name the tools of Problem Identification?

   e) What is the effect of rewarding the employees in TQM?

   f) What do you mean by Quality Circles?

   g) Name the different techniques of Benchmarking.

   h) What are the management's responsibilities in ISO?

   i) What do you understand by signal in Taguchi method?

   j) For what purpose, the ISO-9000 system is implemented in an organization?

SECTION B

2. Discuss the salient features of TQC and TQM?
3. As a manager of a small sporting goods store, describe how you would train front-line employees to handle customer complaints.
4. What are the basic requirements to be fulfilled prior to introducing the JIT?
5. Discuss the Failure Mode Effects analysis of TQM.
6. Discuss in detail the QFD process.

SECTION C

7. a) Explain any one Model of TQM?

   b) Discuss various elements of JIT. Explain Kanban system?

8. a) Write the advantages and disadvantages of Total Employees Involvement?

   b) What steps are involved in complete planning of a process?

9. What are the various advanced Techniques of Total Quality Management? Discuss any one in detail.

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Total No. of Pages: 02

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B.Tech.(CSE/IT) (O.E. 2011 Onwards) (Sem. – 6)

OPTIMIZATION TECHNIQUES

M Code: 71555

Subject Code: CH-304

Paper ID: [A2643]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. a) Define Design Variables?

   b) Write engineering applications of Optimization Techniques?

   c) Describe Local Optimal Point?

   d) Classify optimization problems?

   e) Define Inflection Point'?

   f) Name various single variable optimization techniques?

   g) What are the Kuhn-Tucker conditions?

   h) Elaborate briefly "Gradient based methods"?

   i) Describe linear Programming?

   j) Write various optimization algorithms'?

SECTION B

2. Explain in detail Newton Raphson Method?
3. Illustrate in detail Steepest descent method.
4. Explain Successive Quadratic estimation methods?
5. Describe in detail Powell's conjugate direction method?
6. Differentiate between single variable and multi variable optimization techniques'

SECTION C

7. Describe in detail Hooke-Jeeves Pattern search method and Marquardt's method?
8. What do you mean by statement of an optimization problem? Explain in detail its formulation and various optimization problems. Also, give examples of optimization problems?
9. Illustrate in detail variable elimination and complex search methods?

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Total No. of Pages: 02

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B.Tech. (CSE / Electronics & Computer Engg. / IT) (2011 onwards)
(Sem. – 6)

SOFTWARE ENGINEERING

M Code: 71109
Subject Code: BTCS-603
Paper ID: [A2308]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) Explain in brief the impact of software engineering.

   b) Differentiate between functional and non-functional requirements.

   c) Differentiate between coupling and cohesion.

   d) Explain in brief about the term function-oriented software design.

   e) What are software reliability metrics? Explain.

   f) Explain the term mutation testing in brief.

   g) Differentiate between white-box and black-box testing.

   h) What do you mean by software maintenance? Explain.

   i) Explain the term project planning and control in brief.

   j) Explain in brief about software reuse.

SECTION B

2. What are the advantages and disadvantages of Waterfall Model of software life cycle?
3. Write a detailed note on Requirement gathering.
4. Write a detailed note on user interface design.
5. Explain in detail about static and dynamic analysis.
6. Write a detailed note on Computer aided software engineering.

SECTION C

7. a) Write a detailed note on Requirement analysis and specification.
   b) Explain in detail about object modeling using UML.
8. a) Explain in detail about Object-oriented software development.
   b) Write a detailed note on test case design techniques.
9. Write a detailed note on PSP and Six Sigma.

Total No. of Pages: 02

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B.Tech. (CSE / IT) (O.E. 2011 Onwards) (Sem. – 6)

HUMAN RESOURCE MANAGEMENT

M Code: 71556

Subject Code: HU-251

Paper ID: [A2644]

Max. Marks: 60

Hrs.

CTIONS TO CANDIDATES:
CTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
CTION-B contains FIVE questions carrying FIVE marks each and students have to
mpt any FOUR questions.
CTION-C contains THREE questions carrying TEN marks each and students have
ttempt any TWO questions.

SECTION A

Short notes on:

Affirmative action

HR Audit

Exit Interview

Mentoring

Job Evaluation

Performance Appraisal

Factors affecting motivation

Quality of Work

Employees Grievances

Social Security

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Total No. of Questions: 09

B.Tech. (CSE / IT) (O.E. 2011 Onwards) (Sem. – 6)

HUMAN RESOURCE MANAGEMENT

M Code: 71556

Subject Code: HU-251

Paper ID: [A2644]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. Write Short notes on:

a) Affirmative action

b) HR Audit

c) Exit Interview

d) Mentoring

e) Job Evaluation

f) Performance Appraisal

g) Factors affecting motivation

h) Quality of Work

i) Employees Grievances

j) Social Security

SECTION B

2. Explain the evolution of Human Resource Management. Add examples also.
3. Discuss various on-the-job and off-the-job training methods. Give examples, if any.
4. What are the barriers to performance evaluation? Explain it with suitable examples.
5. Write short notes on '*Psychological tests and interviewing*' with apt examples.
6. Illustrate concept of '*Fringe and Retirement Terminal Benefits*' using real life examples and address concerned issues involved in administration of welfare.

SECTION C

7. Discuss the requirements for human resource planning at global, national, industrial and sectoral levels. Justify your solutions with relevant examples.
8. What do you mean by 'Role of Trade Unions in maintaining cordial Industrial relations'? Explain each factors w.r.t. best practices adopted in this integration sector of HRM.
9. Explain future challenges for HRM. Support all facts and figures used in argument with company and people point of view examples.

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B.Tech. (CSE) (2011 Onwar[illegible] 7, 8)

THEORY OF COMPUTATION

M Code: 71894

Subject Code: BTCS-702

Paper ID: [A2986]

Time: 3 Hrs. Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) Define Finite Automata.

   b) Define Transition Graphs.

   c) Describe the following set by Regular Expression {1, 11, 111, 1111...).

   d) What is the significance of Pumping Lemma?

   e) Differentiate between NDFA and DFA.

   f) Define a Grammar.

   g) Give two properties of LR(k) grammars.

   h) Define Recursively Enumerable Languages.

   i) Compare the computational powers of Pushdown Automata and Turing Machines.

   j) What are normal forms of CFG?

SECTION B

2. Construct a nondeterministic finite automata accepting the set of all strings over {**a,b**} ending in **aba**, and use it to find a deterministic automaton accepting the same set.

3. Construct a Turing Machine that can accept the set of all even palindromes over {0,1}.

4. Reduce the given grammar into Chomsky Normal Form.

   $S \rightarrow abSb \mid a \mid aAb, \quad A \rightarrow bS \mid aAAb$

5. Verify whether that the following context free grammar is ambiguous or not:

   $S \rightarrow 1A0S$

   $S \rightarrow 1A0S1S$

   $A \rightarrow 1$

   $S \rightarrow 0$

6. Construct a grammar G accepting the set L of all the strings over {a, b} having more a's than b's.

SECTION C

7. Consider the regular expression R

   $(a+b)^*(aa+bb)(a+b)^*$

   Which describes the set of all the words over Σ= {a, b}, containing either two consecutive a's or two b's. Construct a Deterministic Finite Automata A that will accept the same set of words.

8. Give an example of a language which is accepted by the PDA but not by DPDA. Also design the PDA for that language.

9. Write short notes on the following:

   a) Decidability

   b) Halting Problem

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Total No. of Pages: 02

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B.Tech. (CSE) (2011 Onwards) (Sem. – 7, 8)

ARTIFICIAL INTELLIGENCE

M Code: 71893

Subject Code: BTCS-701

Paper ID: [A2985]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) State the relationship between Intelligence and Knowledge.

   b) Define terms 'Fact' and 'Rule'.

   c) What are the various applications of AI?

   d) What are the features of NLP?

   e) Briefly explain syntactic processing.

   f) What is rule based learning?

   g) What is an inference engine?

   h) Mention the criteria for the evaluation of search strategy.

   i) Express 'A car without wheels is not valuable' in predicate logic.

   j) What is Heuristics?

SECTION B

2. Distinguish between forward and backward chaining.
3. What is the common way to represent and parse Grammars for natural language processing?
4. Explain state space approach for solving any AI problem.

5. How AI handles decision under uncertainty?

6. What are the differences and similarities between problem solving and planning?

SECTION C

7. Discuss the role of reasoning in AI. How predicate logic is used in Al to represent knowledge?

8. Explain A* searching technique in detail with example. Discuss conditions for the optimality of this technique.

9. Explain back propagation algorithm for nueral nets.

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Total No. of Questions: 09

B.Tech. (CSE) (2011 Onwards Elective-III) (Sem. – 7, 8)

CLOUD COMPUTING

M Code: 71904

Subject Code: BTCS-912

Paper ID: [A2994]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. a) Differentiate Cloud Computing and Internet.

   b) How do multi-tenancy advantageous to the success of cloud computing?

   c) What is resource pooling and rapid elasticity?

   d) Why is API necessary in cloud computing?

   e) Write any two characteristics of public cloud and hybrid cloud.

   f) What is the role of resource scheduler in IaaS service layer?

   g) Enlist the services that are provided by IBM Smart Cloud.

   h) What is SSL?

   i) What is the selection criterion for private cloud deployment model?

   j) Give any two examples of self-service.

SECTION B

2. Design the architecture of PaaS and SaaS in cloud computing? Also, explain the different categories of PaaS and SaaS with example.

3. What is virtualization in cloud computing? Outline the characteristics of server virtualization and application virtualization.

4. Discuss the following concepts in the context of cloud computing:

   a) Billing and Metering Services

   b) Tooling and automation

5. Draw the framework of common cloud management platform reference architecture and explain its components.

6. Write different types of internal security breaches in cloud computing. Also, explain the steps to reduce cloud security breaches.

SECTION C

7. Discuss, in detail, the cloud security reference model and explain how cloud security is integrated into the design of application.

8. Explain the cloud deployment models, in detail. Also, outline their benefits and limitations while implementing and application.

9. Explain the following:

   a) Digital Signatures

   b) Goggle Cloud Platform

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Total No. of Questions: 09

B.Tech. (CSE/IT) (2011 Onwards Elective-II) (Sem. – 7, 8)

BUSINESS INTELLIGENCE

M Code: 71900

Subject Code: BTCS-908

Paper ID: [A2990]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. Write briefly:

   a) What is the need of data integration in corporate world?

   b) List any four popular ETL tools.

   c) What are the building blocks of data quality management?

   d) Define granularity.

   e) Why does the balanced scorecard take into consideration the non-financial measures as well?

   f) List any four applications of business intelligence.

   g) What is the role of administration and operations layer?

   h) What are the benefits of enterprise dashboard?

   i) What are the major causes of bad data quality?

   j) Give few examples from everyday life of fact-based decision making.

SECTION B

2. List and explain the steps to create a dashboard.
3. What are the dimension tables? Explain types of dimensions with the help of examples.
4. Suppose you are a project manager. You lead a 10 member team. Your team members are in three geographically different locations. What measures will you take to ensure that all your team members are on the same page?
5. Explain the perspectives of a balanced scorecard in detail.
6. Discuss data integration approaches in detail.

SECTION C

7. Compare and contrast OLAP and OLTP. Discuss the significance of ROLAP, MOLAP and HOLAP.
8. Explain business intelligence infrastructure components in detail. List the roles and responsibilities of business intelligence.
9. Write short note on:
   a) Business Analytics
   b) Data Warehousing

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B.Tech.(CSE) (2011 Onwards Elective-II) (Sem. – 7, 8)

OBJECT ORIENTED ANALYSIS AND DESIGN

M Code: 71898

Subject Code: BTCS-906

Paper ID: [A2988]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION A

1. Answer the following questions

   a) What is multiplicity of an association?

   b) What is the purpose of system sequence diagram?

   c) What is meant by a scenario?

   d) What are the basic elements of the observer pattern?

   e) What is the purpose of state variable?

   f) Define unit test.

   g) Define domain modeling.

   h) Why CASE tools are used? Explain.

   i) Explain visitor pattern.

   j) Explain proxy pattern.

SECTION B

2. What are the objectives of each Unified Process (UP) phase? Explain.
3. Draw a class diagram, including minimum and maximum multiplicity for the following. The system stores information about two things: cars and owners. A car has attributes for make, model and year. The owner has attributes for name and address. Assume that a car must be owned by one owner and an owner can own many cars but that an owner might not own any cars (perhaps she just sold them all, but you still want a record of her in the system).
4. List the primary steps for developing statechart.
5. What is a design pattern? How are design patterns used in the design discipline?
6. How are sequence diagrams helpful in assigning responsibilities? Explain.

SECTION C

7. Develop an activity diagram based on the following narrative. If you need to make assumptions you can do, also note them.

   The purchasing department handles purchase requests from other departments in the company. People in the company who initiate the original purchase request are the "customers" of the purchasing department. A case worker within the purchasing department receives that request and monitors it until it is ordered and received.

   Case workers process request for the purchase of products under $1,500, write a purchase order, and then send it to the approved vendor. Purchase requests over $1,500 must first be sent out for bid from the vendor that supplies the product. When the bids return, the case worker selects one bid. Then, he or she writes a purchase order and sends it to the vendor.

8. To develop the first-cut sequence diagram, you should follow three steps. Briefly describe each of those three steps with an example.
9. Write a note on aspect-oriented and service-oriented software.

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Total No. of Questions: 09

B.Tech. (CSE) (2011 Onwards Elective-II) (Sem. – 7, 8)

SOFTWARE PROJECT MANAGEMENT

M Code: 71899

Subject Code: BTCS-907

Paper ID: [A2989]

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION A

1. Answer the following questions

   a) Explain why keeping all members of a group informed about progress and technical decisions in a project can improve group cohesiveness?

   b) Explain COCOMO model.

   c) Describe a software application area in which software safety and hazard analysis would be a major concern.

   d) What are the various factors associated with cost estimation of a project?

   e) Define ISO 9000 quality standard.

   f) Explain Putnam's equation.

   g) What is the importance of Monte Carlo simulation technique in risk management?

   h) Is quality and reliability related concepts but are fundamentally different? Justify your answer with an example.

   i) Differentiate between "known risks" and "predictable risks".

   j) What is the difference between a macroscopic schedule and a detailed schedule?

SECTION B

2. Describe Software quality dilemma in your own words.
3. Quality and reliability are related concepts but are fundamentally different in a number of ways. Discuss the differences.
4. What is the difference between an SCM audit and a technical review? Can their function be folded into one review? What are the pros and cons?
5. A formal technical review is effective only if everyone has prepared in advance. How do you recognize a review participant who has not prepared? What do you do if you're the review leader?
6. You are an engineer involved in the development of a financial system. During installation, you discover that this system will make a significant number of people redundant. The people in the environment deny you access to essential information to complete the system installation. To what extent should you, as a systems engineer, become involved in this? Is it your professional responsibility to complete the installation as contracted? Should you simply abandon the work until the procuring organization has sorted out the problem?

SECTION C

7. a) What options do we have when defining the structure of a software team? Explain in detail.

   b) Use the COCOMO II model to estimate the effort required to build software for a simple ATM that produces 12 screens, 10 reports, and will require approximately 80 software components. Assume average complexity and average developer/environment maturity. Use the application composition model with object points.

8. Give at least three examples in which black-box testing might give the impression that "everything's OK," while white-box tests might uncover an error. Give at least three examples in which white-box testing might give the impression that "everything's OK," while black-box tests might uncover an error.
9. Assume you are a software project manager and that you've been asked to compute earned value statistics for a small software project. The project has 56 planned work tasks that are estimated to require 582 person-days to complete. At the time that you've been asked to do the earned value analysis, 12 tasks have been completed. However, the project schedule indicates that 15 tasks should have been completed. The following scheduling data (in person-days) are available:

Task	Planned Effort	Actual Effort
1.	12.0	12.5
2.	15.0	11.0
3.	13.0	17.0
4.	8.0	9.5
5.	9.5	9.0
6.	18.0	19.0
7.	10.0	10.0
8.	4.0	4.5
9.	12.0	10.0
10.	6.0	6.5
11.	5.0	4.0
12.	14.0	14.5
13.	16.0	-
14.	6.0	-
15.	8.0	-

Compute the SPI, schedule variance, percent scheduled for com
and cost variance for the project.