4E4116

4E4116

B. Tech. IV-Sem. (Main / Back) Exam; April-May 2017

Civil Engineering

4CE6A Quantity Surveying & Valuation

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates :-

*Attempt any **five** questions, selecting **one question** from each unit. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.
Use of following supporting materials is permitted during examination.
(Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT - I

1 (a) Enumerate different types of estimates and explain each in detail.

8

(b) Explain the general rules for measurement of works. State unit of measurement for following item of works :

(i) Damp Proof Course (D.P.C)

(ii) Skirting

(iii) R.C.C. lintels

(iv) Rain water pipes.

4+4 = 8

OR

1   (a)   What are measurement sheets and abstract sheets ? What are bills of qualities ? Explain Schedule A and Schedule B.

         8

   (b)   Enumerate in chronological order various major items of works carried out during construction of a building.

         8

UNIT - II

2   (a)   Discuss various factors affecting the rate analysis in detail.

         8

   (b)   Analyze the rate for the work "2.5 cm cement concrete floor 1:2:4". Assume suitable rates of mterial and labour.

         8

OR

2   (a)   Differentiate the freehold and leasehold properties.

   (b)   Define the term tender and its important features.

         4

   (c)   Write down the specifications for 1st class brick work in cement mortar 1:6 in super structure.

         4

         8

UNIT - III

3   (a)   Write short notes on the following :
       (i)   Administrative approval
      (ii)   Expenditure Sanction and Technical Sanction.

         4×2=8

   (b)   What are the factors to be considered for the preparation of detailed estimate. Explain in detail.

         8

OR

3 Estimate the cost of earthwork for a portion of road at the rate of Rs. 465.00 in banking and Rs. 365.00 in cutting for 400 m length from the following data :

Formation width of road is 10 m. side slopes are 2:1 in banking and 1.5 : 1 in cutting

Station	Distance in meters	R.L. of Ground	R.L. of Formation
25	1000	51.00	**52.00**
26	1040	50.90	Downward gradient of 1 in 200
27	1080	50.50	
28	1120	50.80	
29	1160	50.60	
30	1200	50.70	
31	1240	51.20	
32	1280	51.40	
33	1320	51.30	
34	1360	51.00	
35	1400	50.60	

Draw the longitudinal section of road and a cross section.

16

UNIT - IV

4 (a) How does a subsidiary cash book differ from an ordinary cash book ? What certificate is required to be given at the time of closing of a cash book ?

8

(b) Explain the rule for preparation of Muster Roll.

8

OR

4   Write short notes on the following :
    (i)   Standard Measurement book
    (ii) Contingencies and work charge establishment
    (iii) Imprest account
    (iv) Liquidated damages.

                                                            4×4=16

UNIT - V

5   (a) Enlist the different methods of valuation. Explain in detail Land and
         Building method.

                                                            8

    (b) Explain the role of Valuer in a society.

                                                            8

OR

5   (a) Explain the term "Lease Hold Property" in detail.

                                                            8

    (b) Differentiate between the following :
         (i)   Scrap value and Salvage value
         (ii) Depreciation and Sinking fund.

                                                            4×2=8

4E4111

4E4111

B. Tech. IV-Sem. (Main / Back) Exam; April-May 2017
Civil Engg.
4CE1A Strength of Materials - II

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates :-

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.
Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____ 2. NIL _____

UNIT - I

1   Consider the simply supported beam subjected to the two end couples M_1 and M_2 as shown in fig.-1 below, determine the equation of the deflection curve and locate the point of peak deflection if $M_1 = 0$.
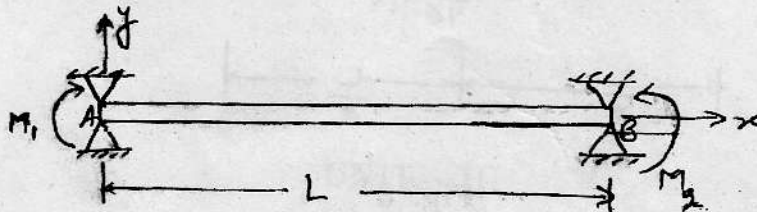

Fig. 1

16

OR

1   The beam AD in fig. 2 below is simply supported at A and C, loaded by a uniform load from B to D, and also by a couple M_o applied at D, as shown in Fig. 2. Determine the equation of the deflection curve through the use of singularity functions.
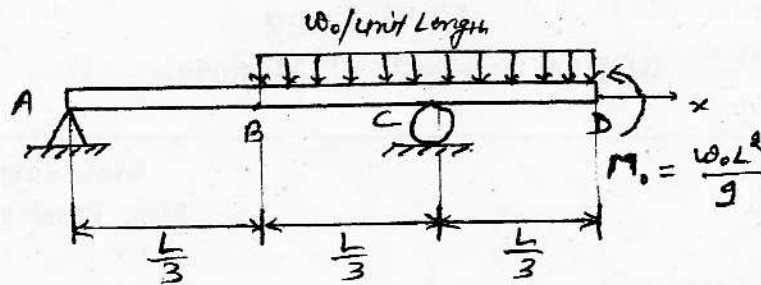

$w_o/unit\ Length$

$M_o = \dfrac{w_o L^2}{9}$

$\dfrac{L}{3}$ $\dfrac{L}{3}$ $\dfrac{L}{3}$

Fig. 2

16

UNIT - II

2   The beam of flexural rigidity EI in fig. 3 below is clamped at end A, supported at C, and loaded by the couple at B, together with the load uniformly distributed over the region BC. Determine all reactions and draw B.M.D.
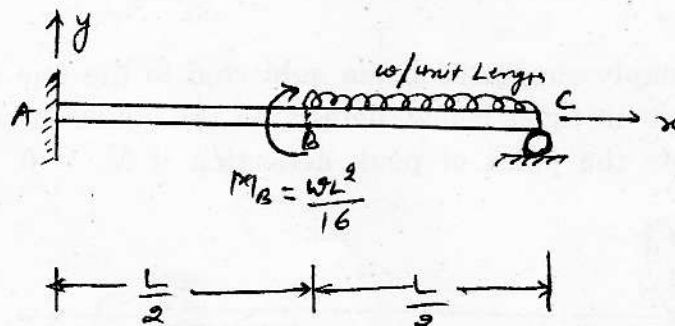

$w/unit\ Length$

$M_B = \dfrac{wL^2}{16}$

$\dfrac{L}{2}$ $\dfrac{L}{2}$

Fig. 3

16

OR

2 (a) Explain 'Middle Third Rule' and 'Middle Fourth Rule'.

8

(b) A short hollow cylindrical column shown in figure 4 below is acted by a load of 10 kN inclined at 30° to the column axis. Calculate the maximum tensile and compressive stresses set up in the base AB of the column.
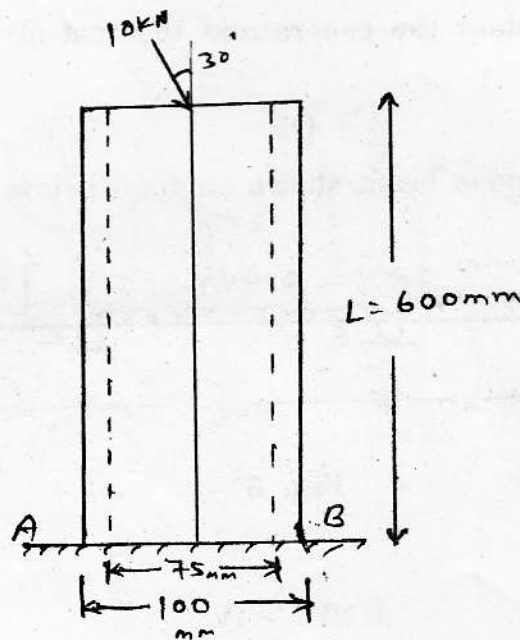

Fig. 4

8

UNIT - III

3 (a) Determine the support moments for the beam and loading shown in fig. 5 below. Also draw S.F.D. and B.M.D.
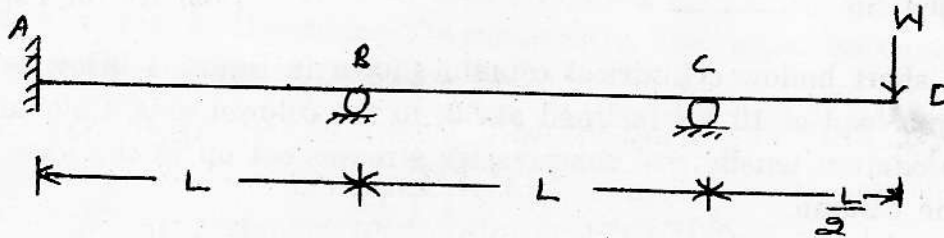
Fig. 5

(b) Write and explain the generalized theorem of three moments.

12

4

OR

3   Analyze the continuous beam shown in fig-6 below.
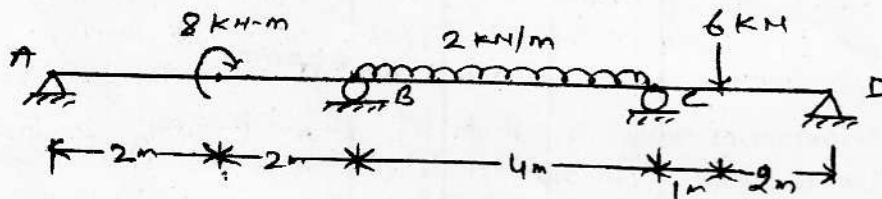
Fig. 6

16

UNIT - IV

4   (a)   A closed-coiled helical spring is to have a stiffness of 900 N/m in compression with a maximum load of 45 N and a maximum shearing stress of 120 N/mm^2. The "solid" length of the spring (i.e. coil touching) is 45 mm. Find the wire diameter, mean coil radius and number of coils. Take $N = 40000$ N/mm^2.

8

   (b)   Derive expression for the axial movement of closed coiled helical spring under axial pull P.

8

OR

4 (a) Write a short note on Power Transmitted by Shafts.

4

  (b) A solid circular shaft of constant cross-section carries three pulleys as shown in fig. 7 below and is supported in Bearing at A and B. Calculate an unknown tension P on the belt of the first pulley. The pulley belts are all vertical. Also determine reactions at supports and draw S.F. and torque diagrams.
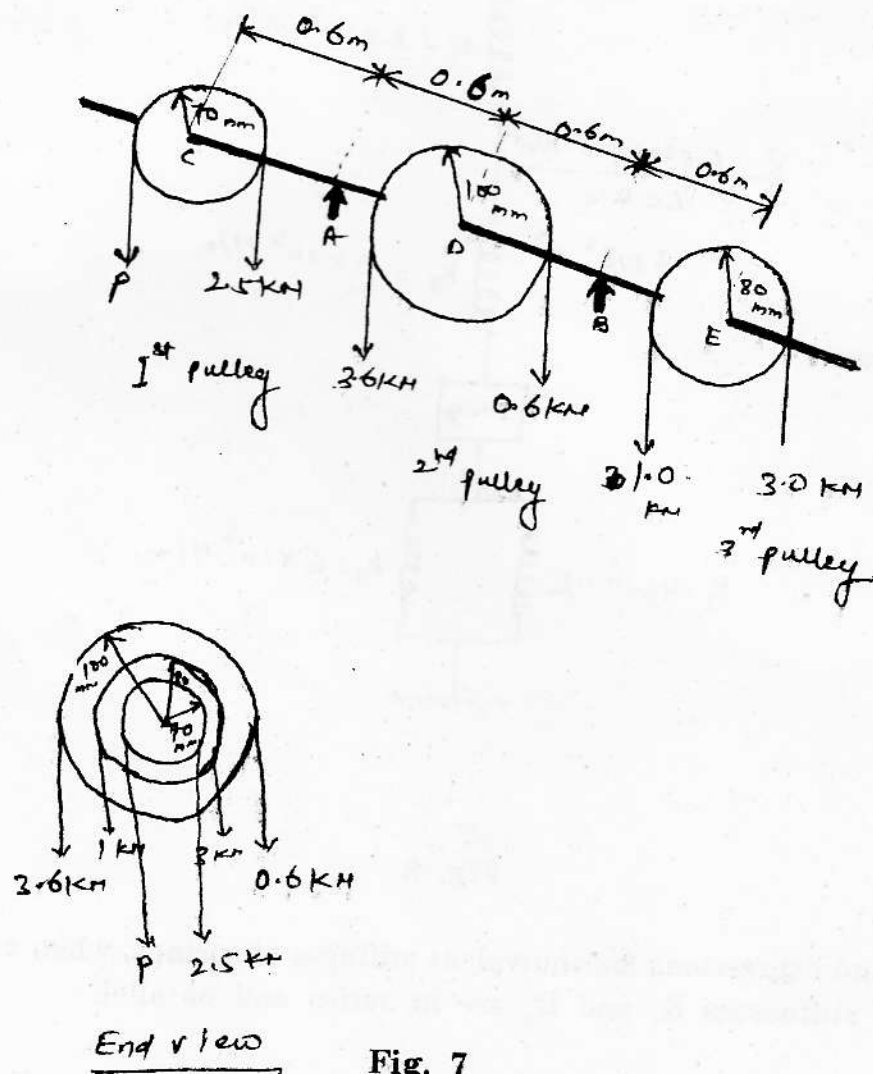
End view   Fig. 7

12

UNIT - V

5   (a)   Determine the natural frequency of the system shown in fig. 8 below. Also find natural period.

$k_1 = 8 \times 10^5 \ N/m$

$E = 200 \times 10^9 \ N/m^2$

$L = 4 \ m$

$I = 1.6 \times 10^{-5} \ m^4$

$k_2 = 3 \times 10^5 \ N/m$

$500 \ kg$

$k_3 = 4 \times 10^5 \ N/m$

$k_4 = 6 \times 10^5 \ N/m$

Fig. 8

12
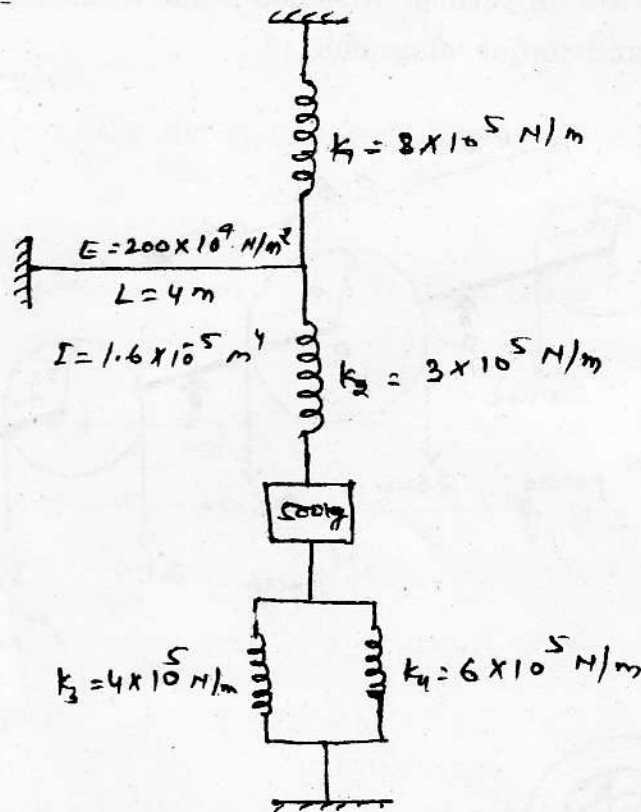
(b)   Find expressions for equivalent stiffness of springs, when two springs of stiffnesses K_1 and K_2 are in series and parallel.

4

OR

5   A mass of one kg is suspended by a spering having a stiffness of 600 N/m. The mass is displaced downward from its equilibrium position by a distance of 0.01 m. Find

(a)   Equation of motion of the system

(b)   Natural frequency of the system

(c)   The Response of the system as a function of time

(d)   Total Energy of the system.

16

_____

4E2033

4E2033

B. Tech. IV-Sem. (Back) Exam; April-May 2017
Civil Engg.
4CE2(O) Concrete & Construction Technology

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.
Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL   2. NIL

UNIT - I

1   (a)   Sieve analysis test results of coarse aggregates of two size fractions are shown in Table 1 and Table 2 given below, with sample size as 3000 gm in each case:

Table 1 : Weight retained on Sieves for 20 mm aggregates

S. No.	Sieve Size (mm)	Weight Retained (gms)
1.	40	Nil
2.	20	600
3.	10	2340

Table 2 : Weight retained on Sieves for 10 mm aggregates

S. No.	Sieve Size (mm)	Weight Retained (gms)
1.	20	Nil
2.	10	1260
3.	4.75	1680

(i) Compute percentage passing from each sieve size and list in Tabular form for each of the data given in Table 1 and Table 2.

6

(ii) Recommend the proportion in which the two size fractions - 20 mm and 10 mm be mixed to make concrete and explain the basis for the same.

6

(b) List factors affecting shrinkage of concrete.

3

(c) State water - cement ratio law.

1

OR

1 (a) What do you understand by 'permeability' of concrete. What measures do you recommend for aiming low 'permeable' concrete.

6

(b) Explain difference between 'slump' test and 'slump flow' tests, their applicability and significance with figures.

8

(c) List any two 'quality control' measures of concrete.

2

UNIT - II

2 (a) List the ranges of 'slump' value of concrete, if 'placing' of concrete is to be in three different conditions as enumerated below :

(i) Pumpable

(ii) In reinforced concrete beams with reinforcement percentage about 1.2%.

4

(b) List the 'curing' method suitable for cases listed below :
Concrete road, reinforced concrete column.

2

(c) List any two situations, where 'accelerator' is normally used as admixture in concrete.

2

(d) Describe properties of Hyash and explain its utility as an admixture in concrete.

8

OR

2 (a) Explain mixing of concrete in a 'batching plant' with help of a line diagram.

8

(b) Describe various 'water-proofing' admixtures and their use.

6

(c) Enumerate application areas of high strength concrete.

2

UNIT - III

3 (a) Explain slip and moving formwork, their application areas and advantages.

6

(b) Describe sequence of works for earthwork in dry and loose soil.

6

(c) List causes of dampness in buildings.

4

OR

3 (a) Describe effects of dampness in buildings.

6

(b) Describe loads on formwork for columns and slabs.

6

(c) Enumerate methods of dewatering.

4

UNIT - IV

4 (a) Describe requirements, material used and construction details of a construction joint in concrete roads with figure/s.

8

(b) Describe types of lintels and their construction.

8

OR

4 (a) Describe modular coordination in precast construction.

6

(b) Describe requirements of a good stair case.

4

(c) Describe various types of joints with figures.

6

UNIT - V

5 (a) Describe factors associated with selection of flooring.

6

(b) Enumerate different types of pitched roots with figs.

8

(c) Make a figure of a king post truss.

2

OR

5 (a) Describe roof covering materials for pitched roofs.

6

(b) Describe merits and demerits of different types of ground floors.

10

4E4112

B. Tech. IV-Sem. (Main & Back) Exam; April-May 2017

Civil Engineering

4CE2A Concrete Technology

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates :-

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.
Units of quantities used / calculated must be stated clearly.
Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. IS 10262   2. NIL

UNIT - I

1. (a) What is the size in 'mm', below which the if particle size is, it is termed 'fine aggregate' and more than this size is called 'Coarse aggregate'.

    2

    (b) Describe the method of determination of 'specific gravity' of fine aggregate.

    8

    (c) Which of the following statements are true :

    (i) In specifying Grade of Concrete, the digits after 'M' refers to compressive strength of concrete at 7 days age.

    (ii) Proportioning of ingredients of concrete with cement only as the cementitious material in the case of a major concrete work involving M25 Grade requires cement approx 400 kg/m^3.

(iii) 'Slump test' can be performed at work site.

(iv) An increase in water/cement ratio results in decrease in compressive strength of concrete.

6

OR

1 (a) Select 'True' statements :

(i) Hydration of cement produces heat in the mass of 'cement and water'.

(ii) Structure of hydrated cement remains changing between the age of one day and seven days.

(iii) C-S-H gel in a hydrated cement paste gets dissolved in water.

(iv) Flowability measuring tests are 'V funnel' and 'Slump flow'.

6

(b) Describe the phenomenon of 'bleeding' in concrete and discuss factors affecting it.

4

(c) Describe 'bulking' of aggregates and method to determine it.

6

UNIT - II

2 (a) Select 'correct' statements out of the following :

(i) Permeability of concrete depends on 'pressure head'.

(ii) Creep of concrete does not depend upon its 'age'.

(iii) Shrinkage of concrete depends upon 'relative humidity'.

(iv) Rebound hammer reading mainly depends on 'hardness' of concrete surface.

6

(b) Discuss factors affecting compressive strength of concrete.

8

(c) Discuss the range of values of ultrasonic pulse velocity in concrete and quality of concrete associated with them.

2

OR

2 (a) Given below are the failure loads of concrete core samples along with their size and age. The samples were collected from a concrete road.

S.No.	Core size in mm (diameter, height)	Age (in days)	Compressive Failure Load in kN
1	142, 260	120	600
2	142, 245	35	670
3	142, 235	30	478
4	142, 270	140	590
5	142, 225	100	580
6	142, 210	65	495

If the concrete grade of the concrete road is M40, comment on the core sample test results, associated compressive strength and its interpretation.

10

(b) Discuss aggregate cement interface and its characteristics. How it may get affected in a concrete containing flyash ?

6

UNIT - III

3 (a) Name three types of concrete mixers, write about their suitability for different concretes.

6

(b) Name three types of compaction equipments for concrete and discuss their applications.

6

(c) Write fine aggregate/coarse aggregate ratio which you shall select for the cases listed below :
(i) w/c 0.50, slump 100 mm, maximum size of aggregate 20 mm
(ii) w/c 0.50 slump 50 mm, maximum size of aggregate 10 mm

4

OR

3 (a) Discuss various methods of curing concrete and their suitability.

8

(b) Discuss durability of concrete, factors affecting it particularly effect of water/cement ratio on it.

8

UNIT - IV

4   (a)   Discuss role of 'retarders' in concrete and applications areas of concrete requiring use of 'retarders'.

                                                                 4

     (b)   Discuss physical and chemical properties of silica fume.

                                                                 4

     (c)   Discuss various types of superplasticizers, their respective properties and application areas.

                                                                   6

     (d)   What is the use of 'air-entraining' agents in concrete.

                                                                   2

OR

4   (a)   Write typical dosages of accelerators, in concrete.

                                                                 2

     (b)   Design a concrete mix of M25 Grade by IS method with following data : specific gravities of cement, fine aggregate and coarse aggregates as 3.12, 2.90 and 2.60 respectively. Water absorption values for fine and coarse aggregates as 0.80 and 0.50 percentage respectively. Free moisture as nil in both types of aggregates. Slump to be 100 mm. Degree of quality control-good. Exposure condition moderate. Determine and list quantities of ingredients in kg/m^3 of concrete.

                                                                 14

UNIT - V

5   (a)   Discuss formwork with appropriate figures for :
         (1)   Columns
         (2)   Slabs.

                                                                   8

     (b)   Describe salient points and applications of under water concreting.

                                                                 8

OR

5   (a)   List three typical performance criteria for a concrete required to be transported approx 2 hours before placement through pump in construction of a public building likely to get water splashes, once in use.

                                                                   6

     (b)   Draw figure of formwork/shuttering for beams, walls and arches.

                                                                     10

4E4113

B. Tech. IV-Sem. (Main & Back) Exam; April-May 2017

Civil Engineering

4CE3A : Hydraulics & Hydraulic Machines

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates :-

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.
*Units of quantities used / calculated must be stated clearly.*
Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT - I

1 Water flowing under an obstacle is shown in Fig.1 below. The flow exerts a vertical force on an object, which is assumed to be function of flow rate, density of water, acceleration of gravity and the length of object. A 1/20 scale model is to be used to predict the vertical force on the prototype.

(a) Use Banckingham π theorem to obtain π terms.

(b) If the model force is 100 N, predict the corresponding force in prototype.

Fig. 1

OR

16
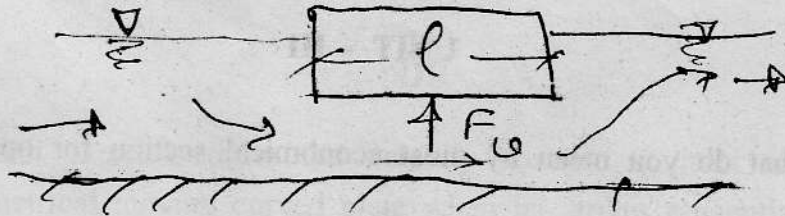
1 (a) What is law of dimensional homogeneity ?

3

   (b) Oil of kinematic viscosity 4.65×10^{-5} m²/s is to be used in a prototype in which both viscous and gravity forces dominate. A model scale of 1:5 is also desired. What viscosity of model liquid is necessary to make both Froude No. and Reynold No. the same in model and prototype ?

13

UNIT - II

2 (a) Derive the equation for velocity distribution in a circular pipe.

6

   (b) An oil of viscosity 9 poise and specific gravity 0.8 is flowing through a horizontal pipe of 50 mm diameter. If the pressure drop in 100 m length of pipe is 1600 kN/m²; determine
   (a) Rate of flow of oil
   (b) Centre line velocity.

10

OR

2 (a) Briefly describe different theories of turbulence.

10

   (b) Derive equation for velocity distribution for turbulent flow in pipes.

6

UNIT - III

3 (a) What do you mean by most economical section for open channel ?

3

   (b) Derive conditions for most economical trapezoidal channel section.

13

OR

3 (a) What are assumptions taken to derive equation for gradually varied flow in open channel ?

6

(b) Find the slope of the free water surface in a rectangular channel of width 20 m. having depth of flow 5m. The discharge through the channel is 60 m^3/s. The bed of channel is having slope of 1 in 4000. Take value of Chezy's const. C = 60.

10

UNIT - IV

4 (a) What are uses of hydraulic jump ?

6

(b) A 4m wide rectangular channel conveys 15 m^3/s of water with a velocity of 5 m/s. Check is there a condition for hydraulic jump to occur. If the hydraulic jump takes place in down stream side, find the depth of flow after the jump.

10

OR

4 With neat sketches draw the velocity triangle at inlet and outlet of an unsymmetrical moving curved plate when jet strikes tangentially at one of its end. Define all terms used in triangles.

16

3

UNIT - V

5 The power plant installation is shown in Fig. 2 below. Water passes through turbine and goes downstream. Determine power available to the turbine when the flow rate is 30 m³/s.
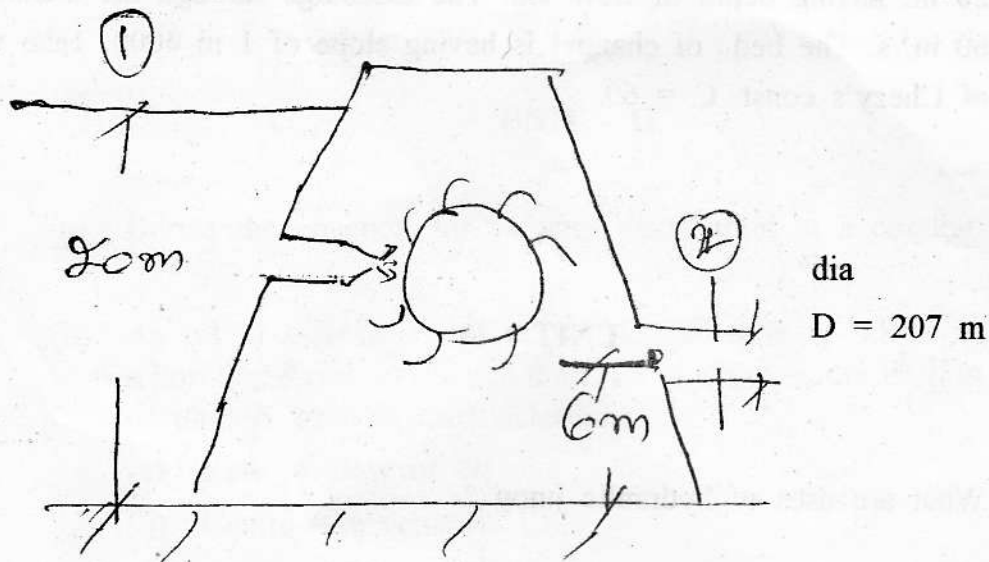

Fig. 2

16

OR

5 Give with neat sketches detailed classification of turbines.

16

4E4114

4E4114

B. Tech. IV-Sem. (Main & Back) Exam; April-May 2017

Civil Engineering

4CE4A Surveying - I

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 26

Instructions to Candidates :-

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT - I

1   Differentiate between the following terms :

(a)   Chainage and offset

(b)   Base line and check line

(c)   Main station and tie station

(d)   Cumulative and Compensating error.

16

OR

1   (a)   Define surveying. What are the principles of surveying ? Explain them.

4E4114]

1

[P.T.O.

(b) A line was measured with a steel tap which was exactly 30 m at a temperature of 20°C and a pull of 10 kg. The measured length was 1650 m. The temperature during measurement was 30°C and the pull applied was 15 kg. Find the true length of line, if cross-sectional area of tap was 0.025 cm^2. The coefficient of expansion is 3.5×10^{-6}/°C and modulus of elasticity E = 2.1×10^6 kg/cm^2.

16

UNIT - II

2 (a) Given below are the bearings observed in a traverse survey conducted with a prismatic compass at a place where local attraction was suspected :

Line	Fore bearing	Back bearing
AB	124° 30'	304° 30'
BC	68° 15'	246° 00'
CD	310° 30'	135° 15'
DA	200° 15'	17° 45' .

At what stations do you suspect local attraction. Find the correct bearings of the lines and the included angles.

(b) Define : True meridian, magnetic meridian, angle of dip, local attraction and angle of magnetic declination.

16

OR

2 (a) Does local attraction at a point affect the magnitude of an angle computed from magnetic beaning read at that point. Explain.

(b) Find out the bearing of the lines of an equilateral triangle ABC running clockwise if the bearing of the line AB is 60° 30'.

16

UNIT - III

3 (a) Enlist the source of errors in a theodolite traverse survey. How is the closing error of a traverse adjusted graphically ?

(b) What is meant by balancing a traverse ? State various rules used to do this.

16

OR

3 (a) What do you mean by latitude and departure ? State the checks to be applied in case of closed and open traverse.

(b) The bearings of two inaccessible stations A and B taken from a station C were 250° 00' and 153° 26' respectively. The co-ordinates of A and B were as follows :

Station	Easting	Northing
A	300 m	200 m
B	400 m	150 m

Calculate the independent co-ordinates of 'C'.

16

UNIT - IV

4 Differentiate between the following pairs :

(a) Back sight and fore sight

(b) Line of collimation and axis of telescope

(c) Profile levelling and cross-sectioning.

(d) Curvature and Refraction correction.

16

OR

4 (a) Explain how the procedure of reciprocal levelling eliminates the effect of refraction and curvature as well as the error of collimation.

(b) The reduced level of ground at four points A, B, C and D are 54.35, 54.30, 54.20, 54.30 m respectively. A sewer is to be laid so that its invert is 3.048 m below the ground at A and it falls with uniform gradient of 1 in 340 to D. The distances AB, AC and AD are 35.845 m, 80.742 m and 134.7 m respectively. Find the invert level and depth of trench at B, C and D.

16

UNIT - V

5 (a) Define a contour. State the various characteristics of contour lines.

(b) Discuss in detail, the methods of direct and indirect contouring.

16

OR

5 Describe concisely the components of a plane table outfit. Explain how would you set up and orient the plane table. State the errors in plane tabling. Describe with sketches, the methods of plane table surveying.

16

4E4115

4E4115

B. Tech. IV-Sem. (Main / Back) Exam; April-May 2017
Civil Engg.
4CE5A Building Planning

Time : 3 Hours   **Maximum Marks : 80**
           Min. Passing Marks : 26

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.
Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. <u>Table 9-S.P.-41 (S&T) – 1987</u>   2.   <u>1/2 Size drawing sheet</u>

UNIT - I

1   (a)   What is Building ? Explain different types of building in short.

                                                           8

      (b)   What is the Site plan ? What are its details ?

                                                           8

OR

1   (a)   Explain Sun path diagram. Also explain the different methods to draw Sun path diagram.

                                                             8

      (b)   How will you design louvers ?

                                                             8

UNIT - II

2 (a) Explain biclimatic chart.

6

(b) What do you mean by orientation of a building ? Discuss various factors affecting it.

10

OR

2 (a) What do you mean by building Bye-laws ? Discuss its objectives.

6

(b) Discuss regulations regarding :
   (i) Floor area ratio.
   (ii) Sizes and height of rooms.
   (iii) Sanitation provisions.

10

UNIT - III

3 (a) What do you mean by planning of a building ? Explain general scope of a building with examples.

8

(b) Discuss prospect, circulation, elegance and privacy with respect to planning of a building.

8

OR

3 (a) What do you mean of Vastu ? Discuss design of a residential building as per Vastu.

8

(b) What do you mean of planning of flats and industries ? Discuss any four factors affecting planning.

8

UNIT - IV

4   Draw and design a residential building having following arrangements :
   (a)   One Bed room size 12'×10'.
   (b)   Two Bed rooms size 10'×16'.
   (c)   Dinning room – assume size.
   (d)   Kitchen and
   (e)   Verandah of 10' width.

   Draw a plan and front elevation and mention schedule of rooms, doors, window and ventilators.

16

OR

4   Design and draw a primary school of capacity 350 students. Estimate the size of plot, draw plan and front elevation. Show the furniture detail of a classroom with dimension detail.

16

UNIT - V

5   (a)   Write down various guide lines to be kept in mind for deciding the location of doors in a building.

8

   (b)   Discuss fire fighting provisions in a building.

8

OR

5   (a)   Explain lighting and ventilation requirements in a building.

8

   (b)   Explain the mean of Noise. Discuss the affects of noise and also explain the method of noise control.

8

UNIT - II

2   (a)   Explain biclimatic chart.

       (b)   What do you mean by orientation of a building ? Discuss various factors affecting it.   6

OR
                                      10

2   (a)   What do you mean by building Bye-laws ? Discuss its objectives.

       (b)   Discuss regulations regarding :   6
            (i)   Floor area ratio.
            (ii)   Sizes and height of rooms.
            (iii)   Sanitation provisions.

                                        10

UNIT - III

3   (a)   What do you mean by planning of a building ? Explain general scope of a building with examples.

       (b)   Discuss prospect, circulation, elegance and privacy with respect to planning of a building.   8

OR
                                        8

3   (a)   What do you mean of Vastu ? Discuss design of a residential building as per Vastu.

       (b)   What do you mean of planning of flats and industries ? Discuss any four factors affecting planning.   8

                                        8

4E2039

4E2039

B. Tech. IV-Sem. (Main / Back) Exam; April-May 2017

Civil Engineering

4CE6.2 Elective Optimization Techniques

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates :-

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.
Units of quantities used / calculated must be stated clearly.
Use of following supporting materials is permitted during examination.
(Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT - I

1   (a)   Find the dimensions of a box of largest volume that can be inscribed in a
           sphere of unit radius.

                                                                                    8

     (b)   What is meant by optimization techniques ? Write its 10 engineering
           applications.

                                                                                    8

OR

1 (a) A company sells two different products A and B, making a profit of Rs. 40 and Rs. 30 per unit, respectively. They are both produced with the help of common production process and are sold in two different markets. The production process has a total capacity of 30,000 man-hours. It takes 3 hours to produce a unit of A and 1 hour to produce a unit of B. The market has been surveyed and company officials feel that the maximum number of units of A that can be sold is 8,000 units and that of B is 12,000 units. Formulate this problem as LPP model to maximize the profit.

6

(b) Classify the optimization problems on the basis of following heads -

(i) Based on constraints

(ii) Based on functions

(iii) Based on nature of decision variables

(iv) Based on time reference

10

UNIT - II

2 (a) Solve the following LPP by simplex method

$$\text{Max } Z = 2x_1 + 5x_2 + 7x_3$$

S.t. $3x_1 + 2x_2 + 4x_3 \leq 100$

$x_1 + 4x_2 + 2x_3 \leq 100$

$x_1 + x_2 + 3x_3 \leq 100$

$x_1, x_2, x_3 \geq 0$

8

(b) Find the dual of following LPP and then use simplex method to solve :

Min $Z_p = x_1 + x_2$

S.t. $2x_1 - 3x_2 \geq 4$

$-2x_1 + x_2 \geq 0$

$x_1, x_2 \geq 0$

OR

2 (a) Solve the following LPP by revised simplex method.

Max $Z = x_1 + 2x_2$

S.t. $x_1 + x_2 \leq 3$

$x_1 + 2x_2 \leq 5$

$3x_1 + x_2 \leq 6$

$x_1, x_2 \geq 0$

8

(b) Use Big M-method to solve

Max $Z = 3x_1 + 2x_2 + x_3$

S.t. $-3x_1 + 4x_2 + x_3 = 7$

$-3x_1 + 2x_2 + 2x_3 = 8$

$x_1, x_2, x_3 \geq 0$

8

UNIT - III

3 (a) Solve the following assignment problem

	I	II	III	IV	V
A	1	3	2	3	6
B	2	4	3	1	5
C	5	6	3	4	6
D	3	1	4	2	2
E	1	5	6	5	4

8

(b) Solve the following transportation problem.

	F_1	F_2	F_3	F_4	Requirement
W_1	6	4	1	5	14
W_2	8	9	2	7	16
W_3	4	3	6	2	5
Availability	6	10	15	4	35

8

OR

3 **(a)** Solve the transportation problem for which the cost, origin availabilities and destination requirement are given below.

	W_1	W_2	W_3	W_4	Supply
F_1	2	3	5	1	7
F_2	7	3	4	6	9
F_3	4	1	7	2	18
Demand	5	8	7	14	34

8

(b) Assign four trucks 1, 2, 3, 4 to vacant spaces 7, 8, 9, 10, 11, 12 so that the distance travelled is minimized. The matrix below shows the distances.

	1	2	3	4
7	4	7	3	7
8	8	2	5	5
9	4	9	6	9
10	7	5	4	8
11	6	3	5	4
12	6	8	7	3

8

UNIT - IV

4 (a) What are the methods employed in solving the non-linear optimization problems. Give a brief of any one method.

8

(b) Minimize $f = 2x_1^2 + x_2^2$ from the starting point $\begin{pmatrix} 1 \\ 2 \end{pmatrix}$ using the univariate method.

8

OR

4 (a) Minimize $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$, by taking the starting point $x_1 = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$. Use Descent method.

8

(b) Minimize $f(x_1, x_2) = \frac{1}{3}(x_1 + 1)^3 + x_2$

S.t. $g_1(x_1, x_2) = 1 - x_1 \leq 0$

$g_2(x_1, x_2) = -x_2 \leq 0$

8

UNIT - V

5 (a) Use dynamic programming method to solve

Min $Z = y_1^2 + y_2^2 + y_3^2$

S.t. $y_1 + y_2 + y_3 = 10$

$y_1, y_2, y_3 \geq 0$

8

(b) Use dynamic-programming to solve

Min $Z = u_1^2 + u_2^2 + u_3^2$

S.t. $u_1 + u_2 + u_3 \geq 15$

$u_1, u_2, u_3 \geq 0$

8

OR

5 (a) Solve the following, dynamic programming problem.

Max $Z = 3x_1 + 4x_2$

S.t. $2x_1 + x_2 \leq 40$

$2x_1 + 5x_2 \leq 180$

$x_1, x_2 \geq 0$

10

(b) State Bellman's principle of optimality. Write characteristics and applications of dynamic programming.

6

CS ⑥

4E4160

B. Tech. IV Sem. (Main) Exam; April-May 2017

Computer Science & Engineering

4CS1A Microprocessors & Interfaces Common with IT

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1.   NIL _____   2.   NIL _____

UNIT - I

1   Write short notes on :
   (1)   Multiplexer
   (2)   De-multiplexer
   (3)   Encoder
   (4)   Decoder

$4 \times 4 = 16$

OR

1   Explain following :
   (1)   Microprocessor
   (2)   Microcontroller
   (3)   Address bus
   (4)   Data bus

$4 \times 4 = 16$

4E4160]   1   [P.T.O.

UNIT - II

2 (a) Draw pin diagram of 8085 and explain each pin.

8

(b) Classify the instructions set of 8085 and explain them.

8

OR

2 (a) Explain the instruction format of 8085. Draw the timing diagram of instruction MOV A, M and explain it.

10

(b) Explain addressing modes of 8085.

6

UNIT - III

3 Explain :

(a) Interrupts of 8085.

(b) RST instructions of 8085.

(c) Maskable and non-maskable interrupts and related data instruction to mask or unmask interrupt.

(d) Use of stack during interrupt processing.

4×4=16

OR

3 (a) Explain, with suitable functional diagram, 8259 interrupt controller and its working.

10

(b) Explain, how subroutines are implemented and executed. Explain call by value and call by reference.

6

UNIT - IV

4   Explain 8255, programmable peripheral interface (controller). Explain all modes of 8255 with example.

16

OR

4   Explain, 8254, programmable interval timer, explain all the modes of 8254 with example.

16

UNIT - V

5   (a)   Write difference between serial communication and parallel communication.

4

      (b)   Explain serial communication controller USART 8251. Explain its all modes with example.

12

OR

5   (a)   Explain RS232 interface protocol.

4

      (b)   Explain interfacing of 4*4 key pad with 8085 using 8255.

12

4E4161

4E4161

B. Tech. IV Sem. (Main/Back) Exam; April-May 2017
Computer Science
4CS2A Discrete Mathematical Structure

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates :-

Attempt any **five questions**, selecting **one question** from each unit. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.
Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. <u>NIL</u>   2. <u>NIL</u>

UNIT - I

1   (i)   Define power set. If S be a finite set of order n then prove that power set $P(S)$ is a finite set of order 2^n.

2+6=8

     (ii)   Define the following :

         (a)   Cross partition of a set.

         (b)   Duality

         (c)   Floor function or greatest integer function.

         (d)   Bijection.

2×4=8

OR

2 (a) Show that the set of odd positive integers is a countable set.

(b) A survey is taken on method of commuter travel. Each respondent is asked **4** to check BUS, TRAIN or AUTOMOBILE as a major method of travelling to work. More than one answer is permitted. The results reported were as follows :

(i) 30 people checked BUS;

(ii) 35 people checked TRAIN;

(iii) 100 people checked AUTOMOBILE;

(iv) 15 people checked BUS and TRAIN;

(v) 15 people checked BUS and AUTOMOBILE;

(vi) 20 people checked TRAIN and AUTOMOBILE;

(vii) 5 people checked all three methods.

How many respondents completed their surveys ?

(c) State and prove the generalized pigeonhole principle. **4**

2+6=8

UNIT - II

2 (i) Define :

(a) Boolean matrix

(b) Product of Boolean matrices

(c) Join and meet of Boolean matrices.

Also compute the join and meet of matrices :

$$A = \begin{bmatrix} 1 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 0 & 1 \\ 0 & 1 & 1 \end{bmatrix} \text{ and } B = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 0 & 0 & 0 \\ 1 & 1 & 0 \end{bmatrix}$$

1×4+4=8

(ii)   Let R be the relation with digraph shown below. Find the transitive closure of R using Warshall's algorithm.
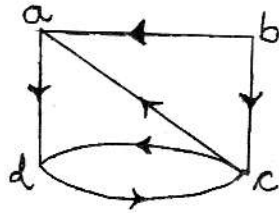
8

OR

2   (i)   Define congruency relation in Modulo system. If $A = Z$ (the set of integers), Relation R defined in A set by aRb as "a is congruent to b mod 2", then prove that R is an equivalence relation.

2+6

(ii)   If the set of integers $I = \{......, -3, -2, -1, 0, 1, 2, 3, ...\}$ be partitioned by the equivalence relation aRb as $a \equiv b$ (mod 3). Obtain the set I/R.

4

(iii)   If $A = \{1, 2, 3, 4, 12\}$, the partial order of divisibility on A is $a \leq b$ (i.e. if a divides b). Then draw the digraph and Hasse diagram of the poset $(A, \leq)$.

4

UNIT - III

3   (i)   Prove by mathematical Induction that $3^n > n^3$ for all integers $n \geq 4$.

8

(ii)   Prove the implication "If n is an integer not divisible by 3, then $n^2 \equiv 1$ (mod 3)".

8

OR

3   (i)   Write short notes on :

(a)   Vacuous proof

(b)   Trivial proof

(c)   Constructive proof

(d)   Non-constructive proof

$1.5 \times 4 = 6$

(ii)   Prove that the linear search algorithm works correctly for every $n \geq 0$.

4

(iii)   Sort the list $X = [64, 25, 12, 22, 11]$ using selection sort algorithm.

6

UNIT - IV

4   (i)   Sketch the complete graphs k_n, $1 \leq n \leq 6$.

$1 \times 6 = 6$

(ii)   Show that the complete digraph with n-nodes has the maximum number of edges i.e. $n(n-1)$ edges, assuming there are no loops.
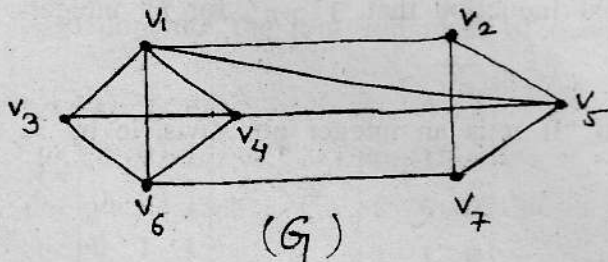
6

(iii)   Draw graph which is Eulerian as well as Hamiltonian.

4

OR

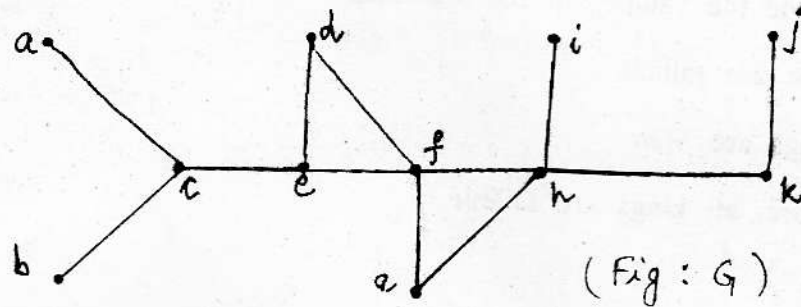4   (i)   Use Welch-Powell algorithm to paint the following graph with minimum number of colors.

(G)

4

(ii) Prove that the chromatic number of a graph will not exceed by more than one, the maximum degree of the vertices in a graph.

6

(iii) Use Depth-first search to find a spanning tree for the following graph G.

(Fig : G)

6

UNIT - V

5   (i)   Show that $(p \wedge q) \rightarrow (p \vee q)$ is a tautology.

4

(ii)   Find PCNF of a statement S whose $PDNF$ is

$(p \wedge q \wedge r) \vee (p \wedge q \wedge \sim r) \vee (\sim p \wedge \sim q \wedge r)$.

6

(iii)   Is the following argument valid ?

Dhruv, a student in this class, knows how to write programs in JAVA. Everyone who knows how to write programs in JAVA can get a high - paying job. Therefore, someone in this class can get a high paying job.

6

OR

4E4161]   5   [P.T.O.

5   (i)   Define Tautology, contradiction and contingency. Determine the contrapositive of each statement :

(a)   If John is a poet, then he is poor.

(b)   Only if Mary studies will she pass the test.

$2 \times 4 = 8$

(ii)   Determine the validity of the argument :

All men are fallible

All kings are Men.

Therefore, all kings are fallible.

8

———

4E4162

4E4162

B. Tech. IV-Sem. (Main & Back) Exam; April-May 2017
Computer Sci. & Engg.
4CS3A Statistics & Probability Theory
CS, IT

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates :-

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.
Units of quantities used / calculated must be stated clearly.
Use of following supporting materials is permitted during examination.
(Mentioned in form No. 205)

1. Normal distribution - Table   2. NIL

UNIT - I

1   (a)   The probability that a teacher will give an unannounced test during any class meeting is 1/5. If a student is absent twice, what is the probability that he will miss at least one test ?

8

(b)   The first four moments of a distribution about the value 5 of the variate are 2, 20, 40 and 50. Also find mean and variance of the distribution.

8

OR

1   (a)   Two random variables X and Y have the following joint probability density function :

$$f(x,y)=\begin{cases} 2-x-y, & 0 \le x \le 1, 0 \le y \le 1 \\ 0 & , \text{ otherwise} \end{cases}$$

Find

(i)   Marginal probability density functions of x and y

(ii)   Conditional density functions

(iii)   Var (X) and Var (Y)

8

(b)   If the life time of a component has probability density function $\lambda e^{-\lambda t}$, $t > 0$. Compute its time to failure and variance.

Also define the mean time to failure in terms of the reliability function.

8

UNIT - II

2   (a)   Determine the mean and variance of binomial distribution. Also define moment generating function of binomial distribution.

8

(b) A driver has two taxies, which he hires out day by day. The number of demands for a taxi on each day is distributed as a Poisson variate with mean 1.5. Calculate the proportion of days on which

(i) neither of the cars is used

(ii) some demand is refused (Given $e^{-1.5} = 0.2231$).

8

OR

2 (a) As a result of tests on 20,000 electric bulbs manufactured by a company it was found that the life time of the bulb was normally distributed with an average life of 2040 hours and standard deviation of 60 hours. On the basis of the information estimate the number of the bulbs that is expected to burn for (i) more than 2150 hours (ii) less than 1960 hours.

8

(b) Define exponential distribution . Show that for the exponential distribution given by $dp = ae^{-\frac{x}{c}}$, $0 \leq x < \infty$, $c > 0$ a being a constant, the mean and the standard deviation are each equal to C.

8

UNIT - III

3 (a) Calculate the coefficient of correlation between x and y using the following data :

x: 1 2 3 4 5 6 7 8 9

y: 9 8 10 12 11 13 14 16 15

8

(b) Calculate rank correlation coefficient for the following data :

x: 81 78 73 73 69 68 62 58

y: 10 12 18 18 18 22 20 24

8

OR

3 (a) Write a short note on linear regression and obtain the regression line of y on x.

4+4=8

(b) Fit a second degree parabola to the following data :

x: 0 1 2 3 4

y: 1 5 10 22 38

8

UNIT - IV

4   (a)   On a telephone booth, arrivals of customers follow the Poisson process with an average time of 10 minutes between one arrival and next arrival. The length of a phone call is assumed to be distributed exponentially with mean 3 minutes.

       (i)   Find the average number of persons waiting in the system.

       (ii)   What is probability that a customer spends more than 10 minutes in the booth ?

       (iii)   Find the fraction of a day when the phone will be used.

                8

  (b)   Assume that the trucks with goods are coming in a market yard at the rate of 30 trucks per day and suppose that the inter-arrival times follow an exponential distribution. The time to unload the trucks is assumed to be exponential with an average of 42 minutes. If the market yard can admit 10 trucks at a time, calculate P (the yard is empty) and find the average length of queue.

                8

OR

4   (a)   Patients arrive at a clinic according to Poisson distribution at a rate of 30 patients per hour. The waiting room cannot accommodate more than 14 patients. Examination time per patient is exponential with mean rate of 20 per hour.

       (i)   Find the effective arrival rate at the clinic.

       (ii)   What is the probability that an arrival patient will not wait ?

       (iii)   What is the expected waiting time until a patient is discharged from the clinic ?

                8

(b) A super market has two girls serving at the counters. The customers arrive in a Poisson fashion at the rate of 12 per hour. The service time for each customer is exponential with mean 6 minutes. Find :

(i) the probability that an arriving customer has to wait for service.

(ii) the average number of customers in the system.

(iii) the average time spent by a customer in the super market.

8

UNIT - V

5 (a) Write a short note on discrete parameter Markov chain.

8

(b) Two brands A and B of a product have probabilities 30% and 70% respectively at time t = 0, if their transition matrix P be $\begin{bmatrix} 0.7 & 0.3 \\ 0.2 & 0.8 \end{bmatrix}$, find their probabilities

(i) after time t = 1,

(ii) after time t = 2

(iii) their steady state probabilities.

8

OR

5   (a)   Automata car wash facility operates with only one bay. Cars arrive according to Poisson distribution, with a mean of 4 cars per hour and may wait in the facilities parking lot if the bay is busy. Find the time spent by a car in the system and in the waiting if

(i)   the time for washing and cleaning a car is exponential with a mean of 10 minutes

(ii)   the time of washing and cleaning a car is constant and is equal to 10 minutes. Which facility is better ?

8

(b)   Write a short note on M/G/1 queuing model.

8

Roll No. _____

Total No. of Pages : [3]

4E4163

4E4163

B. Tech. IV Sem. (Main/Back) Exam; April-May 2017
Computer Sc.
4CS4A Software Engineering

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT - I

1   (a)   Define system and its types along with various characteristics.

6

    (b)   What is requirement specification in Software Engineering ? Describe in detail along with its importance in software development.

10

OR

1   (a)   Explain Computer System Engineering and System Analysis.

8

    (b)   Explain SDLC in detail.

8

4E4163]   1   [P.T.O.

UNIT - II

2   Explain waterfall model in detail along with its various phases; also describe its advantages and disadvantages.

16

OR

2   (a)   Discuss merits and demerits of various models of software development.

8

(b)   Explain specialized process model.

8

UNIT - III

3   Describe the structural analysis for the system and differentiate the DFD and CFD in detail with example.

16

OR

3   Write short notes on :

(a)   FSM (Finite State Machine)

(b)   Data Dictionary

(c)   Control and Process Specification

(d)   Behavioural modelling.

4×4

UNIT - IV

4 What is design documentation in Software Engineering ? Explain along with its importance in detail.

16

OR

4 (a) Describe the top down and bottom up approach in effective modular design with example.

10

(b) Explain Cohesion and Coupling.

6

UNIT - V

5 Explain unified modelling language diagrams with the help of appropriate example.

16

OR

5 Write short notes on :

(a) ODD concepts and methods

(b) Object oriented analysis modelling.

8×2

4E4164

4E4164

B. Tech. IV Sem. (Main) Exam., April-May 2017
Computer Science & Engineering
4CS5A Fundamental of Communication

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No. 205)*

1. NIL _____   2. NIL _____

UNIT - I

1. (a) Explain the amplitude modulation.

   (b) An amplitude modulated signal is given by   6

   $$P_{AM}(t) = 10 \cos\left(2\pi \cdot 10^6 t\right) + 5 \cos\left(2\pi \cdot 10^6 t\right) \cos\left(2\pi \cdot 10^3 t\right) +$$

   $$2 \cos\left(2\pi \cdot 10^6 t\right) \cos\left(4\pi \cdot 10^3 t\right) \text{ Volts}$$

   Find the various frequency components present and the corresponding modulation index. Draw the Line Spectrum and find bandwidth.

6

(c) Explain the difference between narrow band FM and wide band FM.

4

OR

1 (a) Define the following terms for FM waves :
   (i) Carrier swing
   (ii) Frequency deviation
   (iii) Percent modulation.

6

(b) Explain Frequency Division Multiplexing (FDM).

6

(c) Explain any generation method of frequency modulation.

4

UNIT - II

2 (a) State and prove sampling theorem in time domain. What is aliasing effect and how it is reduced ?

8

(b) Draw the circuit diagram of generation of PPM signal. Write the advantage of PPM.

8

OR

2 (a) Find Nyquist rate and the Nyquist interval for the signal.

$$x|t| = \frac{1}{2\pi} \cos\left(4000\,\pi\,t\right) \cos\left(1000\,\pi t\right).$$

8

(b) Explain the Time division multiplexing with block diagram.

8

UNIT - III

3 (a) Describe the working of a Delta Modulation System. Compare the uniform and non-uniform quantization method.

8

(b) Explain the quantization error and derive an expression for minimum signal to noise ratio in PCM system that uses linear quantization.

8

OR

3 (a) Explain Adaptive Delta Modulation in detail with suitable diagram. Also, explain the advantage of adaptive delta modulation over delta modulation.

8

(b) Explain the slope overload distortion and granular noise in delta modulation and how it is removed in ADM.

8

UNIT - IV

4 (a) Represent the data 10110100 using the following digital data formats with the help of neat figures :
(i) RZ
(ii) NRZ.

6

(b) What is the Nyquist Criterion of zero $|S|$? Explain.

4

(c) Explain the generation method of PSK.

6

OR

4 (a) Explain the difference between different modulation techniques.

8

(b) Draw the block diagram of QPSK system and explain its working.

8

UNIT - V

5 (a) Draw a block diagram to generate a PN signal.

   (b) What are the modulation techniques used in FHSS systems ?

8

8

OR

5 (a) What are the important applications of Spread Spectrum (SS) system ?

   (b) What is meant by spreading a signal ?

6

   (c) What are the modulation techniques used in DSSS systems ?

4

6

Roll No. _____   Total No. of Pages : 3

4E4165

4E4165

B. Tech. IV Sem. (Main) Exam; April-May 2017

Computer Science and Engineering

4CS6A Principles of Programming Languages

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.
Use of following supporting materials is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT - I

1   (a)   What do you mean by environment of programming languages ? What are the effects of environment on languages.

8

    (b)   Explain the history of programming languages.

8

OR

1   (a)   Differentiate between syntax and semantics giving proper examples.

8

    (b)   Distinguish between static binding and dynamic binding.

8

4E4165]   1   [P.T.O.

UNIT - II

2 (a) What is type equivalence ? Also explain structural and name equivalence using example.

8

(b) Distinguish between static type checking and dynamic type checking.

8

OR

2 (a) Describe the implementation and specification of sequential files and direct access files ?

8

(b) Discuss the structured data type of variant records.

8

UNIT - III

3 (a) What do you mean by structured sequence control ? Also discuss the problems in structured sequence control.

8

(b) Explain the associativity and precedence of operation with suitable examples.

8

OR

3 (a) What are activation records ? How are they useful in subprogram calls ?

10

(b) Write a short note on Lazy Evaluation Rule.

6

UNIT - IV

4 (a) Explain local data and referencing environments.

6

(b) Explain the implementation of various parameter passing methods.

10

OR

4 (a) Explain formal and actual parameters.

6

(b) What is scope, lifetime and visibility of a variable ? Compare local, non-local and global referencing environment.

10

UNIT - V

5 (a) Define abstract data types. Explain ADT in C++ and Java.

10

(b) What do you understand by encapsulation ? Explain.

6

OR

5 (a) Differentiate between static, stack and heap based storage management, with suitable example.

12

(b) What do you understand by garbage collection ? Explain.

4

4E4131

4E4131

B. Tech. IV-Sem. (Main) Exam; April-May 2017
Electronics & Communication Engg.
4EC2A Random Variables & Stochastic Processes

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.
Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT - I

1 (a) State the theorem of total probability and Baye's theorem on inverse probability.

8

   (b) For a certain binary communication channel, the probability that a transmitted '0' is received as '0' is 0.95 and the probability that a transmitted '1' is received as '1' is 0.90. If the probability that a '0' is transmitted is 0.4, find the probability that (i) a '1' is received (ii) a '1' was transmitted given that '1' was received.

8

OR

1 (a) A fair dice is rolled 5 times. Find the probability that 1 shows twice, 3 shows twice and 6 shows once.

5

(b) State Bernoulli's theorem on independent trials.

6

(c) Each of two persons A and B tosses 3 fair coins. What is the probability that they obtain the same number of heads ?

5

UNIT - II

2 (a) A random variable (continuous) 'x' has a pdf $f(x) = k\,x^2 e^{-x}$; $x \geq 0$. Find k, mean and variance.

8

(b) If a continuous random variable 'x' has Rayleigh density

$$f(x) = \frac{x}{\alpha^2} e^{-\frac{x^2}{2\alpha^2}} X v(x),$$ find $E(X^n)$ and deduce the values of $E(X)$ and $\mathrm{var}(X)$.

8

OR

2 (a) If 'x' is $N\left(\mu; \sigma^2\right)$ then show that $z = \dfrac{(x-\mu)}{\sigma}$ is a standard normal random

variable; that is $N(0', 1)$.

8

(b) A noisy transmission channel has a per digit error probability $P_e=0.01$.

(i) Calculate the probability of more than one error in 10 received digits.

(ii) Repeat using Poisson approximation.

5

(c) The pdf of a random variable x is given by

$$f_x(x) = \begin{cases} k & a \le x \le b \\ 0 & \text{otherwise} \end{cases}$$

Calculate $P\left((x) \le c\right)$ for $c = \dfrac{1}{2}$ if $a = -11$, $b = 2$.

3

UNIT - III

3 (a) The joint pdf of (x, y) is given by $f(x, y) = 24\, xy$; $x > 0$, $y > 0$, $x + y \le 1$

and $f(x, y) = 0$, elsewhere, find the conditional mean and variance of y

given x.

8

(b) State central limit theorem and verify it for random variables (independent) x_k, where for each k, $P(x_k = \pm 1) = \dfrac{1}{2}$.

8

OR

3 (a) Calculate the correlation coefficients for the following ages of husband (x) and wives (y).

x:	23	27	28	28	29	30	31	33	35	36
y:	18	20	22	27	21	29	27	29	28	29

8

(b) Let x and y be defined by

$x = \cos \Theta$ and $y = \sin \Theta$

where Θ is a random variable uniformly distributed over $[0, 2\pi]$.

(i) Show x and y are uncorrelated

(ii) Show that x and y are not independent.

8

UNIT - IV

4 (a) Consider a random process $x(t)$ is defined by

$$x(t) = u\cos t + v\sin t \quad -\infty < t < \infty$$

where 'u' and 'v' are independent random variables, each of which assumes the values -2 and 1 with the probabilities $\frac{1}{3}$ and $\frac{2}{3}$ respectively. Show that $x(t)$ is wss but not strict sense stationary.

(b) Verify the equations :   **8**

(i) $R_{xy}(-\tau) = R_{yx}(\tau)$

(ii) $\left| R_{xy}(\tau) \right| \le \sqrt{R_x(0)R_y(0)}$

(iii) $\left| R_{xy}(\tau) \right| \le \frac{1}{2}\left[R_x(0) + R_y(0) \right]$.

OR

4 (a) If the input to a continuous time linear system is a random process $\{X(t), t \in T_x\}$ and output of the linear system is $\left(Y(t), t \in T_y\right)$.

Find the autocorrelation function of $Y(t)$.

8

averse

8   8

smitted
'1' is
is 0.4,
d given

8

10

(b) If $X(t)$ is a wss random process and has a m.s. derivative $X'(t)$ then show that

(i) $R_{XX'}(\tau) = \dfrac{d}{d\tau} R_x(\tau)$

(ii) $R_{X'}(\tau) = -\dfrac{d^2}{d\tau^2} R_x(\tau)$.

6

UNIT - V

5 (a) A wss random process $X(t)$ with autocorrelation function

$R_x(\tau) = \overline{e}^{\,a|\tau|}$ where 'a' is a real positive constant is applied to the input of an LTI system with impulse response $n(t) = \overline{e}^{\,bt} u(t)$ find the autocorrelation function of the output $Y(t)$.

8

(b) A zero mean wss random process is called band limited white noise if its spectral density is given by

$S_X(w) = \begin{cases} N_0/2 & |\omega| \le \omega B \\ 0 & |\omega| > \omega B \end{cases}$

Find the autocorrelation function of $X(t)$.

8

OR

5   (a)   Let $Y(t)$ be the output of an LTI system with impulse response $n(t)$ when a wss random process $X(t)$ is applied as input. Show that

   (i) $S_{xy}(w) = n(w)S_x(w)$

   (ii) $S_y(w) = n^*(w)S_{xy}(w)$

10

   (b)   Consider a wss process $X(t)$ with autocorrelation function $R_x(z)$ and power spectral density $S_x(w)$ let $X'(t) = dx(t)/dt$ show that $S_x(w) = w^2 S_x(w)$.

6

_____

4E4132
B. Tech. IV-Sem. (Main) Exam; April-May 2017
Electronics & Communication Engineering
4EC3A Electronic Measurement & Instrumentation

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates :-

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____ 2. NIL _____

UNIT - I

1   (a)   Explain the types of errors in measurements in detail.

10

(b)   A resistance was rated at 20 Ω and the measured current through this resistor was 8.2 A. The range of the ammeter was 10A. Compute the power in watts dissipated in the resistor. The scale of the ammeter had 100 divisions and could be read with certainty to ± 0.5 division. It was later found that the resistance of the resistor was 0.2% greater than the specified resistance and the ammeter 1.0% more than the true value. Determine the known error in the computed power in watt and in percent of the computed power.

6

OR

4E4132]

[P.T.O.

1 (a) The stress in a mild steel plate circular diaphragm is given by

$$\delta = \frac{3D^2P}{16t^2} \ N/m^2$$

where D = diameter of diaphragm, m
t = thickness of diaphragm, m
P = applied pressure, N/m²
A diaphragm has a diameter of 15 mm and thickness of 0.2 mm and the applied pressure is 300×10^3 N/m². Calculate the stress. The known error in diameter is 1% and in thickness is 3%. Calculate the error in stress.

10

(b) Define the following terms :
(1) Accuracy   (2) Precision.

6

UNIT - II

2 (a) Explain the true r.m.s. responding a.c. voltmeter with the suitable block diagram.

8

(b) In a dual slop integrating DVM, the reference voltage is 100 mV and the first integrating period is set as 50 ms. The input resistor of the integrator is 100 kΩ and the integrating capacitor 0.047 μF. For an input voltage of 120 mV, determine the second integration (de-integration) period.

8

OR

2 (a) An ideal diode has been connected across a 10 Ω, 100 mA, centre-zero PMMC meter as shown in figure 2 (a). Determine the reading of meter.
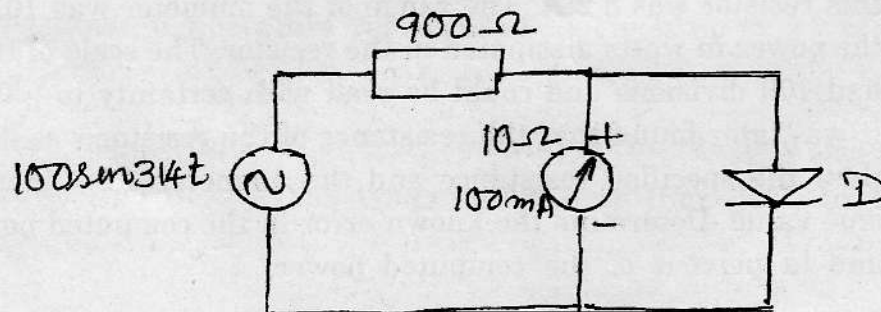
Fig. 2(a)

6

(b) Explain the vector impedance meter with the neat diagram.

10

UNIT - III

3 (a) How can the following quantity be measured using CRO ?
   (1) Current

   (2) Frequency

   (3) Phase angle

   (4) Voltage.

(b) Explain the dual beam oscilloscope.

16

OR

3 (a) Compare the digital storage oscilloscope and analog storage oscilloscope.

8

(b) What value should C_1 have for V_o to be equal to 0.1 V_i in circuit shown below ?
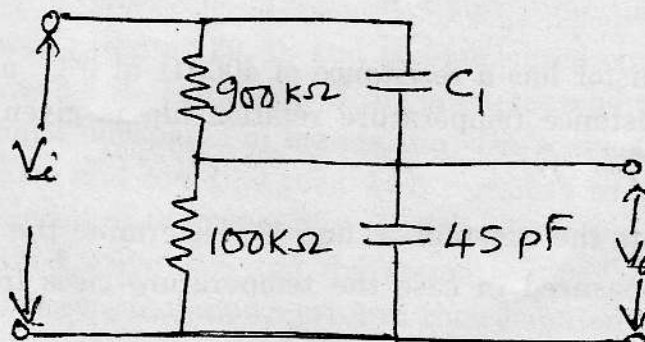
Fig. 3(b)

8

UNIT - IV

4   Explain all kind of attenuators used in signal generators.

16

OR

4   (a)   What is the frequency synthesized signal generator ? Explain direct analog synthesizer.

8

(b)   Draw the block diagram and explain the working of a random noise generator.

8

UNIT - V

5   (a)   An accelerator has a damping ratio of 0.7. Calculate the value of frequency ratio so that ratio of steady relative displacement to amplitude of input displacement is 0.99 (i.e. the error is 1%)

6

(b)   Explain the loading effect and frequency response of piezoelectric transducer.

10

OR

5   (a)   Derive an expressions for the gauge factor of strain gauges. Give its applications and working principle in detail.

10

(b)   A thermistor has a resistance of $4000\,\Omega$ at $0°C$ and $800\,\Omega$ at $40°C$. The resistance temperature relationship is given by

$$R_1 = R_0\alpha\ e^{\beta/T}$$

determine the constant α and β. Determine the range of resistance to be measured in case the temperature rises from $50°C$ to $100°C$.

6

4E4133

4E4133

B. Tech. IV-Sem. (Main / Back) Exam; April-May 2017
Electronics & Communication Engg.
4EC4A Electromagnetic Field Theory

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates :-

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.
Units of quantities used / calculated must be stated clearly.
Use of following supporting materials is permitted during examination. (Mentioned in form No. 205)

1. NIL _____

2. NIL _____

UNIT - I

1   If the electric field intensity is given by $\vec{E} = 30i + 2xy^2\hat{j} + 5xz^2\hat{k}$ then find

     (i)   The work done in moving $20\,\mu c$ from origin to $(1,2,0)$ in this field.

     (ii)   The work done in a circular path of radius 2 meter in xy plane for unit positive charge

     (iii)   The electric field in cylindrical co-ordinate system.

4+4+8=16

OR

1 (a) If the charge density is given by $p(x,y,z) = \dfrac{20}{x} + y^2 z$ then find the total charge in a cube placed in first quardant as shown in fig-1.
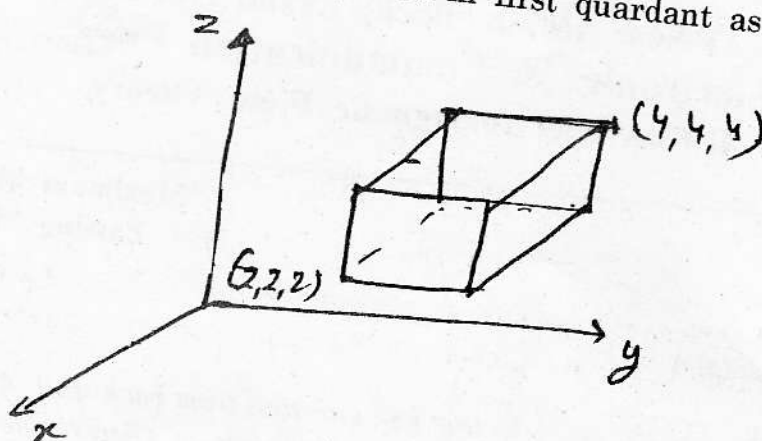
Fig. 1

(b) Explain the use of following w.r. to field theory.   **10**
   (i) Curl
   (ii) Divergence
   (iii) Stokes theorem
   (iv) Divergence theorem.

6

UNIT - II

2 Prove that :
   (i) Equipotential surface is normal to electric field intensity.
   (ii) Normal component of electric flux density passes without any change at the interface when charge density at interface is zero.
   (iii) $\nabla \cdot D = \rho_v$
   (iv) $\nabla \times E = 0$ in static field.

OR   4×4=16

[P.T.O.

2 (a) Find the electric field intensity at any point due to a charge density
$\rho(x, y, z) = 20x^2y^2z \, c/m^s$

Also find the electric field at
(i) Origin and
(ii) (0, 0, 2)

Assume the medium has relative permittivity $E_r = 4$

(b) Find the electrical energy stored in a sphere of radius = 2 meter around
a point charge of 10 μc placed at the centre of this sphere. Assume
the relative permittivity is $E_r = 2$.

10

UNIT - III

6

3 (a) Find the magnetic field intensity in medium-2 (fig.2)
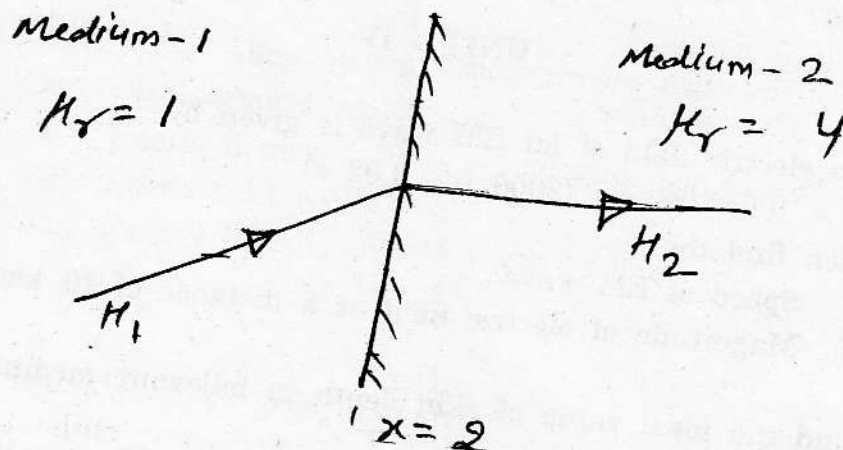
Fig. 2

Assume

$\mu_1 = 20i + yj + a\hat{k}$ and current density at interface is zero.

(b) Prove that

(i) $\nabla \cdot B = 0$

(ii) $\vec{B} = \nabla \times \vec{A}$.

4+4=8

OR

3 (a) Find the analogous relation of following in magnetic field.

(i) $V(x, y, z) = \dfrac{1}{4\pi t_0} \int \dfrac{p(x, y, z)\, dv}{r}$

(ii) $\nabla^2 V = \dfrac{P}{\epsilon}$

4+4=8

(b) A current loop (2×4) cm^2, carrying 2 ampere current is placed in yz plane. Find torque on it if the magnetic field at that region is given $\vec{B} = 200\hat{j} + 10\hat{k}$

8

UNIT - IV

4 (a) The electric field of an EM wave is given by
$E_x = 100e^{-0.02z} \sin (2000\, t - 0.02\, z)$
Then find the
(i) Speed of EM wave
(ii) Magnitude of electric field at a distance of 10 km

4×2=8

(b) Find the ideal value of skin depth in following medium
(i) Perfect vacuum
(ii) Perfect conductor at DC
(iii) Perfect conductor at $f = 10$ GHz

(iv) Conductor with conductivity $\sigma = 10^6$ SΩ at $f = 10^9$ Hz

4×2=8

OR

4 (a) A wave is incident from medium 1 to medium 2 then find its (fig 3)
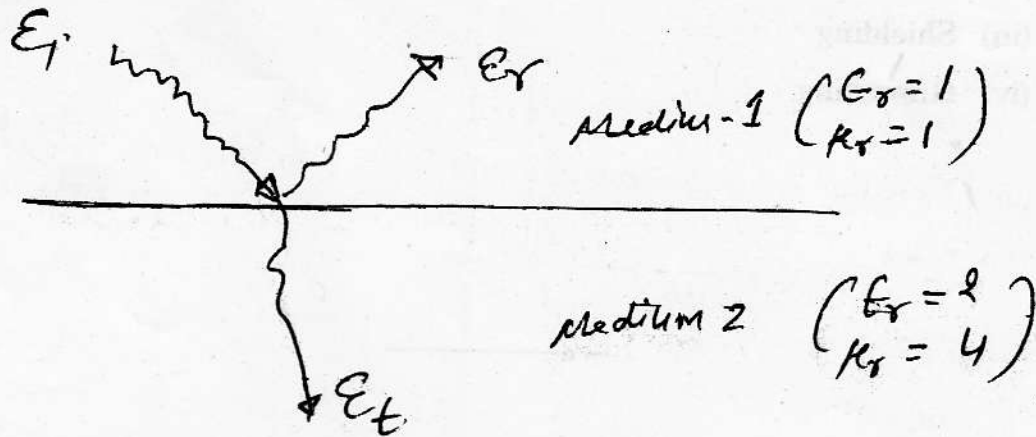
Fig. 3

(i) reflected power
(ii) transmitted power.

4+4=8

(b) Define the following with their proper expressions :
(i) Displacement vector
(ii) Depth of penetration
(iii) Phase shift coefficient
(iv) Energy density of EM wave.

4×2=8

UNIT - V

5 Find the radiation resistance of dipole antenna.

16

OR

5 Write short notes on any two :

    (i)   EMI testing

    (ii)   EMC

    (iii) Shielding

    (iv) Grounding.

$8 \times 2 = 16$

———

4E4134

B. Tech. IV-Sem. (Main / Back) Exam; April-May 2017
Electronics & Communication Engg.
4EC5A Optimization Techniques

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.
Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT - I

1   (a)   Explain the term 'optimization'. Discuss briefly the applications of optimization techniques in engineering field.

8

(b)   A carpenter has 90, 80 and 50 running feet respectively of teak, plywood and rosewood. Product A requires 2, 1 and 1 running feet of take, plywood and rosewood respectively. Product B requires 1, 2 and 1 running feet of teek, plywood and rosewood respectively. If A would sell for Rs. 48 and B would sell for Rs. 40 per unit, how much of each should he make and sell in order to obtain the maximum gross income out of his stock of wood ? Give a mathematical formulation to this linear programming problem.

8

OR

1. (a) Discuss the meaning, significance and scope of optimization techniques.

8

(b) Vitamin C and vitamin E are found in two different fruits F_1 and F_2. One unit of fruit F_1 contains 3 units of vitamin C and 2 units of vitamin E. Similarly, one unit of fruit F_2 contains 2 units of vitamin C and 2 units vitamin E in it. A patient needs minimum of 30 units of vitamin C and 20 units of vitamin E. Also one unit of fruit F_1 costs Rs. 20 and one unit of fruit F_2 costs Rs. 25. The problem, that the hospital faces is to find such units of fruit F_1 and F_2 which should be supplied to the patients at minimum cost. Formulate the above as a linear programming problem.

8

UNIT - II

2. (a) Describe the revised simplex procedure for solving a linear programming problem.

8

(b) Solve the following LPP by converting it into its dual :

Minimize $Z = x_1 + x_2$

Subject to $3x_1 + 2x_2 \geq 4$

$-x_1 + 3x_2 \geq 5$

$4x_1 + 2x_2 \geq 5$

$2x_1 + x_2 \geq 1$

and $x_1, x_2 \geq 0$

8

OR

4E4134]

2

[P.T.O.

2   (a)   Solve the following LPP using simplex method :

Minimize $Z = x_1 - 3x_2 + 2x_3$

Subject to $3x_1 - x_2 + 3x_3 \le 7$

$-2x_1 + 4x_2 \le 12$

$-4x_1 + 3x_2 + 8x_3 \le 10$

and $x_1, x_2, x_3 \ge 0$

8

(b)   Consider the linear programming problem :

Maximize $Z = 3x_1 + 5x_2 + 4x_3$

Subject to $2x_1 + 3x_2 \le 8$

$2x_2 + 5x_3 \le 10$

$3x_1 + 2x_2 + 4x_3 \le 15$ and

$x_1, x_2, x_3 \ge 0$

The optimum solution to this problem is contained in the following simplex table :

Basic variables	$C_j \rightarrow$		3	5	4	0	0	0
	C_B	X_B	X_1	X_2	X_3	X_4	X_5	X_6
x_2	5	$50/41$	0	1	0	$15/41$	$8/41$	$-10/41$
x_3	4	$62/41$	0	0	1	$-6/41$	$5/41$	$4/41$
x_1	3	$89/41$	1	0	0	$-2/41$	$-12/41$	$15/41$
$\left(Z = 765/41\right)$ $Z_j - C_j \rightarrow$			0	0	0	$45/41$	$24/41$	$11/41$

Find the range over which components b_2 and b_3 of the requirement vectors can be changed maintaining the feasibility of the solution.

8

4E4134]   3   [P.T.O.

UNIT - III

3 (a) Find the optimum solution of the following transportation problem :

	D_1	D_2	D_3	D_4	Capacity
O_1	19	30	50	10	7
O_2	70	30	40	60	9
O_3	40	8	70	20	18
Demand	5	8	7	14	

8

(b) Solve the following assignment problem :

Jobs

		J_1	J_2	J_3	J_4	J_5
	M_1	10	4	5	3	11
	M_2	13	11	9	12	10
Machines	M_3	12	3	10	1	9
	M_4	9	1	11	4	8
	M_5	8	6	7	3	10

8

OR

4

3 (a) Find the optimum solution of the following transportation problem :

Stores

	1	2	3	4	Supply
A	4	6	8	13	50
B	13	11	10	8	70
C	14	4	10	13	30
D	9	11	13	8	50
Demand	25	35	105	20	

Factories

8

(b) A department head has five subordinates and five jobs to be done. The subordinates differ in efficiency and jobs differ in their intrinsic difficulty. The estimate of the times each man would take to perform each job is given in effectiveness matrix. How should the tasks be allocated on one to one basis, so as to minimize the total man hours.

Subordinates

	I	II	III	IV	V
A	1	3	2	3	6
B	2	4	3	1	5
C	5	6	3	4	6
D	3	1	4	2	2
E	1	5	6	5	4

Jobs

8

UNIT - IV

4 (a) Solve by steepest descent method :

Minimize $f(x) = 2x_1^2 + x_2^2 + 2x_1x_2 + x_1 - x_2$ starting from the point $x_1 = (0, 0)$.

8

(b) Solve :

Minimize $f(x) = x_1^2 + x_2^2$

Subject to $g_1(x) = -x_1 - x_2 + 5 \leq 0$

$$g_2(x) = -x_1 + x_2 \leq 0$$

By the exterior penalty method and find the solutions corresponding to $r = 1$, 10 and ∞.

8

OR

4 (a) Solve :

Minimize $f(x) = x_1 - x_2$

Subject to $g(x) = 3x_1^2 + x_2^2 - 2x_1x_2 - 1 \leq 0$

Using the sequential linear programming method and taking the convergence limit $\in = 0.02$.

8

(b) Compute the Newton step corresponding to $x_1 = (0, 1)$ in a search of unconstrained nonlinear programming

Minimize $f(x_1, x_2) = (x_1 + 1)^4 + (x_2 + 1)^4 + x_1 x_2$.

8

4E4134]

6

[P.T.O.

UNIT - V

5 **(a)** State Bellman's principle of optimality, using it solve the following dynamic programming problem :

Minimize $Z = x_1^2 + x_2^2 + x_3^2$

Subject to $x_1 + x_2 + x_3 \geq 15$ and

$$x_1, x_2, x_3 \geq 0.$$

8

(b) Solve the following LPP by using dynamic programming method :

Maximize $Z = 3000x_1 + 2000x_2$

Subject to $5x_1 + 2x_2 \leq 180$

$$3x_1 + 3x_2 \leq 135$$

and $x_1, x_2 \geq 0.$

8

OR

5 **(a)** State the 'Principle of optimality' in dynamic programming, using it solve the following dynamic programming problem :

Maximize $Z = x_1 \, x_2 \, x_3$

Subject to $x_1 + x_2 + x_3 = 10$ and

$$x_1, x_2, x_3 \geq 0$$

8

(b) Solve the following linear programming problem by using dynamic programming approach :

Maximize $Z = 6x_1 + 4x_2$

Subject to $2x_1 + x_2 \leq 390$

$3x_1 + 3x_2 \leq 810$

$x_2 \leq 200$

and $x_1, x_2 \geq 0$.

8

4E4135

B. Tech. IV-Sem. (Main) Exam; April-May 2017
Electronics & Communication Engg.
4EC6A Mathematics - IV

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates :-

Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.
Units of quantities used / calculated must be stated clearly.
Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT - I

1 (a) Define the operators : $\Delta, \nabla, \delta, \mu$.

2

(b) Prove that :

8

$$u_0 + \frac{xu_1}{1!} + \frac{x^2u_2}{2!} + \frac{x^3u_3}{3!} + \ldots = e^x \left[u_0 + x\Delta u_0 + \frac{x^2}{2!}\Delta^2 u_0 + \ldots \right]$$

(c) Prove that : $\Delta \log f(x) = \log \left[1 + \dfrac{\Delta f(x)}{f(x)} \right]$.

6

OR

1 (a) Given the following data :

$x:$	10^0	20^0	30^0	40^0	50^0	60^0	70^0	80^0
$y:$	0.9848	0.9397	0.8660	0.7660	0.6428	0.5000	0.3420	0.1737

Evaluate :

(i) $y\left(25^0\right)$

(ii) $y\left(32^0\right)$

(iii) $y\left(73^0\right)$

8

(b) Apply Lagrange's formula to find $f(x)$ from the following data :

$x:$	0	1	4	5
$f(x):$	4	3	24	39

Hence find f(3)

8

UNIT - II

2   (a)   A slider in a machine moves along a fixed straight rod. Its distance $x(cm)$ along the rod is given below for various values of time t(secs.):

Evalaute :

t:	0.0	0.1	0.2	0.3	0.4	0.5	0.6
x:	30.28	31.43	32.98	33.54	33.97	33.48	32.13

(i) $\dfrac{dx}{dt}$ for $t = 0.1$, $t = 0.3$, $t = 0.5$

(ii) $\dfrac{d^2 x}{dt^2}$ for $t = 0.1$, $t = 0.3$, $t = 0.5$

8

(b)   Use Milne's predictor-corrector method to obtain $y(0.4)$ and $y(0.5)$ for the following differential equation :

$\dfrac{dy}{dx} = 2e^x - y$, given that

x:	0	0.1	0.2	0.3
y:	2	2.01	2.04	2.09

8

OR

4E4135]   3   [P.T.O.

2 (a) Evaluate $\int_{-1.6}^{-1} e^x \, dx$ by the

      (i) Trapezoidal rule

      (ii) Simpson's $\dfrac{1}{3}$ rule

      (iii) Simpson's $\dfrac{3}{8}$ rule and compare your results with the exact value.

                                8

    (b) If $\dfrac{dy}{dx} = x + y^2$, use Runge-Kutta method to find an approximate value of y for $x = 0.2$, given that $y = 1$ when $x = 0$ (take $h = 0.1$)

                                8

UNIT - III

3 (a) Establish the following differential formulae involving $J_n(x)$:

      (i) $\dfrac{d\left[x^n J_n(x)\right]}{dx} = x^n J_{n-1}(x), \ n \geq 0;$

      (ii) $\dfrac{d\left[x^{-n} J_n(x)\right]}{dx} = -x^{-n} J_{n+1}(x), \ n \geq 0.$

                                8

(b) Show that :

(i) $(2n+1)x\,P_n(x)=(n+1)\,P_{n+1}(x)+n\,P_{n-1}(x)$

(ii) $\int\limits_{-1}^{1} x\,P_n(x)\,P_{n-1}(x)\,dx=\dfrac{2n}{(2n-1)(2n+1)}.$

8

OR

3 (a) State and prove orthogonal properties of Bessel's functions.

8

(b) Expand in a series of Legendre's polynomials :

$x^4+3x^3-x^2+5x-2.$

8

8

UNIT - IV

4 (a) There are three boxes containing respectively 1 white, 2 red and 3 black balls; 2 white, 3 red and 1 black ball; 3 white, 1 red and 2 black balls. A box is chosen at random and from it two balls are drawn at random. The two balls are one red and one white. Find the probability that these come from (i) the first box, (ii) the second box, (iii) the third box.

8

(b) In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and S.D. of the distribution. Given that

$P=\dfrac{1}{\sqrt{2\pi}}\int\limits_{0}^{Z} e^{-\frac{1}{2}t^2}\cdot dt$, the values of Z corresponding to p=0.19 and p=0.42 are 0.50 and 1.40 respectively.

8

OR

4　(a)　Razor blades are supplied by a manufacturing company in packets of 10. There is a probability of 1 in 100 blades to be defective. Using Poisson distribution calculate the number of packets containing one defective blade, no defective blade and all defective blades in a consignment of 10,000 packets.

8

(b)　Two random variables have the least square regression lines with equations :

$3x + 2y - 26 = 0$ and $6x + y - 31 = 0$. Find the mean values and the coefficient of correlation between x and y.

8

UNIT - V

5　(a)　Show that a necessary condition for $I = \int_{x_1}^{x_2} f(x, y, y') dx$, $y' = \dfrac{dy}{dx}$ to be an extremum is that $\dfrac{\partial f}{\partial y} - \dfrac{d}{dx}\left(\dfrac{\partial f}{\partial y'}\right) = 0$.

8

(b)　Find the path on which a particle, in absence of friction, will slide from one fixed point to another point in the shortest time under the action of gravity.

8

OR

5   (a)   Find a function $y(x)$ for which

$$\int_0^1 \left[x^2 + (y')^2 \right] dx \text{ is stationary given that } \int_0^1 y^2 dx = 2; \; y(0) = 0, \; y(1) = 0.$$

8

(b)   Find the equations of the curves for which the functional

$$\int_0^1 \left[(y')^2 + 12xy \right] dx, \; y' = \frac{dy}{dx}$$

with $y(0) = 0$ and $y(1) = 1$ can be extremised.

8

4E2090

B. Tech. IV-Sem. (Old Back) Exam; April-May 2017
Electronic Inst. & Control Engg.
4IC6.1 Elective Object Oriented Programming

(Common for Electronics & Comm. Engg., AE & I Engg. & EI & C Engg. Branch)

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates :-

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly. Use of following supporting materials is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT - I

1   (a)   Explain the concepts of classes and objects in OOPS.

    (b)   What is inheritance ? Give an example of multiple inheritance.   6

    (c)   What does polymorphism mean in object oriented programming ?   6

                       4

OR

1   (a)   What is Encapsulation in object oriented programming ?   4

    (b)   What are public, private and protected members in object oriented programming language ?   6

    (c)   What is reference variable ? Explain with suitable example.   6

UNIT - II

2 (a) Write a C++ program to overload the increment operator with prefix and postfix forms.

(b) Explain how the destructor is invoked ? 10

  6

OR

2 (a) What is constructor ? Explain the different types of constructors with suitable example.

  8

(b) What are friend functions ? Why are they used ? Explain with illustration.

  8

UNIT - III

3 (a) Explain the variation from C++ to Java.

(b) What is the significance of byte code in Java programming ? 4

(c) Explain the working of java virtual machine (JVM). 6

  6

OR

3 (a) What is array ? How can you declare an array in Java ? Explain with example.

  8

(b) Write a java program to swap two numbers without using third variable.

  8

UNIT - IV

4 (a) Write a java program to calculate the area of rectangle using parameterized constructor.

  8

2

(b) Explain the following operators :
(i) Bitwise operators

(ii) Assignment operator *operator.   4

4

OR

4 (a) What is operator overloading in Java ? What are the important points which should be taken care of while operator overloading ?

8

(b) Write a Java program to generate the Fibonacci Series using for loop.

8

UNIT - V

5 (a) Define package in java. Explain with suitable example, how you will create and import a package.

8

(b) What is interface ? Give an example to defining and implementing an interface. Also show how can multiple inheritance is achieved in Java using interface.

8

OR

5 (a) What is access protection in java ? Explain with example.

8

(b) Write short notes on :
(i) Exception handling

(ii) Packages.   4

4

4E2149

B. Tech. IV-Sem. (Main/Back) Exam; April-May 2017

Biomedical

4BM3 Digital Electronics

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates :-

Attempt any *five questions*, selecting *one question* from *each unit*. *All Questions* carry *equal* marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly. Use of following supporting materials is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT - I

1 (a) How addition and subtraction is carried out in 2's complement representation ? Discuss with examples.

8

(b) Explain signed binary numbers and 1's complement representation of negative numbers.

8

OR

2 (a) Simplify the following :

(i) $xy + \overline{xz} + x\overline{y}z(xy + z)$

(ii) $\overline{\overline{xy} + xyz + x(y + x\overline{y})}$

8

(b) Design the following boolean function with NAND gates only.

$$f(A, B, C) = (A + BC)(B + \overline{C}A)$$

8

UNIT - II

3 (a) Draw an open collector TTL circuit and explain its working.

8

(b) Discuss the various specification of digital IC's.

8

OR

4 (a) Explain the working of CMOS NAND gate and CMOS NOR gate.

8

(b) Explain the working of ECL with suitable diagram.

8

UNIT - III

5 (a) Simplify the following using K-map in SOP and POS form

$$f(A, B, C, D) = \sum (1, 3, 4, 5, 6, 7, 9, 12, 13, 14, 15)$$

10

(b) What are minterms and maxterms ? Explain with suitable example.

6

OR

6 (a) Simplify the following function using Quin-Mcklusky method.

$$f(A,B,C,D) = \sum(0,1,2,8,10,11,14,15)$$

10

   (b) Explain the concept of variable mapping.

6

UNIT - IV

7 (a) Design a binary to gray code decoder.

12

   (b) Give some features of combinational logic circuit.

4

OR

8 (a) Design a full adder using 4:1 MUX.

10

   (b) Discuss half subtractor with logic diagram & truth table.

6

UNIT - V

9 (a) What is race arount condition ? How is it removed ?

6

   (b) Design D flip-flop using SR flip-flop.

10

OR

10 (a) Design an MOD-6 synchronous up counter using T flip-flop.

10

    (b) Explain the parallel in serial out shift register with proper diagram.

6

EC

Common in EE&EC

(8)

4E4120

B. Tech. IV-Sem. (Main & Back) Exam; April-May 2017
Electronic Inst. & Control Engg.
4E11A Analog Electronics

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.

Use of following supporting materials is permitted during examination. (Mentioned in form No. 205)

1. NIL_____ 2. NIL_____

UNIT - I

1 (a) For a current shunt feedback amplifier, find expression for input resistance and output resistance.

(b) For the circuit given that $R_C = 4k\Omega$, $R_1 = 40\,k\Omega$, $R_S = 10\,k\Omega$, $h_{ie} = 1.1\,k\Omega$, $h_{fe} = 50$, $h_{re} = h_{oe} = 0$, find : (i) A_{vf} (ii) R_{if} (iii) R'_{of}

Fig. 1

OR
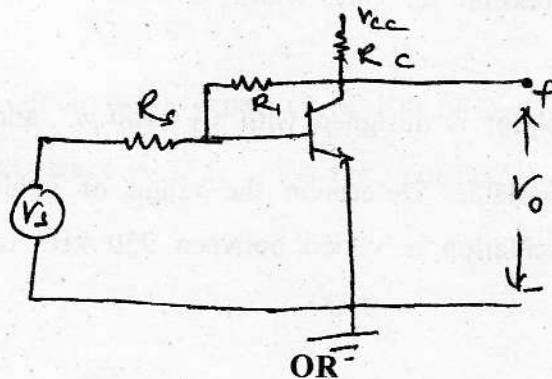
1 (a) Enumerate the effect of negative feedback amplifiers.

(b) An amplifier has a voltage gain of 40. The amplifier is now modified to provide a 10% negative feedback in series with the input. Determine :
(i) Voltage gain with feed back
(ii) Amount of feedback in dB.
(iii) Loop gain,

UNIT - II

2 (a) Explain a generalised reasonant circuit oscillator (LC oscillator). How is its resonant frequency controlled by external circuit elements ? Under what conditions such an oscillator is called Colpitt oscillator ?

(b) A phase shift oscillator uses three identical RC sections in the feedback network. The value of components are $R = 100\,k\Omega$ and $C = 0.01\,\mu F$. Calculate the frequency of oscillator.

OR

2 (a) Explain the working of a monostable multivibrator with the help of suitable circuit diagram using BJT and also show the waveforms at various points and derive expression for time width.

(b) A Colpitts oscillator is designed with $C_1 = 100\,pF$ and $C_2 = 7500\,pF$. The inductance is variable. Determine the range of inductance values of the frequency if oscillation is varied between 950 kHz to 2050 kHz.

UNIT - III

3 (a) Derive the expression for the CE current gain and voltage gain including source resistance R_S.

(b) A transistor's short circuit current gain is measured to be 25 at a frequency of 2 MHz. If $f_B = 200\,kHz$, calculate :

(i) The current gain bandwidth product.

(ii) h_{fe} at low frequency

(iii) Short circuit current gain at 10 MHz and 100 MHz.

OR

3 (a) Draw the high frequency equivalent circuit of an emitter follower and derive the expression of upper cut-off frequency, f_H.

(b) Given the following transistor measurements made at $I_C = 5\,mA$, $V_{CC} = 10\,V$ and at room temperature $h_{fe} = 100$, $h_{ie} = 600\,\Omega$ $A_i = 10$ at frequency f = 10 mHz $C_c = 3\,Pf$. Find $f_B, f_T, C_e, R_{b'e}$ and $r_{bb'}$

UNIT - IV

4 (a) How you can classify tuned amplifiers, discuss in brief with suitable examples.

(b) A tank circuit has a capacitor of 100 pF and an inductor of 150 μH. The series resistance is 15 Ω. Find the impedance, Q and bandwidth of resonant circuit.

OR

4   (a)   An FET having $g_m = 6\,mA/V$ has a tuned load consisting of a 400 μH inductance of 5 Ω in parallel with a capacitor of 2500 pF. Find.
   (i)   Resonant frequency
   (ii)   Tuned circuit dynamic resistance
   (iii) Gain at resonance
   (iv)   Signal bandwidth

   (b)   Explain the working of stagger tuned amplifier with help of frequency response.

UNIT - V

5   (a)   Compare the power output, efficiency and rating of devices required for a class-A push pull and class-B push pull stages. Also derive the required expression.

   (b)   A power transistor operated in class 'A' operator delivers a maximum of 6W to a 8 Ω load with the supply voltage of 25 V. The Q point is adjusted for a symmetrical swing. Calculate
   (i)   Steps down turns ratio
   (ii)   Peak collector current
   (iii) Efficiency

OR

5   (a)   Discuss crossover distortion in class-B power amplifier.

   (b)   A complimentary symmetry class-B amplifier supplies output to a load of 3 Ω from the supply voltage of 20 V. Calculate maximum power output, Power dissipation rating of each transistor.

4E2112

4E2112

B. Tech. IV-Sem. (Main / Back) Exam; April-May 2017
Electrical Engg.
4EE4 Computer Programming-II

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.
Use of following supporting material is permitted during examination.

1. NIL _____   2. NIL _____

UNIT - I

1 (a) Explain the following Unix commands :

   (i)   cp

   (ii)   ls

   (iii) cal

   (iv)   rm

   (v)   banner

   (vi)   date

   using appropriate syntax.

   2×6

(b) Write short notes on file system in Unix.

4

OR

1 (a) Explain the following Unix commands :
      (i) cat
      (ii) wc
      (iii) grep
      (iv) sort

3×4

(b) Write the names of commands that perform following operation :
      (i) Places one or more files in the line printer queue.
      (ii) Deletes empty directories from the file system.
      (iii) Reports how much space is used by a directory.
      (iv) Evaluates an expression.

1×4

UNIT - II

2 (a) What is vi editor ? Explain different modes of operation in vi editor.

8

(b) Explain the following vi command :
      (i) h   (ii) j
      (iii) K   (iv) X
      (v) V   (vi) r
      (vii) a   (viii) R

1×8

OR

2 Write short notes on :
      (i) Cursor movement commands.
      (ii) String replacement commands.

8×2

4E2112]

2

[P.T.O.

UNIT - III

3   Write short notes on :

(i)   Java virtual machine (JVM).

(ii) Java byte code.

(iii) Applets of Java.

8+4+4

OR

3   (a)   How Java is different from C++ ?

5

(b)   What are data types in Java ? Explain various data types in detail.

8

(c)   What is the structure of a Java program.

3

UNIT - IV

4   (a)   Write a Java program that prints table of a given number n.

8

(b)   Explain the followings :

(i)   Relational operators.

(ii) Boolean logic operators.

4×2

OR

4   (a)   Write a Java program to generate the Fibonacci series.

8

(b)   Write short notes on :

(i)   Switch statement.

(ii) Operator precedence.

4×2

UNIT - V

5 (a) What is a package ? How package is defined in Java ? Explain user defined package.

8

(b) What is applet ? How applets are implemented ? How applets are useful in programming ?

8

OR

5 (a) What is an interface ? How interfaces are defined and implemented in Java ?

8

(b) Write short note on awt tools and control.

8

4E4174

B. Tech. IV Sem. (Main / Back) Exam; April-May 2017
Electrical Engg.
4EE4A Generation of Electrical Power

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.
Use of following supporting materials is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT - I

1   (a)   Discuss why ?

    (i)   The overall station efficiency of a thermal plant is very low.

    (ii)   It is necessary to heat the water (in a feed water heater) before feeding it to the boiler.

                                                      8

    (b)   Discuss the principle of operation of an open cycle gas turbine plant. Why is its efficiency low ?

                                                      8

OR

1   (a)   What is hydrograph ? What information does it provide ? How can a flow duration curve be obtained from a hydrograph ?

                                                                        8

      (b)   Discuss why ?
          (i)   Nuclear power plants are used only as base load plants.
          (ii)   Moderator is necessary in a reactor.

                                                                        8

UNIT - II

2   (a)   How can tidal power be utilized for benefit of mankind ? What are problems associated in construction of barrages for tidal schemes ?

                                                                        8

      (b)   How can wind energy be converted into electrical energy ? What prohibits large scale utilization of wind power for electricity generation.

                                                                        8

OR

2   (a)   Discuss the role of new energy sources in the context of present day energy crisis.

                                                                        8

      (b)   Discuss the future prospects of solar energy use.

                                                                        8

UNIT - III

3   (a)   The daily load curve data for a system is as under :
          Week days :

Time	12 – 5 am	–8 am	–12 noon	–1 pm	–5 pm	–9 pm	–12 pm
Load (MW)	100	150	250	100	250	350	150

        Saturday and Sunday :

Time	12–5 am	–5 pm	–9 pm	–12
Load (MW)	100	150	200	150

        Draw a load duration curve for the system for one week. Find the weekly load factor.

                                                                              10

(b) What is the effect of load factor on unit generation cost.

6

OR

3 (a) Discuss why ?

(i) Some power companies put a penalty for low power factors.

(ii) It is not economical for consumers to raise power factor to unity.

10

(b) Discuss the advantages of improving power factor.

6

UNIT - IV

4 (a) What is depreciation curve ? Why is it necessary to maintain it ? Discuss the methods to calculate the depreciation charges.

8

(b) How the power factor affects when kW demand is constant and in another case when kVA demand is constant.

8

OR

4 (a) What do you understand by the term co-generation ?

8

(b) Why should the total generation cost per unit of thermal energy depend on the station load factor ? Draw a typical curve showing this variation and justify its shape.

8

UNIT - V

5 (a) How does the plant location affect the reliability of electric supply ?

6

(b) Distinguish between operating reserve and spinning reserve.

5

(c) What is the difference between 'present worth' and 'capitalized cost'.

5

OR

5 (a) An industrial consumer has single phase 230 V supply. His monthly energy consumption is 2020 kWh. A maximum demand indicator installed at his premises indicates 40A which is charged at unity power factor for 2 hours daily at Rs. 3.50 per kWh. The remaining units are charged at Rs. 1.80 per kWh. Find his monthly bill (for 30 days) and average tariff per kWh.

10

(b) What is tariff ? What are its objectives ?

6

4E4175

4E4175

B. Tech. IV-Sem. (Main) Exam; April-May 2017
Electrical Engg.
4EE5A Electrical Machines - II

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from each unit. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.
Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT - I

1   (a)   Show that a 3-phase distributed winding excited by balanced 3-phase currents will produce a sinusoidally distributed rotating magnetic field of constant magnitude when the phase windings are wound 120° electrical degrees apart in space.

(b)   Explain the term "distribution factor" in connection with alternator armature winding and derive the equation of it, when the armature winding is uniformly distributed.

8+8

OR

1   (a) Explain clearly the meaning of coil-pitch factor. Give equation for coil-pitch factor of armature winding of alternator.

    (b) A 3-phase, 50 Hz, 2-pole, star connected alternator has 54 slots with 4 conductors per slot. The pitch of the coil is 2 slots less than pole-pitch. If the machine is given 3300 volts between lines on open circuit, determine useful flux per pole.

                                                                        6+10

UNIT - II

2   (a) Starting from first principles, develop the equivalent circuit of a 3-phase induction motor. Also draw phasor diagram of 3-phase induction motor.

    (b) Derive the equation for torque developed under running conditions, by a 3-phase induction motor. Find the condition for maximum running torque.

                                                                        8+8

OR

2   (a) Draw and explain the circuit diagrams for performing no-load and block rotor tests on a 3-phase induction motor. How the parameters of equivalent circuit are determined with the results of these tests ?

    (b) Why starters are necessary for starting the 3-phase induction motor. Explain star-delta starter.

    (c) Explain phenomenon of crawling and logging in a 3-phase induction motor.

                                                                        6+5+5

UNIT - III

3   (a) Explain, why single-phase induction motor is not self starting.

    (b) Explain double-revolving field theory of single-phase induction motor and derive the equation for net torque developed.

(c) Draw and explain the equivalent circuit of single-phase induction motor, based upon double-field revolving theory.

(d) Draw circuit diagram and phasor diagram of a capacitor start and run single-phase induction motor.

2+6+4+4

OR

3 (a) Describe construction and working of a shaded pole motor.

(b) Briefly explain construction and working of single-phase series motor. Also draw its phasor diagram.

(c) Write short note on "Universal Motor."

5+6+5

UNIT - IV

4 (a) Why a rotating field system used in synchronous machines is preferable to a stationary field ?

(b) Draw phasor diagrams of a loaded alternator (cylindrical type) for following conditions :

  (i) Lagging power factor

  (ii) Leading power factor and

  (iii) Unity power factor

(c) Sketch and explain the open-circuit and short-circuit characteristics of a synchronous generator. Briefly explain, how the voltage regulation of an alternator is found by synchronous impedance method.

4+4+8

OR

4 (a) Explain the two reaction theory applicable to salient pole synchronous machines and draw its phasor diagram.

   (b) Derive the equation for power developed by the salient pole synchronous machines and draw its power-angle characteristics.

   (c) Why salient pole synchronous machines are more stable than cylindrical rotor machine, explain.

                                                                            6+6+4

UNIT - V

5 (a) Explain why the synchronous motor is not self-starting. Explain the procedure of starting a synchronous motor in brief.

   (b) What are V-curves and inverted V-curves of a 3-phase synchronous motor? How these curves are obtained experimentally ?

   (c) Explain hunting of a synchronous machine. How it can be avoided ?

                                                                            5+7+4

OR

5 (a) Explain with neat sketches, the principle of operation of a 3-phase synchronous motor. Explain why it will not run at other than synchronous speed.

   (b) A 3-phase, star-connected synchronous motor has effective armature resistance and synchronous reactance of 0.2 Ω and 2.0 Ω per phase respectively. It takes 20 amps to drive a certain load. Calculate the excitation emf induced in the motor if its works with (i) 0.8 power factor Lagg. (ii) 0.8 P.F. leading (iii) Unity P.F. conditions.

                                                                            8+8

4E4175]   4   [12080]

4E4176

4E4176

B. Tech. IV-Sem. (Main / Back) Exam; April-May 2017

Electrical Engg.

4EE6A Advance Engg. Mathematics - II

(Common to EE and EX)

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.
Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL ————————————   2. NIL ————————————

UNIT - I

1 (a) Prove that $E \equiv e^{hD}$.

4

(b) Solve the following equations by Gauss-Seidel Method, correct upto 3 decimal places :

$$2x - 4y + 10z = -15$$
$$9x + 2y + 4z = 20$$
$$x + 10y + 4z = 6$$

4

(c) Find u_{32} using Stirling's Formula : $u_{20} = 14.035$, $u_{25} = 13.674$, $u_{30} = 13.257$, $u_{35} = 12.734$, $u_{40} = 12.089$, $u_{45} = 11.309$.

8

OR

1 (a) Find the positive value of $\left(\dfrac{1}{17}\right)^{1/3}$ correct upto 4 decimal places using Newton-Raphson Method.

4

(b) Use Lagrange Formula, express the rational function $\dfrac{3x^2 + x + 1}{(x-1)(x-2)(x-3)}$ as a sum of partial fractions.

4

(c) Find least squares fit of the form $y = a + bx^2$ to the following data :

x	−1	0	1	2
y	2	4	10	15

8

UNIT - II

2 (a) Compute $f'(3)$ from the following table :

x	1	2	4	8	10
y	0	1	5	21	27

4

(b) Find $\int_0^6 \dfrac{e^x}{1+x}\, dx$ approximately using Simpson's 3/8th rule of integration.

4

(c) Using Runge Kutta 4th order method, find the value of y when x=1 by taking h=0.5, given that y(0)=1 and $\dfrac{dy}{dx} = \dfrac{y-x}{y+x}$.

8

OR

2 (a) The table below gives the results of an observation. θ is observed temperature in degrees centigrade of a vessel of cooling water, t is the time in minutes from the beginning of observations :

t	1	3	5	7	9
θ	85.3	74.5	67.0	60.5	54.3

Find approximate rate of cooling at t=3.5.

4

(b) Find the solution of $\dfrac{dy}{dx} = 1 + xy$, $y(0) = 1$ which passes through (0,1) in the interval (0, 0.5) using Picard's interation formula upto second approximation.

4

(c) Solve the difference equation $y_{n+2} - 2y_{n+1} + y_n = n^2 2^n$.

8

UNIT - III

3 (a) Express $f(x) = x^4 + 2x^3 - 6x^2 + 5x - 3$ in terms of Legendre Polynomials.

4

(b) Show that

(i) $P_n(1) = 1$

(ii) $P_n(-x) = (-1)^n P_n(x)$.

4

(c) Prove that $J_n(x) = \frac{1}{\pi} \int_0^\pi \cos(n\theta - x\sin\theta) d\theta$.

8

OR

3 (a) Prove that $(n+1)P_{n+1}(x) = (2n+1)x P_n(x) - n P_{n-1}(x)$.

4

(b) Find the values of $P_0(x), P_1(x), P_2(x), P_3(x)$ and $P_4(x)$ using Rodrigue's Formula and sketch a rough diagram of these functions between -1 to 1.

4

(c) State and prove orthogonality of Bessel's function of 1st kind.

8

UNIT - IV

4 (a) State axioms of probability and prove that for any two events A and B,
$$P(A \cup B) = P(A) + P(B) - (A \cap B).$$

4

(b) Probability distribution function of variable x is given by
$$f(x) = \begin{cases} 2e^{-2x} & x \geq 0 \\ 0 & x < 0 \end{cases}.$$ Find expected value of $1, x, x^2, x^3, x^4$ (i.e. First four moments of x about the origin).

4

(c) A student is given a true-false examination with 8 questions. If he corrects at least 7 questions, he passes the examination. Find the probability that he will pass given that he guesses all questions.

4

(d) The income of a group of 10,000 persons was found to be normally distributed with mean 750 pm and standard deviation of 50. Show that, of this group, about 95% had income exceeding 668/- and only 5% had income exceeding 832/-. Also find the lowest income among the richest 100. [Area under the normal curve from 0 to $z = \Phi(z)$, $\Phi(1.64) = 0.4495$, $\Phi(0.49) = 2.33$]

4

OR

4 (a) In a certain college, 4 percent of the men and 1 percent of the women are taller than 6 feet. Furthermore, 60 percent of the students are women. Suppose a randomly selected student is taller than 6 feet. Find the probability that the student is a woman.

4

(b) Compute mean of binomial distribution. Is binomial distribution always symmetric ?

4

(c) In a certain factory turning out razor blades, there is a small chance of 0.002 for any blade to be defective. The blades are supplied in packets of 10. Calculate the approximate number of packets containing no defective, one defective and two defective blades in a consignment of 10,000 packets.

4

(d) The mean weight of 500 male students at a certain college is 151 lb and the standard deviation is 15 lb. Assuming that the weights are normally distributed, find how many students weigh (a) between 120 and 155 lb, (b) more than 185 lb. [Area under the normal curve from 0 to $z = \Phi(z)$; $\Phi(2.10) = .4821$, $\Phi(0.30) = 0.1179$, $\Phi(2.30) = 0.4893$]

4

UNIT - V

5 (a) Obtain the rank correlation co-efficient for the following data :

x	68	64	75	50	64	80	75	40	55	64
y	62	58	68	45	81	60	68	48	50	70

4

(b) If θ is the acute angle between the two regression lines in the case of two variables x and y, show that $\tan\theta = \dfrac{1-r^2}{r} \cdot \dfrac{\sigma_x \sigma_y}{\sigma_x^2 + \sigma_y^2}$ where r, σ_x, σ_y have their usual meanings.

4

(c) Using Z transform, solve the difference equation :

$y_{n+2} + 10y_{n+1} + 25y_n = n;$ $y_0 = 1, y_1 = -5.$

8

OR

5 (a) Determine Z transform, $Z\{e^{-an}\cos(\beta n)\}.$

4

(b) Find the coefficient of correlation between the values of x and y :

x	1	3	5	7	8	10
y	8	12	15	17	18	20

6

(c) In a partially destroyed laboratory record of an analysis of a correlation data, the following results only are legible : Variance of $x = 9$, regression equations : $8x - 10y + 66 = 0$, $40x - 18y = 214$. What were *(a)* the mean values of x and y *(b)* the standard deviation of y and the co-efficient of correlation between x and y.

6

Roll No. _____   Total No. of Pages : 3

4E4122

4E4122

B. Tech. IV-Sem. (Main/Back) Exam; April-May 2017
Electronics Instrumentation & Control Engg.
4E13A Electrical Measurement

Time : 3 Hours   Maximum Marks : 80
                                           Min. Passing Marks : 24

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from each unit. All Questions
carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any
data you feel missing suitably be assumed and stated clearly.
Units of quantities used / calculated must be stated clearly.
Use of following supporting materials is permitted during examination.
(Mentioned in form No. 205)*

1. Nil _____   2. NIL _____

UNIT-I

1   (a)   What do you mean by phantom loading ? Explain the calibration techniques
          of single phase energy meter by phantom loading.

                                                                              8

    (b)   The inductance of a moving iron ammeter with a full scale deflection of

          90° at 1.3 A, is given by the expression $L = \left(200 + 35\theta - 5\theta^2 - \theta^3\right)\mu H$, where

          θ is the deflection in radian from the zero position. Estimate the angular
          deflection of the pointer for a current of 1.0 A.

                                                                              8

                                        OR

1 (a) A 50 volt range spring controlled electrodynamic voltmeter having a square law scale response takes 0.04A on d.c. for full scale deflection of 90°. The control constant is 0.5×10^{-6} N-m/degree and the initial mutual inductance of the instrument is 0.31 H. Find the true potential difference across the instrument when it reads 50V at 50 Hz.

8

(b) Explain the working of repulsion type moving iron instruments. Discuss about the methods of producing controlling and damping torques in them.

8

UNIT-II

2 (a) Explain the effect of secondary burden on the ratio and phase errors of a current transformer.

8

(b) Explain two wattmeter method of measuring power in three phase circuits.

8

OR

2 (a) Define the following terms used for instrument transformers :
   (i) Transformation ratio
   (ii) Nominal ratio
   (iii) Turns ratio
   (iv) Ratio correction factor.

8

(b) Explain the Arnold's method for testing of current transformers.

8

UNIT-III

3 Explain the working of co-ordinate A.C. potentiometer. How is it standardized ? What are the functions of the transfer instrument and the phase shifting transformer.

16

OR

3 (a) Explain the circuit diagram of slide wire potentiometer and explain its applications also.

8

   (b) Explain the reasons why d.c. potentiometer cannot be used for a.c. measurement straight way. Explain the modifications that are needed in a d.c. potentiometer to be used for a.c. applications.

8

UNIT-IV

4 (a) Explain the Price's Guard wire method for the measurement of high resistance.

8

   (b) Draw and explain the circuit of Kelvin's Double bridge method for the measurement of low resistance. Also derive the conditions for balance.

8

OR

4 (a) Explain the loss of charge method for measurement of insulation resistance of cables.

8

   (b) What do you mean by fall of potential method. What are the factors which influence the earth resistance.

8

UNIT-V

5 Explain the following AC bridges with phasor diagram :
   (a) Heaviside bridge.

8

   (b) Anderson bridge.

8

OR

5 (a) Derive the balance equations of Hay's bridge. Draw the phasor diagram for balance conditions.

8

   (b) What are the various sources of error in bridge measurement and their precautions.

8

4E2109

4E2109

4E2109

B. Tech. IV-Sem. (Main/Back) Exam; April-May 2017
Electrical Engg.
4EE1(O) Power Electronics - II

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.
Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT - I

1 (a) What are the advantages of negative feedback in amplifiers ? Derive the input impedance R_{if} of a voltage series and current shunt feedback amplifier.

   (b) An amplifier has a voltage gain of 4000. It's input impedance is 2K and output impedance is 60 K. Calculate the voltage gain, input and output impedance of the circuit is 5% of the feedback is fed in the form of series negative voltage feedback.

OR

1 (a) Explain the concept of feedback with the help of block schematic of a signal loop feedback amplifier. Derive expression for the transfer gain with feedback.

(b) Draw the circuit diagram of a two stage amplifier employing current shunt feedback and obtain the expression of its gain with feedback.

UNIT - II

2 (a) What is the Barkhausen criterion for the feedback oscillators ? Explain the principle of working of Colpitts oscillator.

(b) What type of feedback is employed in oscillators ? Explain how amplitude and frequency stability are improved in an oscillators.

OR

2 (a) Why are the RC oscillators preferred for the generation of low frequencies ? Draw a neat circuit diagram of a phase shift oscillator using BJT. Derive an expression for its frequency of oscillation.

(b) In a Hartley oscillator, $L_1 = 15$ mH and $C =$ pF. Calculate L_2 for a frequency of 168 kHz. The mutual inductance between L_1 and L_2 is 5 μH. Also find the required gain of the transistor to be used for the oscillator.

UNIT - III

3 (a) What is the mean by CMMR ? Derive the expression for CMMR in an emitter coupled differential amplifier.

(b) How a differentiator circuit can be designed using an ideal operation amplifier ? Explain.

OR

3 (a) Draw and explain logarithmic and antilog amplifier by using operation amplifier. Derive the expression of logarithmic amplifier.

(b) Explain the slew rate. For an operation amplifier having a slew rate of 3 $v/\mu sec$. What is the maximum closed loop voltage gain that can be used when the input signal varied by 0.4 v in 12 μsec ?

UNIT - IV

4   (a)   Define the following term of D/A conversion :
   - (1)   Resolution
   - (2)   Accuracy
   - (3)   Monotonicity
   - (4)   Conversion time.

      (b)   Draw and explain the series emitter follower regulated power supply circuit.

OR

4   (a)   Draw and explain the functional diagram of IC 555 timer and explain an application with the help of circuit diagram.

      (b)   Write short note on three terminal monolithic regulator.

UNIT - V

5   (a)   Define the conversion efficiency. Compare maximum efficiency of a series fed and transformer coupled class A signal transistor power stage.

      (b)   Show that optimum conversion efficiency possible in class B push pull amplifier is 78.5% and also explain the main drawback of class B configuration in power amplifier.

OR

5   (a)   Write short note on complementary symmetry power amplifiers.

      (b)   Prove that in class A amplifier if distortion is 10 percent power gain to the load is increased by 1 percent

---

Roll No. _____

Total No. of Pages : 4

4E2110

4E2110

B. Tech. IV-Sem. (Back) Exam; April-May 2017
Electrical Engg.
4EE2 Digital Electronics

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.
Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT - I

1 (a) Find the radix r.

   (i) $(30)_{10} + (54)_r = (144)_r$

   (ii) $\sqrt{(41)_r} = 5_r$

   (iii) $(25)_{10} + (30)_8 = (54)_r$

   (iv) $(23)_r + (12)_r = (101)_r$

                                                                                    8

   (b) Write short note on weighted and nonweighted code.

                                                                                    8

OR

1. (a) Briefly explain the concept of error detection and correction codes.

8

(b) Perform the following decimal additions for use with the 8421 BCD code :

(i) $(386)_{10} + (756)_{10}$

(ii) $(123)_{10} + (987)_{10}$

8

UNIT - II

2. (a) Simplify the following Boolean expressions :

(i) $(A+C)(\overline{A}\overline{B}+B)(\overline{C}+AB)$

(ii) $\overline{(AC+\overline{B})(\overline{A+C}+B)}$

8

(b) Minimize following function using k-map.

$f(A, B, C, D) = \Sigma_m (1, 2, 6, 7, 9, 13, 15) + \Sigma d (3, 5, 11, 12)$

8

OR

2. (a) Implement a 2-input EX-OR gate using

(i) 2 input NAND gates only

(ii) 2 input NOR gates only

8

(b) Minimize following Boolean function using Quine Mc-clusky method.

$f(A, B, C, D) = \Sigma_m (0, 2, 4, 5, 8, 9, 10) + d (1, 13, 14)$

8

4E2110]

2

[P.T.O.

UNIT - III

3 (a) Write short notes on :
   (i)   noise immunity
   (ii) Fan-out
   (iii) Fan-in
   (iv) Propagation delays

8

   (b) Compare various logic families : TTL, RTL, ECL and MOS.

8

OR

3 (a) Draw and explain 2-input CMOS NAND gate.

8

   (b) Explain ECL family with the help of suitable circuit diagram.

8

UNIT - IV

4 (a) Implement the following function with multiplexer.
   $$f(A, B, C, D) = \Sigma_m (0, 1, 3, 4, 8, 9, 15)$$

8

   (b) Design BCD to excess-3 encoder.

8

OR

4 (a) Design and implement a 4-bit binary to gray code converter.

8

   (b) Explain the half adder and full adder with suitable diagram.

8

UNIT - V

5   Write short notes on : (any two)

   (i)   Registers

   (ii)   Counter

   (iii) J-K flip-flop

   (iv)   R-S flip-flop

                                                               $8 \times 2 = 16$

OR

5   (a) Write the difference between sequential and combinational circuits. List
          some applications of sequential circuits.

                                                                          8

     (b) Explain the following conversions :

          (i)   JK flip-flop to D-flip-flop

          (ii)   J-K flop-flop to T-flip-flop.

                                                               $4 \times 2 = 8$

_____

4E4172

Total No. of Pages : 7

4E4172

B. Tech. IV-Sem. (Main) Exam; April-May 2017

Electrical Engineering

4EE2AC Circuit Analysis - II

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.
Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____ 2. NIL _____

UNIT - I

1 (a) Describe the necessary properties for transfer function.

8

   (b) Explain with reasons, why the following expression for the driving point impedance $Z(s)$ is not suitable for representing a passive network.

$$Z(s) = \frac{S^4 - S^3 - 2S^2}{S+5}$$

8

OR

4E4172]

1

[P.T.O.

1   (a)   Describe the necessary properties of driving point functions.

                                                                              8

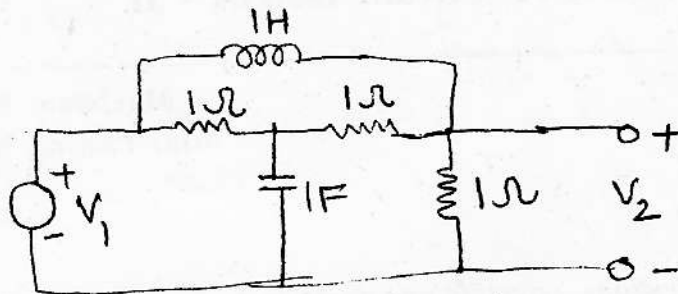   (b)   Find the transfer function of the network shown in **Fig. 1**. Also sketch
           pole zero configuration.

Fig. 1

                                                                              8

UNIT - II

2   (a)   Obtain the transfer function $\dfrac{V_0}{V_s}$ of the RL circuit in **Fig. 2**, assuming

           $V_s = V_m \cos \omega t$. Sketch its frequency response.
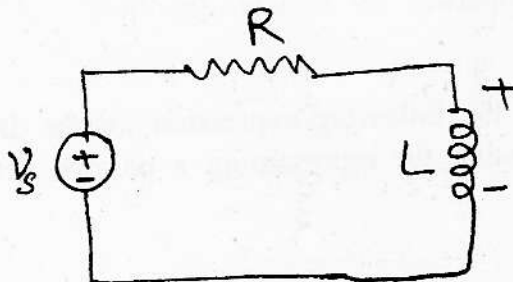
Fig. 2

                                                                              8

(b) Find G_{21} (s) for the network shown in **Fig. 3**, when V_1 (s) is the applied voltage at the input terminals.
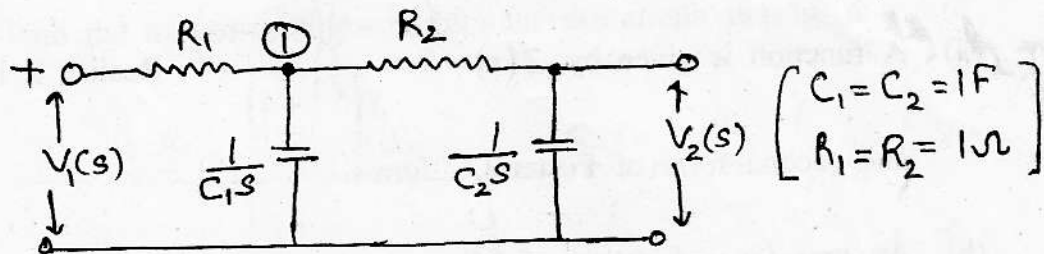

Fig. 3

8

OR

2   (a) Check the stability of the following system expressed of the polynomial $P(s) = S^3 + 2S^2 + 2S + 40$.

Apply Routh-Hurwitz criterion.

8

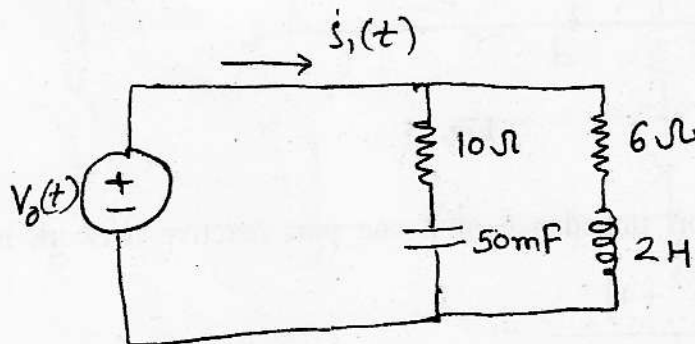(b) Find the transfer function $\dfrac{V_o(w)}{I_j(w)}$ for the circuit in **Fig. 4**. Obtain its zeros and poles.

Fig. 4

8

UNIT - III

3   (a)   A function is given by $Z(s) = \dfrac{\left(S^2+1\right)\left(S^2+16\right)}{S\left(S^2+4\right)}$. Realise it in the first

and second form of Foster LC forms.

8

(b)   An impedance function of LC network is given by

$$Z(s) = \frac{12S^3 + 4S}{3S^4 + 10S^2 + 2}$$

Synthesize the function to draw the Cauer-2 network.

8

OR

3   (a)   Find the driving port impedance in Laplace form of the given network across a–b in **Fig. 5**.
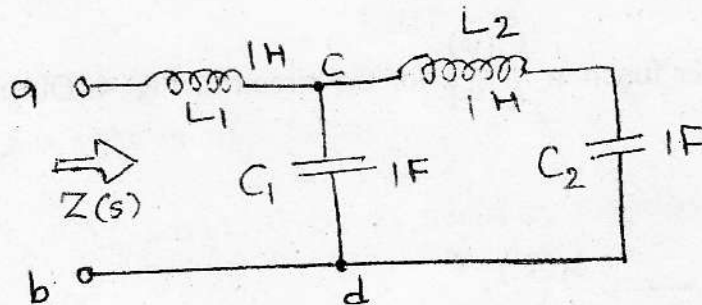

Fig. 5

8

(b)   The driving port impedance of a one port reactive network is given by

$$Z(s) = \frac{S\left(S^2 + 4\right)}{\left(S^2 + 1\right)\left(S^2 + 16\right)}$$

Obtain the Foster forms of LC network realization.

8

UNIT - IV

4   (a) Find the transmission parameters for the circuit in **Fig. 6**.
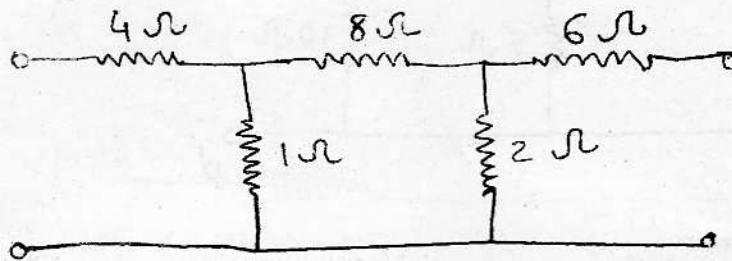

Fig. 6

8

(b) A π (Pie) network has been shown in **Fig. 7** where $(0.5\,I_3)$ is the controlled current source. Obtain the Z-parameters for the π circuit model.
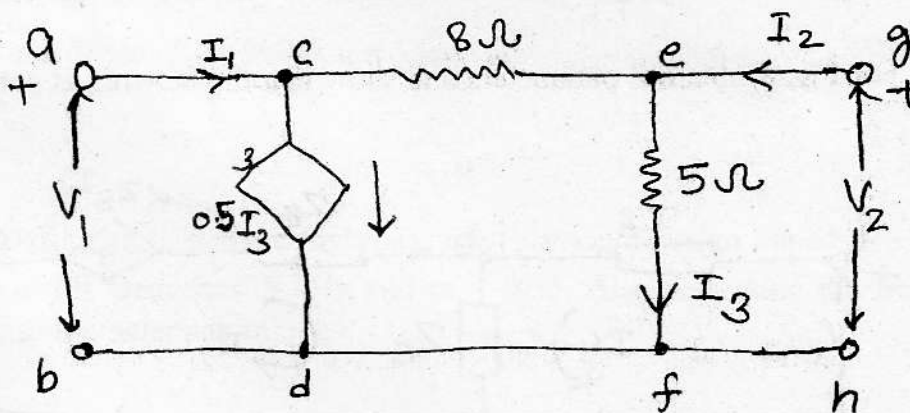

Fig. 7

8

OR

4E4172]

5

[P.T.O.

4   (a)   Two networks have been shown in **Fig. 8**. Obtain the transmission parameters of the resulting circuit when both the circuits are in cascade.
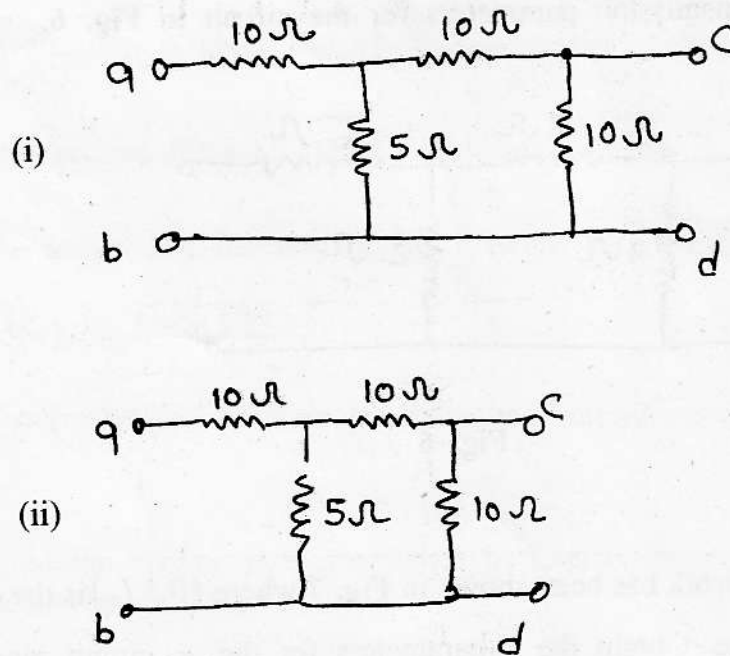
(i)

(ii)

Fig. 8

8

(b)   For **Fig. 9** obtain Z parameters and show that the network is not reciprocal.
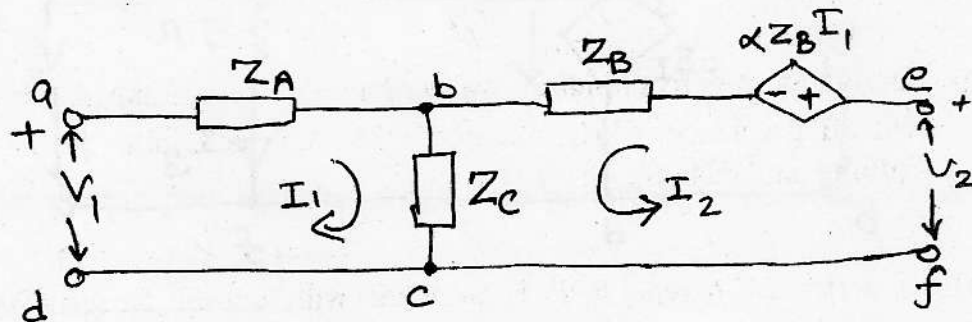

Fig. 9

8

UNIT - V

5 (a) Determine what type of filter is shown in **Fig. 10**.

   Calculate the corner of cutoff frequency.

   (Take $R = 2\,k\Omega$, $L = 2H$ and $C = 2\,\mu F$)
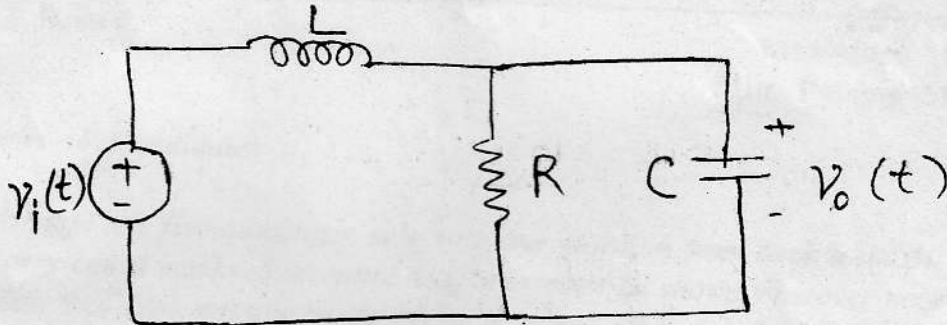
Fig. 10

8

(b) Design a constant K-high pass filter having $f_c = 4\,kHz$ and design impedance $R_0 = 600\,\Omega$ (π - section)

8

OR

5 (a) Design an m-derived high pass filter having a design impedance of $600\,\Omega$, cut off frequency 5 kHz and m = 0.35. Also determine the frequency of infinite attenuation.

8

(b) A series LCR type BPF is to work with cut-off frequencies 23 kHz and 25 kHz. Assume L = 45 mH while load resistance is 50 $k\Omega$. Design the BPF.

8

4E4172]

7

[10960]

4E4142

4E4142

B. Tech. IV-Sem. (Main / Back) Exam; April-May 2017

Mechanical Engg.

4ME3A Machining & Machine Tools

Common with Automobile

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 24

Instructions to Candidates :-

*Attempt any **five** questions, selecting **one** question from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No. 205)

1. NIL   2. NIL

UNIT - I

1 (a) Explain the mechanism of chip formation and the types of chip with suitable diagrams.

4+4=8

(b) In an orthogonal cutting test with a tool of rake angle 10°, the following observations were made :

Chip thickness ratio = 0.3

Horizontal component of the cutting force = 1290 N

Vertical component of cutting force = 1650 N

Calculate the various components of the cutting forces and the coefficient of friction at the chip tool interface by using Merchants theory.

8

OR

1   (a)   What is the thermal aspects of machining ? Discuss briefly a technique for measuring average chip tool interface temperature.

3+5=8

(b)   What is tool nomenclature ? With suitable sketch explain geometry of single point cutting tool.

2+6=8

UNIT - II

2   (a)   Differentiate between Flank wear and crater wear. Also discuss difference between Adhesion and Abrassion tool wear mechanism.

4+4=8

(b)   Explain the important characteristics of a cutting tool material and list the different types of tool material.

5+3=8

OR

2   (a)   What is machinability and machinability index ? Explain briefly.

2+3=5

(b)   Discuss various cutting fluids properties.

3

(c)   In a normal turning operation, the tool life varies with cutting speed as follow :

Cutting Speed $\left(\dfrac{m}{min}\right)$	Tool Life (min)
25	30
70	2

Estimate the tool life for this operation at a speed of 60 m/min.

8

UNIT - III

3 (a) Differentiate between Grinding and Broaching operation. **4**

(b) Explain up and down milling. **4**

(c) A shaper is operated at 120 cutting strokes per min. and is used to machine a work piece with a 250 mm length and 120 mm width. Use a feed of 0.6 mm per stroke and a depth of cut 6 mm. Calculate the total machining time to machine the component. Take approach distance = 25 mm. **8**

OR

3 (a) List the basic specifications to fully describe the lathe machine. **4**

(b) Explain about drilling time estimation. **4**

(c) What is Automatic lathe ? How automatic lathes are classified and list the operations carried out on automatic lathe. **2+4+2=8**

UNIT - IV

4 Briefly explain about any four :

(i) Honning

(ii) Lapping

(iii) Super finishing

(iv) Thread milling

(v) Thread Grinding

4×4=16

OR

4 (a) Explain the function of bond materials and about commonly used bond materials.

2+6=8

(b) The designation of the grinding wheel is given as

51 A 36 L 5 V 23

Explain the significance of the various elements of the codes.

8

UNIT - V

5 (a) How gears are manufactured by powder metallurgy process ? Explain.

6

(b) Why gear finishing processes are required ? Write down the advantages and limitations of gear shaving and gear lapping process.

2+4+4=10

OR

5 (a) Discuss the difference between gear hobbing and gear shaping.

8

(b) Briefly explain Electro-hydraulic forming methods.

8

4E4144

4E4144

B. Tech. IV-Sem. (Main / Back) Exam; April-May 2017

Mechanical Engineering

4ME5 Industrial Engineering

Common with Automobile

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 24

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT - I

1   (a)   Discuss the role of an Industrial Engineer in a manufacturing company.

8

(b)   Discuss the principles of motion economy and its application in plant layout and design of work stations.

2+3+3

OR

1   (a)   What is Productivity? Differentiate between Capital Productivity, Labour Productivity and Material Productivity with a suitable example.

2+2+2+2

(b)   State four benefits of Method study. Draw the symbols for four Therbligs and state their function. Make a left and right hand operation chart for changing a refill in a ball pen.

2+2+4

UNIT - II

2 (a) A work study was conducted in a factory. In a total of 5000 observations in 60 hours, no activity was found in 500 observations. The ratio between manual to machine elements is 3:1. Average performance rating is estimated at 85%. The total number of pieces produced during the observed duration is 120. Rest and personal allowances may be taken as 15% of the normal time. Calculate, the standard time in minutes.

8

(b) What is decision making? Discuss the stages of decision making.

4+4

OR

2 (a) What is scientific management? Discuss the principles of scientific management.

3+

(b) Describe the basic procedure for conducting a time study. What are the various allowances to be added to the observed time to determine standard time?

4+4

UNIT - III

3 (a) Discuss the procedure for the formation of a joint stock company.

8

(b) Explain what is 'cost of capital'? Discuss the relative advantages and disadvantages of equity capital versus borrowed capital.

4+4

OR

3 (a) Distinguish between the single proprietorship and partnership firms. Explain the concept of limited liability.

6+2

(b) Discuss the types of organizations with suitable organization charts. Which type of organization would you suggest for a startup company and why?

6+2

UNIT - IV

4 (a) The data (Rs in Lakhs) for company ABC is given below in Rupees in Lakhs.

Net Sales	=	1300
Rate of Tax	=	30%
Factory overheads	=	110
Interest paid	=	190
Materials Consumed	=	400
Marketing expenses	=	160
Gains from sale of old plant	=	30
Administrative overheads	=	130
Dividend	=	8%
Equity capital	=	900

Prepare a Profit and Loss statement for company and determine the Gross Profit, Profit before Interest Depreciation and Tax (PBIDT) and Profit after Tax.

5+1+1+1

(b) Write short notes on the following:
(1) Working capital
(2) Leverage ratios
(3) Profitability ratios
(4) Liquidity ratios

2×4=8

OR

4 (a) Explain the concept of time value of money. Company ABC has invested a sum of Rs I Lakhs for 5 years at an interest rate of 10% per annum, computed at annual rests. Company XYZ has invested the same amount at an interest rate of 9.6% for 5 years compounded quarterly. Which company has made the better investment?

8

(b) A semi-automatic machine (machine A) for a certain operation costs Rs. 2000. An automatic machine (machine B) for the same work costs Rs. 3000. Both the machines have a life of 4 years, and no salvage value. The operating cost for machine A is Rs 4000 per year, and the operating cost for machine B is Rs 3000 per year for the same output. Using present worth method and considering interest at 10% per annum, determine which machine must be purchased by the company.

8

UNIT - V

5 (a) What is depreciation? Discuss the various methods of calculating depreciation.

10

(b) The data for a small manufacturing concern is given below :
   Cost of Fixed Assets   =   Rs. 24,000
   Units sold   =   8,000
   Variable cost   =   Rs. 64,000
   Sale price per unit   =   Rs. 10
   Contribution for 8000 Units =   16,000

   Find out :
   (i) the Sales Volume required to Break Even
   (ii) the sales price for a Break Even sales of 10000 units.

6

OR

5 (a) Define Break-Even analysis. Explain the following terms :
   (i)   Profit Volume ratio
   (ii) Contribution
   (iii) Margin of Safety
   (iv) Variable Cost

8

(b) A machine is purchased at a cost of Rs 30 Lakhs. It has a useful life of 6 years, with an estimated salvage value of Rs 3 Lakhs. The rate of interest is 10%. Calculate the depreciation of the machine using the (a) straight line method, (b) sinking fund method and (c) sum of years digits method.

2+3+3

4E2054

4E2054

B. Tech. IV-Sem. (Back) Exam; April-May 2017
Mechanical Engineering
4ME6(O) Measurement and Control

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.
Use of following supporting materials is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT - I

1.   (a)   What is calibration and why is it necessary for an instrument ?

                                                                  6

   (b)   Explain the construction of wire wound strain gauge and derive the expression for the gauge factor.

                                                                  10

OR

1.   (a)   What is the need of a Mechanical Engineer to study measurement and control ? Differentiate Accuracy and Precision with an example.

                                                                    8

   (b)   Explain mechanical and optical strain gauges with neat sketch.

                                                                   8

UNIT - II

2 (a) Explain construction and working principle of LVDT.

8

(b) Explain with the help of diagram how stroboscope works. Also discuss how the measured speed can be verified to be true?

8

OR

2 Describe the working principle and construction of thermocouple. Describe the different types of compensations used and also methods of measurement of their output voltage.

16

UNIT - III

3 (a) Write down the advantage of closed loop control system over open loop control system ?

4

(b) Describe different types of input signals commonly used.

4

(c) Find the Transfer function of the following block diagram using block diagram reduction method.

Fig. 1

8
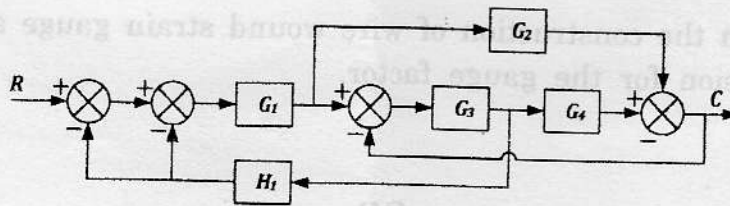
OR

3   (a)   Obtain the Transfer function for a negative feedback system with G(s) connected in its forward path and H(s) connected in its feedback path.

6

(b)   Simplify the block diagram shown and obtain the closed loop transfer function C(s) / R(s). Verify the result by signal flow graph.
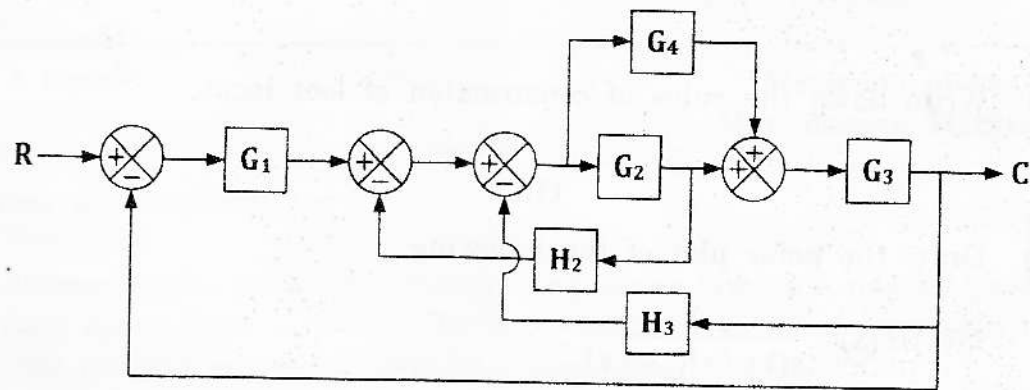
Fig. 2

10

UNIT - IV

4   Write short notes on the following :

(a)   Speed control system

(b)   Reeling system

(c)   Thermal system

(d)   Pneumatic system.

4×4

OR

4   (a)   Derive the transient response of a unit input first order system.

8

(b)   Define the feedback characteristics of control systems.

8

5   (a)   Define stability. Applying Routh criterion find the value of k if the system is stable.

$$G(s)\,H(s) = \frac{k(s+2)}{s(s+3)(s^2+2s+3)}$$

10

   (b)   Write down the rules of construction of loot locus.

6

OR

5   (a)   Draw the polar plot of the following :

$$G(s)H(s) = \frac{1}{s(1+T_1 s)(1+T_2 s)}$$

8

   (b)   Explain Nyquist stability criterion with the help of example.

8

4E4145

4E4145

B. Tech. IV-Sem. (Main & Back) Exam; April-May 2017

Mechanical Engineering

4ME6A I. C. Engines

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 26

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.
Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL   2. NIL

UNIT - I

1 (a) What are the fundamental differences between SI and CI engines ?

8

(b) Discuss the differences between ideal and actual valve timing diagrams of a petrol.

8

OR

1 A two stroke C.I. Engine delivers 5000 kW while using 1000 kW to overcome frictional losses. It consumes 2300 kg of fuel per hour at an air-fuel ratio of 20 to 1. The heating value of fuel is 42000 kJ/kg. Find the
(a) indicated power
(b) mechanical efficiency

(c) indicated thermal efficiency,
(d) brake thermal efficiency.

4×4=16

UNIT - II

2 (a) Explain briefly the process of combustion in S.I. engine and also explain the stages of combustion with the help of P-Q diagram.

8

(b) Describe the phenomenon of detonation in C.I. Engine.

8

OR

2 (a) Write a short note on alternative fuel for I.C. engines.

8

(b) What are the desirable properties of good I.C. engine fuels,

8

UNIT - III

3 Describe with suitable diagram the following systems of a carburettor :
(a) Main metering system.
(b) Idling system.
(c) Power enrichment or economizer system.
(d) Acceleration pump system.

4×4=16

OR

3 (a) State the advantages of electronic ignition system over convectional ignition system.

8

(b) Describe with the help of suitable diagram common rail direct injection system.

8

UNIT - IV

4   (a)   Discuss the functions of lubricant in an engine:

                   8

      (b)   Describe the mist lubrication system used for a two stroke engine,

                   8

OR

4   (a)   Explain water cooling system with suitable diagram. What is the function of fins ?

                   8

      (b)   Explain the methods of supercharging in four stroke engines.

                   8

UNIT - V

5   (a)   What is a dual fuel engine ? How mixing of fuel takes place.

                   8

      (b)   What is the effect of variable compression ratio on thermal efficiency of the engine ?

                   8

OR

5   (a)   Explain the working of stratified engine.

                   8

      (b)   What are the requirements of a dual fuel engine ?

                   8

4E4143

4E4143

B. Tech. IV-Sem. (Main) Exam; April-May 2017

Production & Industrial Engg.

4PI4A   Design of Machines Elements - I

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates :-

*Attempt any **five** questions, selecting **one question** from each unit. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.
Use of following supporting materials is permitted during examination.
(Mentioned in form No. 205)

1. NIL_____   2. NIL_____

UNIT - I

1   (a)   What is a machine element ? Give two examples.

4

    (b)   What do you understand by mechanical properties of materials ? How these are helpful in machine design ?

12

OR

1   (a)   What is 'machine design' ? Explain the basic procedure of machine design.

8

    (b)   Explain standardization, limits, fits and surface roughness for manufacturing consideration in design with neat sketch and suitable examples.

8

UNIT - II

2 (a) What is 'Stress concentration' ? How it can be reduced in a
       component ?

       8

   (b) Determine the diameter of a circular rod made of ductile material with
        a fatigue strength (complete stress reversal) σ_c = 265 MPa and a tensile
        yield strength of 350 MPa. The member is subjected to a variable axial
        load from W_{min} = $- 300 \times 10^3$ N to W_{max} = 700×10^3 N and has a stress
        concentration factor = 1.8. Use factor of safety as 2.0.

        8

OR

2   It is required to design a cotter joint to connect two steel rods of equal diameters.
    Each rod is subjected to an axial tensile force of 50 kN. Design the joint and
    specify its main dimensions.

    16

UNIT - III

3 (a) What is a 'beam' ? Which type of stresses can be induced in it ? Discuss
        the role of section modulus in beams design with two examples of different
        shapes.

        8

   (b) A truck spring has 12 number of leaves, two of which are full length
        leaves. The spring supports are 1.05 m and the central band is 85 mm
        wide. The central load is to be 5.4 kN with a permissible stress of 280 MPa.
        Determine the thickness and width of the steel spring leaves. The ratio
        of the total depth to the width of the spring is 3. Also determine the
        deflection of the spring.

        8

OR

3 (a) What is a 'lever' ? Explain the principle of it and leverage. Classify the
        levers.

        8

4E4143]   2   [P.T.O.

(b) A right angled bell-crank lever is to designed to raise a load of 5 kN at the short arm end. The lengths of short and long arms are 100 and 450 mm respectively. The lever and the pins are made of steel 30C8 (S_{yt} = 400 N/mm²) and the factor of safety is 5. The permissible bearing pressure on the pin is 10 N/mm². The lever has rectangular cross-section and the ratio of width to thickness is 3 : 1. The length to diameter ratio of fulcrum pin is 1.25 : 1

Calculate :
(i) The diameter and the length of fulcrum pin
(ii) The shear stress in the pin
(iii) The dimensions of the boss of the lever of the fulcrum and
(iv) The dimensions of the cross-section of the lever.
Assume that the arm of bending moment on the lever expands upto the axis of the fulcrum.

8

UNIT - IV

4 (a) A line shaft transmits 25 kW power at 200 rpm by means of a vertical belt drive. The diameter of the belt pulley is 1 m and the pulley overhangs 150 mm beyond the centre line of the end bearing. The belt tension acts vertically downward. The tension on the tight side of the belt is 2.5 times that on slack side. The shaft is made of plain carbon steel 40C8 (S_{yt} = 380 N/mm²) and the factor of safety is 2.5. The mass of the pulley is 25 kg. Determine the diameter of the shaft.

12

(b) What is a 'key' ? Explain the failure of key.

4

OR

4 (a) What is coupling ? Classify it.

4

(b) Design a muff coupling which is used to connect two steel shafts transmitting 25 kW power at 360 rpm. The shafts and key are made of plain carbon steel 30C8 (S_{yt} = S_{yc} = 400 N/mm²). The sleeve is made of grey cast iron FG 200 (S_{ut} = 200 N/mm²). The factor of safety for the shaft and key is 4. For the sleeve, the factor of safety is 6 based on ultimate strength.

12

UNIT - V

5 (a) Explain the concept of thread for single start and double start, relative to lead of them. Explain the terminologies used to define the threads with neat sketches.

8

(b) What are the 'locking devices' ? Classify them and explain their working concept with neat sketches.

8

OR

5 (a) Why uniform strength is required in bolts ? How it can be achieved ? Determine the diameter of the hole that must be drilled in a M48 belt such that the bolt becomes of uniform strength.

8

(b) A bracket, as shown in Fig. supports a load of 30 kN. Determine the size of bolts, if the maximum allowable tensile stress is in the bolt material is 60 MPa. the distances are $L_1 = 80$ mm, $L_2 = 250$ mm and $L = 500$ mm.

8
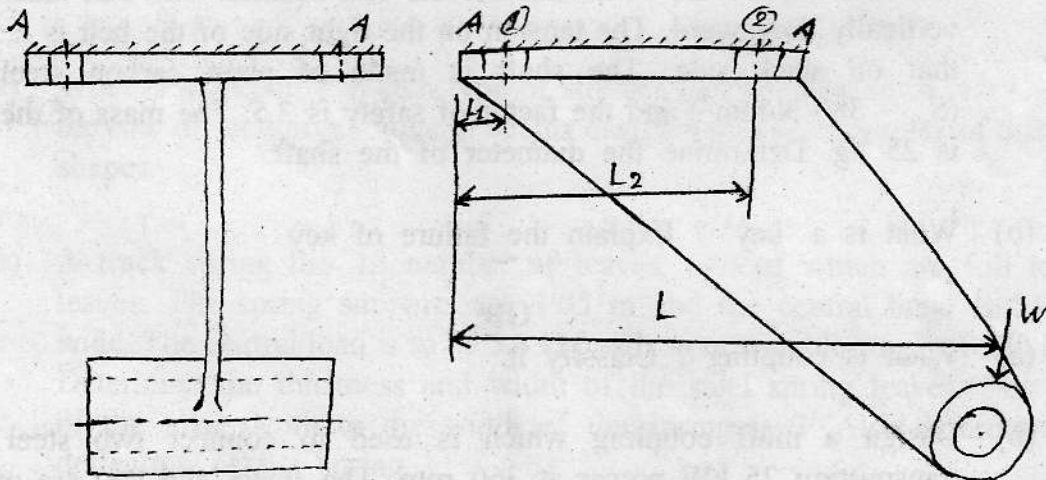
Fig. : Bracket with eccentric loading.

4E4148

B. Tech. IV-Sem. (Main & Back) Exam; April-May 2017

Automobile Engineering

4AE2A Fluid Mechanics & Machines

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 26

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.
Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT - I

1 (a) Define the viscosity and derive the expression of units of viscosity.

8

(b) Explain surface tension. Prove that the relationship between surface tension and pressure inside a droplet of liquid in excess of outside

pressure is given by $p = \dfrac{4\sigma}{d}$.

8

OR

1   (a)   If the velocity profile of a fluid over a plate is parabolic with the vertex 20 cm from the plate, where the velocity is 120 cm/sec. Calculate the velocity gradiant and shear stress at a distance of 0.10 and 20 cm from the plate, if the viscosity of fluid is 8.5 poise.

                                                                                           12

    (b)   Determine the viscosity of a liquid having kinematics viscosity 6 stokes and specific gravity 1.9.

                                                                                           4

UNIT - II

2   (a)   Determine the total pressure and centre of pressure on an isosceles triangular plate of base 11 m and altitude 4 m when it is immersed vertically in an oil of specific gravity 0.9. The base of the plate coincides with the free surface of oil.

                                                                                           10

    (b)   Explain the term meta-centre and metacentric height.

                                                                                           6

OR

2   A fluidflow field is given by

$$V = x^2 yi + y^2 zj - \left(2xyz + yz^2\right) K$$

Prove that it is a case of possible steady incompressible fluid flow. Calculate the velocity and acceleration at the point [2, 1, 3].

                                                                                           16

UNIT - III

3 (a) An oil of viscosity 0.1 Ns/m² and relative density 0.9 is flowing through a circular pipe of diameter 50 mm and length 300 m. The rate of flow of fluid through the pipe is 3.5 litre/sec. Find the pressure drop in a length of 300 m and also the shear stress at the pipe wall.

(b) Explain Prandtl mixing. Length Theory.

10

OR

6

3 (a) Show that velocity distribution for turbulent flow through rough pipe is given by $\dfrac{u}{u_*} = 5.75 \log_{10}(y/k) + 8.5$.

(b) Derive Hagen Poiseulle's equation.

8

8

UNIT - IV

4 In given dig. when a sudden contraction is introduced in a horizontal pipe line from 50 cm to 25 cm the pressure changes from 10500 kg/m² to 6900 kg/m². Calculate the rate of flow. Assume coefficient of contraction of let to be 0.65.Following this if there is a sudden enlargment from 25 cm to 50 cm and if the pressure at the 25 cm section is 6900 kg/m² what is the pressure at 50 cm enlarged section ?

16
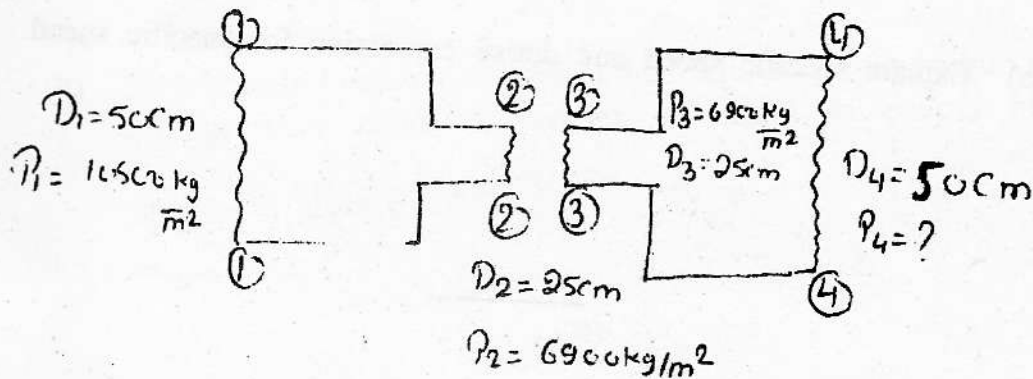
OR

4 (a) What do you mean by equivalent pipe ? Obtain expression for equivalent pipe.

8

(b) Define and explain the terms :

(i) Hydraulic gradient line

(ii) Total energy line.

4+4=8

UNIT - V

5 (a) Explain the working principle of Hydraulic Accumulator with a neat sketch.

8

(b) Explain the working principle of Hydraulic Ram with a neat sketch.

8

OR

**5** (a) Explain characteristic curve of hydraulic turbine.

8

(b) Explain specific speed and derive expression for specific speed.

8

ME (9)

Roll No. _____

4E4140
B. Tech. IV Sem. (Main/Back) Exam; April-May 2017
Mechanical Engg.
4ME1A Kinematics of Machines (Common with Automobile)

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used / calculated must be stated clearly.

Use of following supporting materials is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT - I

1 (a) What do you mean by inversion of mechanism ? Describe with the help of suitable sketches the inversion of a slider crank chain.

8

(b) The crank of an engine is 200 mm long and connecting rod length to crank radius ratio is 4. The crank has turned through 45° for inner dead centre position. The uniform speed of rotation of crank is 200 rpm clockwise. Determine velocity and acceleration of slider.

8

OR

1 (a) Draw and explain Klien's construction for determining the acceleration of the piston of a reciprocating engine.

8

(b) The link AB of a four bar mechanism resolves uniformly at 120 rpm in clockwise direction. Find the angular acceleration of link BC and CD. The dimensions of various links are as given : AB = 50 mm, BC = 100 mm, CD = 90 mm, AD = 120 mm and DAB = 60°.

8
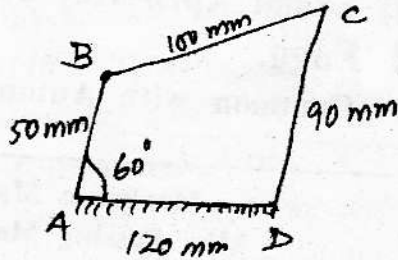
UNIT - II

2 (a) Sketch and describe the Ackermann steering mechanism. Discuss its advantages with respect to Davis mechanism.

8

(b) Explain the construction and working of overhead value mechanism.

8

OR

2 (a) Describe the working of hook's joint. Also show for a hook's joint that $\tan\theta = \tan\phi \cdot \cos\alpha$ where the θ, ϕ, α have their usual meaning.

8

(b) Two shafts are connected by means of hook's joint, the angle between the shafts is 20°. What will be the angle turned by driving shaft when :
(i) Velocity ratio is maximum, minimum and unity.
(ii) Acceleration of driven shaft is maximum and zero.

8

UNIT - III

3 (a) Derive the conditions for maximum power transmitted by belt drive.

8

(b) A shaft rotating at 200 rpm, another shaft at 300 rpm and transmits 6 kW through a belt. The belt is 100 mm wide and 10 mm thick. The distance between the shafts is 4m. The smaller pulley is 0.5 m in diameter. Calculate the stress in the belt : if it is -
(i) An open belt drive
(ii) An cross belt drive, take $\mu = 0.3$.

8

OR

3 (a) Derive an expression for tension ratio of V-belt -
$$\frac{T_1}{T_2} = e^{\frac{\mu\theta}{\sin\alpha}}$$

     8

(b) Find the effort required at the end of handle, fitted to the screw of a screw jack to lift a load of 2000 N. The length of handle is 50 cm. The mean diameter and pitch of screw are 6 cm and 1 cm respectively. The coefficient of friction is 0.09.

     8

UNIT - IV

4 (a) Derive an expression for the torque transmitted by a single plate clutch assuming uniform wear.

     8

(b) A torque of 350 N-m is transmitted through a cone clutch having a mean diameter of 300 mm and a semicone angle of 15°. The maximum normal pressure at the mean radius is $150\,kN/m^2$. The coefficient of friction is 0.3. Calculate the width of the contact surface. Also, find the axial force to engage the clutch.

     8

OR

4 (a) Derive the expression of retardation when brakes are applied to the front wheel of an automobile and -
  (i) Vehicle moves up on inclined plane
  (ii) Vehicle moves on level road.

     8

(b) Describe the construction and operation of a prony brake absorption dynamometer.

     8

UNIT - V

5 (a) Draw the displacement, velocity and acceleraiton diagram for a follower when it moves with SHM. Derive the expression for velocity and acceleration during out stroke and return stroke of the follower.

     8

(b) A cam with 30 mm minimum radius is rotating clockwise at 1200 rpm to give the follower motion to a roller follower of 20 mm diameter -

(a) Lift = 25 mm

(b) Follower offset = 10 mm

(c) Follower rise during 120° cam rotation with SHM.

(d) Follower to dwell for next 60° cam rotation.

(e) Follower to return during 120° cam rotation with uniform velocity.

(f) Follower to dwell for remaining period.

Draw the profile of cam for above conditions.

8

OR

5 (a) Define the following terms as applied to cam with a neat sketch :

(i) Base circle

(ii) Pitch circle

(iii) Pressure angle

(iv) Stroke of the follower

8

(b) A cam with minimum radius of 50 mm, rotating clockwise at a uniform speed, is required to give a knife edge follower the motion as described below :

(i) To move outwards through 40 mm during 100° rotation of the cam.

(ii) To dwell for next 80°.

(iii) To reutrn to its starting position during next 90°.

(iv) To dwell for the rest period of a revolution i.e. 90°.

Draw the profile of the cam.

When the line of stroke of follower is offset by 15 mm.

The displacement of the follower is to take place with uniform acceleration and uniform retardation. Determine the maximum velocity and acceleration of the follower when the cam shaft rotates at 900 rpm.

8

Roll No. _____

Total No. of Pages : 3

4E2050

4E2050
B. Tech. IV-Sem. (Back) Exam; April-May 2017
Mechanical Engineering
4ME2(O) Automobile Engineering

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates :-

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.
Units of quantities used / calculated must be stated clearly.
Use of following supporting materials is permitted during examination.
(Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT - I

1   What is the function of a frame ? Explain conventional, semi-integral and integral frame with neat sketches.

16

OR

1   How are clutches classified ? Explain the working of a centrifugal clutch with suitable sketch.

16

UNIT - II

2   Explain any two of the following gear forces :
     (i)   Sliding mesh gear box
     (ii) Constant mesh gear box
     (iii) Synchromesh gear box.

                                                          8×2=16

OR

2   Explain briefly with the help of neat sketches :
     (i)   Half floating rear axle
     (ii) Fully floating rear axle.

                                                          8×2=16

UNIT - III

3   (a) What is a suspension system ? Discuss the elements of a suspension
          system.
                                                                        8

     (b) Give the layout of a steering system and label the various parts. Also
          explain the working of a steering system.
                                                                        8

OR

3   (a) Describe the construction of a type. What are the causes of a tyre
          wear ?
                                                                        8

     (b) How are brakes classified ? Explain the working of hydraulic brakes.
                                                                        8

UNIT - IV

4   Explain briefly :
     (i)   Specific gravity test
     (ii) Open volt test
     (iii) Trickle charging
     (iv) Battery rating.

                                                          4×4=16

OR

4 Draw and explain the simplified wiring circuit for the lighting system of a car.

16

UNIT - V

5 What do you understand by automotive air conditioning ? Explain the major components automotive air conditioning with the help of neat sketches.

16

OR

5 Write short notes on :
(i) Air bags
(ii) NVS (Night Vision System)
(iii) GPS (Global positioning system)
(iv) Safety belts.

4×4=16

4E4141
B. Tech. IV-Sem. (Back) Exam; April-May 2017
Mechanical Engg.
4ME2A(O) Fluid Mechanics

Time : 3 Hours   Maximum Marks : 80
                                  Min. Passing Marks : 26

Instructions to Candidates :-

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.
Units of quantities used / calculated must be stated clearly.
Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL_____   2. NIL_____

UNIT - I

1   A - U-tube Manometer is used to measure the pressure of water in a pipeline, which is in excess of atmospheric pressure. The right limb of the manometer contain mercury and is open to atmosphere. The contact between water and mercury is in the left limb. Determine the pressure of water in the main line, if the difference in level of mercury in the limbs of U-tube is 10 cm and free surface of mercury is in level with the centre of the pipe. If the pressure of water in pipeline is reduced to 9810 N/m^2, calculate the new difference in the level of mercury. Sketch the arrangements in both cases.

16

OR

1 (a) Determine the viscosity of a liquid having kinematic viscosity 6 stokes and specific gravity 1.9.

6

   (b) A caisson for closing the entrance to a dry clock is of trapezoidal form 16 m wide at top and 10 m wide at bottom and 6 m deep. Find total pressure and centre of pressure on the caisson if the water on outside is just level with the top and clock is empty.

10

UNIT - II

2 A fluid flow field is given by

$$V = x^2 y i + y^2 z j - \left(2xyz + yz^2\right) K$$

Prove that it is a case of possible steady incompressible fluidflow. Calculate velocity and acceleration at point [2, 1, 3].

16

OR

2 (a) Derive the Bernoull's Equation.

8

   (b) A nozzle of diameter 20 mm is fitted to a pipe of diameter 40 mm. Find the force exerted by nozzle on the water which is flowing through the pipe at the rate of 1.2 m³/min.

8

4E4141]   2   [P.T.O.

UNIT - III

3 (a) Derive the Hagen Poiseuille formula.

8

(b) An oil of viscosity 10 poise flows between two parallel fixed plates which are kept at a distance of 50 mm apart. Find the rate of flow of oil between the plates if the drop of pressure in a length of 1.2 m be 0.3 N/cm^3. The width of plate is 200 mm.

8

OR

3 (a) A rough pipe is of diameter 8.0 cm. The velocity at a point 3.0 cm from wall is 30% more than velocity at a point 1.0 cm from pipe wall. Determine the average height of roughness.

8

(b) Explain hydrodynamically smooth and rough boundaries.

8

UNIT - IV

4 (a) Derive the discharge formula for venturimeter.

8

(b) Derive the experssion for discharge over a triangular notch.

8

OR

4   (a)   Derive the Darcy-Weisbach equation.

8

(b)   A horizontal pipe line 40 m long is connected to a water tank at one end and discharge freely into the atmosphere at the other end. For the first 25 m of its length from the tank, the pipe is 150 mm diameter and its diameter is suddenly enlarged to 300 mm. The height of water level in the tank is 8 m above the centre of pipe. Consider all losses of head which occur, determine the rate of flow.

Take $f = .01$ for both secitons of the pipel

8

UNIT - V

5   (a)   A Pelton wheel has a mean bucket speed of 10 meter per second with a jet of water flowing at the rate of 700 litres/sec. Under a head of 30 meter. The buckets deflect the jet through an angle of 160°. Calculate the power given by water to the runner and hydraulic efficiency of turbine take $C_v = .98$.

8

(b)   Explain the draft-tube.

8

OR

5   Explain any four in following :
(i)   Hydraulic press
(ii)   Hydraulic ram
(iii)   Hydraulic lift
(iv)   Hydraulic accumulator
(v)   Hydraulic coupling
(vi)   Hydraulic torque converter gear pump.

4×4