Code No. 3047 / O

FACULTY OF ENGINEERING

B.E. 2/4 (Civil) II – Semester (Old) Examination, December 2016

Subject: Fluid Mechanics – I

Time: 3 Hours **Max.Marks: 75**

Note: Answer all questions from Part A. Answer any five questions from Part B.

PART – A (25 Marks)

1 Differentiate between notch and weir. 2

2 Define the terms viscosity and surface tension. 2

3 What is Buoyancy? 2

4 Discuss the applications of impulse momentum equation in fluid mechanics. 2

5 Define convective and local acceleration. 2

6 Define stagnation point and Mach angle. 3

7 Differentiate between free vertex and forced vertex flow. 3

8 Prove that the velocity of sound wave in compressible fluid is given by $c = \sqrt{k/p}$. 3

9 List out the minor losses in pipe flow. 3

10 Write the Bernoulli's equation for isothermal process. 3

PART – B (5x10 = 50 Marks)

11 a) State and prove Pascal's law. 6

b) The velocity potential function $Ø = 5(x^2-y^2)$. Calculate the velocity at the point (4, 5). 4

12 a) Derive Bernoulli's equation from Euler's equation of motion and clearly state the assumptions involved. 5

b) A pipe bend tapers in the direction of flow with a diameter of 300 mm and carries water at a head of 20 m with velocity 3.5 m/sec. If the axis of the pipe is at 45^o. Find the magnitude and direction of the resultant force at the bend. 5

13 a) Derive discharge expression for triangular notch or weir. 5

b) Prove that error in discharge due to error in measurement of head over rectangular notch is given by $\frac{dQ}{Q} = 1.5\frac{dH}{H}$. 5

14 A gas with velocity 300 m/s is flowing through a horizontal pipe at a section where the pressure is $6x10^4$ N/m^2 and temperature 40^oC. The pipe changes in diameter at this section the pressure is $9x10^4$ N/m^2. Find the velocity of gas at this section if the flow is adiabatic. Take R = 287 J/kg/^{o}K and K = 1.4. 10

…2.

15 a) Derive Darcy-Weisbach equation. 6

b) Determine the wall shear stress in a pipe of diameter 100 mm which carries water. The velocities at the pipe center and 30 mm from the pipe centre are 2 m/s and 1.5 m/s. Consider the flow in pipe is as turbulent. 4

16 a) Derive the expression for loss of energy due to sudden contraction in a circular pipe. 5

b) Oil of specific gravity 0.9 flows in a 300 mm diameter at the rate of 120 litres per second and the pressure at a point A is 24.525 kPa. If the point A is 5.2 m above the datum line, calculate the total energy at point A in terms of meters of oil. 5

17 a) Explain the significance of Reynold's experiment along with upper and lower critical Reynold's number. 5

b) Draw a neat sketch of differential manometer and explain how difference in pressure between two points is measured. 5

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Code No. 3083 / N

FACULTY OF ENGINEERING

B.E. 2/4 (Civil) II – Semester (New) (Suppl.) Examination, December 2016

Subject: Fluid Mechanics – I

Time: 3 Hours **Max.Marks: 75**

Note: Answer all questions from Part A. Answer any five questions from Part B.

PART – A (25 Marks)

1 Write the relation between absolute pressure, atmospheric pressure and gauge pressure. (2)

2 Differentiate between local acceleration and convective acceleration with equation. (2)

3 Why is divergence more gradual than convergence in a Venturimeter? (2)

4 A jet propelled aircraft is flying at 1100 km/hr at sea level, calculate the Mach Number at a point on the aircraft where air temperature is 20^{o}C.(R=287 J/kg K and K=1.4). (2)

5 Define Reynolds number and explain its significance. (2)

6 State and briefly explain Newton's law of viscosity. (3)

7 Explain the limitations and assumptions of Bernoulli's equation. (3)

8 What do you mean by velocity approach in a notch? (3)

9 Define Mach number, Explain with a neat sketch about Mach cone. (3)

10 Distinguish between lower critical Reynolds number and upper critical Reynolds number. (3)

PART – B (50 Marks)

11 a) Explain briefly the following terms: i) Mass Density ii) weight density iii) specific gravity iv) Dynamic viscosity v) kinematic viscosity. (5)

b) A 2-dimensional flow is described by the velocity components $u=6x^3$ and $V=16x^2y$. Determine the stream function and velocity potential function. (5)

12 a) Derive Euler's equation of motion in three dimensions. (5)

b) A 60^{o} reducing bend is connected in a pipe line, the diameter at inlet and outlet of the bend being 50cm and 25cm respectively. Find the force exerted by the water on the bend if the intensity of pressure at inlet of the bend is 200kN/m^2. The rate of flow is 1m^3/s. (5)

13 a) Describe the working principle of Bourdon pressure gauge with neat sketch. (5)

b) In a vertical pipe conveying oil of specific gravity 0.9, two pressure gauges have been installed at A and B, where the diameters are 160mm and 80mm respectively. A is 2m above B, the pressure gauge reading have shown that the pressure at B is greater than at 'A' by 0.1kg/cm^2. Neglecting all the losses, calculate the rate of flow. (5)

14 a) Obtain the expression for the velocity of sound for the compressible flow in terms of pressure and density. Also obtain the relevant expression for velocity of sound in terms of bulk modulus. (5)

b) A rocket travels in air of pressure 1.033kg/cm^2 at 15^{o}C at a velocity of 1650km/hr. Find the Mach number and Mach angle. Take K=1.4 and R=29.2 kgm/kg^o K. (5)

15 a) Derive Darcy's Weisbach equation for the loss of head due o friction in a pipe with the aid of neat sketch. (5)

b) In a pipe of 20mm diameter, the maximum velocity of flow is found to be 1.5m/s. If flow in the pipe is laminar, find (i) the average velocity and the radius at which it occurs, and (ii) the velocity at 40mm from the wall of the pipe. (5)

16 a) Derive the three dimensional continuity equation in Cartesian coordinates. (5)

b) Lubricating oil of specific gravity 0.86 is pumped through 305m long horizontal pipe at a rate 1.23x10^{-3} m^3/sec. What is the viscosity of oil, if the pressure drop is 210Pa? The diameter of pipe is 15cm. (5)

17 Write short notes on **TWO** of the following: (10)

a) Application of impulse momentum principle.

b) Moody's diagram

c) Hot wire anemometer

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Code No. 3055 / O

FACULTY OF ENGINEERING

B.E. 2/4 (EEE) II – Semester (Old) Examination, December 2016

Subject: Electrical Machinery – I

Time: 3 Hours **Max.Marks: 75**

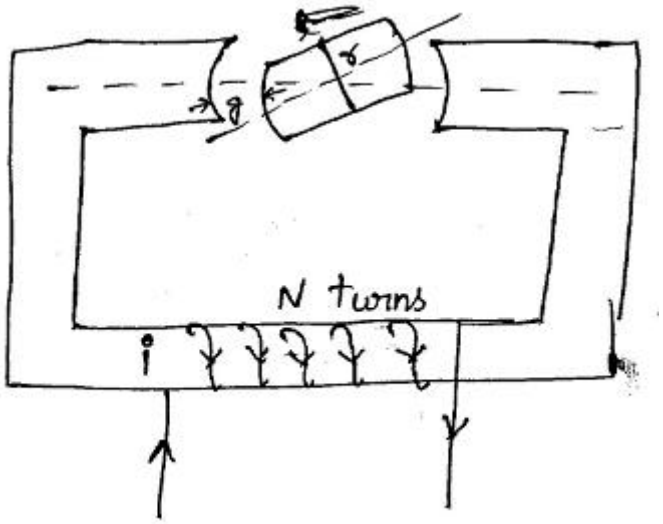
Note: Answer all questions from Part A. Answer any five questions from Part B.

PART – A (25 Marks)

1	Draw electromechanical energy conversion system.	2
2	What are the electromechanical energy conversion devices?	2
3	Why do we need insulation in between the armature laminations?	2
4	Classify the D.C machines and draw their schematic diagram.	3
5	Derive the generated e.m.f of a D.C generator.	3
6	What is the significance of back e.m.f in a D.C. motor?	3
7	A D.C motor takes an armature current of 110 A at 480 V. The armature circuit resistance is 0.2Ω. The machine has 6 poles and the armature is lap-connected with 864 conductors. The flux per pole is 0.05 wb. Calculate (a) speed (b) Gross torque developed by the armature.	3
8	What are the disadvantages of a O.C test on transformer.	2
9	Name various types of transformers w.r.t. core types.	2
10	What type of transformer connection is suitable for low current applications and why.	3

PART – B (5x10 = 50 Marks)

11 What is the torque developed by the mechanical configuration shown below radius = 60 mm, gap length g = 2 mm, length normal to radius ℓ = 10 mm. 10



12 a) What are the armature reaction effects and how to overcome those effects. 5

b) Explain parallel operation of D.C. generators. 5

13 a) Draw and explain torque-armature current, speed-armature current and speed torque characteristics of D.C shunt motor. 5

b) Explain how efficiency of a D.C motor is obtained by conducting Swinburne's test. 5

14 a) Explain O.C test on 1¤ transformer. 5

b) Full load copper losses on the h.v side of a 100 KVA, 11000 / 317 V 1ϕ transformer is 0.62 kW and on the L.V side 0.48 kW. Calculate R_1, R_2 and R_3 the equivalent resistance. 5

15 Explain Scott connection of transformers. 10

16 a) Explain the various methods of starting a DC motor with neat diagrams. 5

b) Explain the theory of commutation. 5

17 a) Explain brush shift in a D.C machine. 5

b) How speed of a D.C. motor varies by changing field current. 5

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CODE No. 3092/N

FACULTY OF ENGINEERING

B.E. 2/4 (EEE) II - Semester (New) (Suppl.) Examination, December 2016

Subject : Electrical Machines - I

Time : 3 Hours **Max. Marks: 75**

Note: Answer all questions from Part-A and answer any five questions from Part-B.

PART – A (25 Marks)

1 Explain the concept of co-energy with I & λ curve.
2 Write a note on doubly excited system.
3 Define winding pitch and commutator pitch.
4 Write the EMF equation of DC generator explaining all terms. .
5 Why DC series motor is called variable speed motor ?
6 Why is the speed of shunt motor practically constant ?
7 State the advantages and disadvantages of Flux control method.
8 Draw and explain the characteristics of compound motor.
9 State the advantages and applications of auto transformer.
10 Explain the working of tank and other accessories like terminal, bushing etc in a 1-ϕ transformer.

PART-B (5 X 10 = 50 Marks)

11 a) What do you mean by "energy" and "co-energy" in magnetic system? Also mention its importance.
b) In a rectangular electromagnetic relay, the existing coil has 1500 turns of resistance of 1Ω. The cross-sectional area of the core A=5 cmx5cm. Neglect the reluctance of magnetic circuit and fringing effects. If the coil is exited with an ac voltage of 50 Hz frequency, having peak to peak voltage of 100 v and armature is held at a fixed distance of 1 cm, find the average force on the armature.

12 a) Draw the performance characteristic of different types of DC generators and explain them. .
b) A 100 kW DC shunt generator driven by a belt from an engine runs at 750 rpm and is connected to 230 V de mains. When the belt breaks, it continues to run as motor drawing 9kW from the mains. At what speed would it run ? Given : Armature resistance =0.018Ω and field resistance=115Ω

13 a) Derive from the fundamental, emf and torque equations and explain the characteristics of DC shunt motor.
b) A 250 V dc shunt motor has an armature resistance of 0.5Ω and a field resistance of 25Ω. When driving a constant torque load at 600 rphm, the motor draws 21 A. What will be the new speed of the motor if an additional 250 Ω resistance is inserted in the field circuit.

14 a) Discuss in detail about shunt armature speed control of dc shunt motor. .
b) A d.c. series motor having a resistance of 1Ω drives a fan for which the torque varies as the square of speed. At 220 v, the set runs at 350 r.p.m. and takes 25A. The speed is to be raised to 500 r.p.m. by increasing the voltage. Determine the necessary voltage and the corresponding current assuming the field to be unsaturated.

Contd…..2

15 a) Draw the circuit of any one type of starter and explain its operation.

b) A series motor of resistance 1 Ω between terminal runs at 800 rpm, 200 v with a current of 15 A. Find the speed at which it will run when connected in series a 5 Ω resistance and taking the same current at the same supply voltage.

16 a) Derive an expression for maximum efficiency of a transformer.

b) A 250/2500 V, 1-ϕ, 50 Hz Transformer has an equivalent resistance of 600 Ω and reactance of 110 Ω, referred to LT side. The noload impedance in 2 + j 50 Ω. The load connected to the HT terminal is 380+j230Ω for a primary voltage of 250V. Find (i) secondary voltage (ii) primary current and and power output of the transformer.

17 Discuss in detail about the following :

(a) Stray load losses.

(b) Eddy current loss.

(c) Condition for maximum efficiency in transformers.

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Code No. 3056 / O

FACULTY OF ENGINEERING

B.E. 2/4 (Inst.) II - Semester (Old) Examination, December 2016

Subject : Electrical Machines

Time : 3 Hours **Max. Marks: 75**

Note: Answer all questions from Part - A and answer any five questions from Part-B.

PART – A (25 Marks)

1 Explain the principle of operation of DC Motor. (2)
2 Why a starter is required to start a D.C. Motor? (2)
3 Define regulation of a transformer. Draw the equivalent diagram of transformer. (3)
4 Show by means of a connection diagram, how a two-winding transformer can be used as an auto-transformer. Give applications. (3)
5 "Single phase induction motor is not self starting". Why? (3)
6 Derive the torque equation for a 3-phase induction motor. (2)
7 Give the reason why capacitor is used in ceiling fans? (2)
8 Justify whether synchronous impedance method gives a poorer voltage regulation. (2)
9 Explain the operation of DC compound generator. (3)
10 Compare DC Series and Shunt motor. Also give applications. (3)

PART – B (50 marks)

11 (a) Explain how A.C. voltage generated is converted to D.C. voltage in a generator.
(b) What is the main purpose of laminating the armature core of a D.C. Generator.
(c) A 4-pole, long shunt, lap wound generator supplies 25kw at a terminal voltage of 500 V. The armature resistance is 0.03Ω, series field resistance is 0.04Ω and shunt field resistance is 200Ω. The brush drop may be taken as 1 V. Determine the e.m.f. generated.

12 (a) Explain the following:
(i) Back e.m.f
(ii) Necessity of starter for a D.C motor.
(b) Derive an expression for the speed of a D.C motor.
(c) Draw the speed Vs Torque characteristics of a:
(i) Series motor and
(ii) Shunt motor.

13 (a) Derive the EMF equation of transformer. Hence derive the voltage ratio.
(b) A 15kVA 2400/240 V, 60 Hz transformer has a magnetic core of 50cm^2 cross section and a mean length of 66.7 cm. The application of 2400 V causes magnetic field intensity of 450 AT/m (RMS) and a maximum flux density of 1.5 T. Determine:
(i) The turn's ratio
(ii) The number of turns in each winding
(iii) The magnetizing current

..2

14 (a) Discuss in detail the predetermination of regulation of an alternator from the open circuit and short circuit tests.

(b) A 2000 V, single-phase alternator was tested on open circuit and short circuit. The details of which are as follows:
A field current of 2.5A produced a short circuit current of 100 A. With open circuit, the same field current generates an e.m.f. of 500V. The effective resistance of the armature is 0.8 ohm. Calculate the regulation at full load current of 100A.
(i) at a power factor of 0.75 lagging (ii) at a power factor of 0.65 leading.

15 (a) Explain the principle of rotating magnetic field and hence prove that it is of constant magnitude and rotates at synchronous speed.

(b) A 3-phase, 4 pole 50 Hz induction motor has a full load speed of 1440 rpm. For this motor, calculate the following
(i) full-load slip and rotor frequency
(ii) speed of stator field with respect to
(A) stator structure and
(B) rotor structure and
(iii) speed of rotor field with respect to
(A) rotor structure
(B) stator structure and
(C) stator field.

16 (a) With a neat sketch, explain the principle of operation of Shaded pole Induction motor.

(b) Explain the working principle of split-phase capacitor-run single phase induction motor.

17 Write short notes on:
(i) Conversion of 3-phase to 2-phase in transformer
(ii) Synchronous condenser

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Code No. 3093 / N

FACULTY OF ENGINEERING

B.E. 2/4 (Inst.) II – Semester (New) (Suppl.) Examination, December 2016

Subject: Electrical Machines

Time: 3 Hours **Max.Marks: 75**

Note: Answer all questions from Part A. Answer any five questions from Part B.

PART – A (25 Marks)

1	Write a brief note on electro mechanical energy conversion.	3
2	What are the functions of commutator in a dc machine?	3
3	What are the various losses occurring in a dc series motor?	3
4	What is meant by ideal transformer?	2
5	Define all day efficiency of a transformer.	2
6	Mention two applications of synchronous motor.	2
7	A single-phase induction motor, by itself, is not self starting. Give reasons – Why?	2
8	Draw the phasor diagram of an alternator when delivering a leading power factor load.	3
9	Give a few applications of synchronous motors.	3
10	Why are induction motors called “asynchronous”?	2

PART – B (5x10 = 50 Marks)

11	a)	Describe with relevant diagrams, the different methods of excitation of D.C. machines.	5
	b)	Explain the commutation process in DC machines with the help of neat diagrams.	5
12	a)	Explain armature and field speed control of DC shunt motor with neat circuit diagram and necessary equation.	5
	b)	A 220 V, DC shunt motor has armature resistance of 0.08 Ohms, on load it takes an armature current of 60 A and runs at 740 rpm. If the flux of the motor is reduced by 12% without changing the load torque, calculate the new speed of the motor.	5
13	a)	Explain O.C and S.C tests conducted on a single phase transformer with neat diagrams.	5
	b)	The efficiency of a 1 MVA, 110 / 220 V, 50 Hz single phase transformer is 98.7% at half load at 0.8 p.f. lagging and 98.9% at full load 0.8 p.f. lagging. Determine the full load copper loss and iron loss.	5

…2.

14 a) Define the terms synchronous reactance and voltage regulation of alternator. Explain synchronous impedance method of determining regulation of an alternator. 5

b) From the following tests, determine the regulation of a 2 KVA single phase alternator, delivering a current of 100 A at 0.8 p.f. leading. Test results:- Full load current of 100 A is produced on short circuit by a field excitation of 2.5 A. An emf of 500 V is produced on open circuit by the same field current. The armature resistance is 0.8 Ohm. 5

15 a) Explain any one speed control method of 3-phase induction motor. 5

b) the rotor of a 6-pole, 50 Hz, 3-phase induction motor has a resistance of 0.2 ohm / phase and runs at 960 rpm. If the load torque remains unchanged. Calculate the additional rotor resistance that will reduce the speed by 10%. 5

16 a) Explain the construction and principle of operation of a synchronous motor. 5

b) Explain the construction, working and applications of a stepper motor. 5

17 Write short notes on the following:

a) Synchronous condenser 5

b) Micro motors. 5

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Code No. 3062 / O

FACULTY OF ENGINEERING

B.E. 2/4 (ECE) II-Semester (Old) Examination, Nov. / Dec. 2016

Subject : Signal Analysis and Transformation Techniques

Time : 3 hours **Max. Marks : 75**

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1 State any three properties of continuous time unit impulse function. 2
2 Determine the power and Energy of x(t) where x(t) = A exp(- at) ; a > 0. 3
3 State and prove Convolution Theorem. 2
4 Distinguish between Energy Spectral Density versus Power Spectral Density. 3
5 Find the inverse Laplace Transform of X(s) = 1/ (s)(s+3). 2
6 If x(t) = [Sin^2(at)/t] ; find X(s). 3
7 State and prove parsevel's theorem in Z-domain. 3
8 Find the Z-transform of the following sequence x(n) given below; 3
x(n) = [$(1/2)^n$ u(n) * $(1/4)^n$ u(n)], using convolution property.
9 Find DTFT of the following sequence x(n) = [$Sinw_0n$. u(n)]. 2
10 Find DFT of the sequence x(n) = [1, -2 , 2, 3]. 2

PART – B (50 Marks)

11 a) Find the Fourier series for periodic signal x(t) = t; for 0 ≤ t ≤ 1; so that t repeats every 1 second. 6
b) Find the time domain signal Corresponding to $C_n = (-1/2)^{|n|}$, $\omega_0 = 1$. 4

12 a) Compare Fourier transform and Laplace transform. 5
b) Using frequency shift property find Laplace transform of x(t) = t^2 e^{-3t} u(t). 5

13 a) Find the Autocorrelation of the signal x(t) = A cos($w_0t + \phi$). 5
b) Verify parseval's theorem for the energy signal x(t) = exp (-3t). u(t). 5

14 a) A signal x(t) = [cos ω_0 t + 2 sin ω_0 t + 0.5 sin 4 ω_0 t] ; is filtered by an RC low pass filter with a 3 dB frequency fc = $2f_0$. Find output power S_0. 5
b) If x(t) = cos ω_0 t, then find energy spectral density. 5

15 An LTI system is described by the difference equation
y(n)-(9/4) y(n-1) + (1/2) y(n-2) = [x(n) – 3x(n-1)] ; find H(Z) ? also plot ROC.
Find h(n) if the system is stable and causal. 5+5

16 a) Find the inverse Z-transform of X(z) = z(z-1) / $[(z+1)^3$ (z+2)] ; Roc : |z| > 2. 5
b) Find inverse Z-transform of X(z) = z/$(z-1)^3$; using Residue theorem method. 5

17 a) Find the inverse Fourier transform for the first order recursive filter
H(w) = 1/{(1-a e^{-jw})} . 5
b) The output y(n) of a liner shift invariant system with input x(n) is given by
y(n) = x(n) – 2x(n-1) + x(n-2) . Determine the magnitude and phase response of the system. 5

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Code No. 3099 / N

FACULTY OF ENGINEERING

B.E. 2/4 (ECE) II – Semester (New) (Suppl.) Examination, December 2016

Subject: Signal Analysis and Transform Techniques

Time: 3 Hours **Max.Marks: 75**

Note: Answer all questions from Part A. Answer any five questions from Part B.

PART – A (25 Marks)

1 Sketch the following signals

a) u(n+2).u(-n+3)

b) x(n) = u(n+4)-u(n-2) 2

2 Examine whether the following signals are periodic or not.

a) x(t) = 3u(t) + 2 sin 2t

b) x(t) = sin(10t + 1) – 2cos(5t-2). 3

3 Show that the following signals are orthogonal over an interval [0, 1] $x_1(t) = 2$;

$x_2(t) = \sqrt{3}(1-2t)$. 3

4 State and prove convolution theorem. 2

5 Given x(t) = sin (2t+ $\frac{®}{4}$) and x(t) = $\cos^2 t$; find complex exponential Fourier series. 3

6 What do you mean by Gibb's phenomenon? 2

7 State and prove Parseval's energy Theorem. 2

8 State properties of PSD? 3

9 Find z-transform of y(n) = x(n-2)u(n) and y(n) = x(n+2)u(n). 3

10 The impulse response of a system is $h(n) = \begin{cases} 1 & \text{for } 0 \le n \le N-1 \\ 0 & \text{otherwise} \end{cases}$

find transfer function. 2

PART – B (5x10 = 50 Marks)

11 a) Determine the power and rms value of signal $x(t) = A\sin(w_o t + \bar{\ })$. 5

b) Find whether the signal is energy or power signal. 5

$$x(t) = \begin{cases} t-2, & -2 \le t \le 0 \\ 2-t, & 0 \le t \le 2 \\ 0 & -- \end{cases}$$

…2.

12 a) Test the following system are linear, causal, stable, time variant or not. 6

y(n) = $a^{x(n)}$; y(n) = sin $\left\{\frac{2® \text{ b fn}}{F}\right\}$ x(n).

b) Find inverse Fourier transform of the following signals. 4

X(w) = $\frac{4(jw)+6}{(jw)^2+6(jw)+8}$ and X(w) = $\frac{1+3(jw)}{(jw+3)}$

13 a) Find the Laplace transform of x(t) = u(t-1); and x(t) = $\bar{e}^{2t}$ u(-t) + $\bar{e}^{3t}$ u(-t). 5

b) State and prove final value theorem in s-domain. 5

14 a) The input and impulse response to the system are given by x(t) = u(t+2) and h(t) = u(t-3). Determine output of the system graphically. 6

b) State and prove properties of autocorrelation functions. 4

15 Find the convolution of the signals $x_1(t) = \bar{e}^{2t}u(t)$ and $x_2(t) = \bar{e}^{4t}u(t)$ using convolution property of Laplace transform and verify result in time domain too. 10

16 a) Using final value theorem find $x(\infty)$ if JX(z) is given by

i) $\frac{z+1}{(z-06)^2}$

ii) $\frac{z+2}{4(z-1)(z+0.7)}$

iii) $\frac{2z+3}{(z+1)(z+3)}$

b) State all properties of ROC in terms of z-domain.

17 a) Find impulse and step response of the system 5

y(n) = 2x(n) – 3x(n-1) + x(n-2) – 4x(n-3)

b) The output y(n) for an LTI system with input x(n) is given by 5

y(n) = x(n) – 2x(n-1) + x(n-2)

Determine magnitude and phase response.

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Code No. 3065 / O

FACULTY OF ENGINEERING

B.E. 2/4 (M/P/AE) II-Semester (Old) Examination, Nov. / Dec. 2016

Subject : Kinematics of Machines

Time : 3 hours **Max. Marks : 75**

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1 Classify kinematic elements with examples.
2 Sketch a slider crank mechanism when the piston is at one of the dead center position, and locate all I-centers.
3 Differentiate Davis and Ackermann steering gear mechanisms.
4 Classify cams.
5 Differentiate cycloidal and involute profile gear teeth.
6 Explain slip and creep in belt drive.
7 What is degree of freedom of kinematic pair, classify them according to degree of freedom with examples.
8 Classify straight line motion mechanisms and mention where these mechanisms are employed.
9 Explain the inverted gear train and mention applications of it.
10 What is coriolois acceleration? What are the conditions at which this component has to be considered in the kinematic analysis of mechanism.

PART – B (50 Marks)

11 a) Define degrees of freedom of a mechanism. Explain the KUTZ BACH criterion for determining the degrees of freedom of a mechanism. 3

b) What is inversion of mechanism? In a four bar chain, the lengths of links are 100mm, 120mm, 160mm and 200 mm respectively. Explain the inversions of this kinematic chain with applications, when the links of length 100mm and 120mm are fixed. 7

12 A crank and rocker mechanism PQRS has the following dimensions :
PQ = 375mm, QR = 620mm, RS = 500mm, PS = 750mm, QL = 310mm, (L is an intermediate point) RM = 150mm, SM = 400mm (M is an offset point to link RS, take RMS in clock wise direction).
PS is the fixed link. PQ is the crank rotates at 20 rad/sec clockwise and retard at 240 rad/sec^2, when it makes an angle of 50^0 with the fixed link. Determine.

a) The linear accelerations of points, R, L and M. 5

b) The angular velocity and accelerations of links QR and RS. 5

13 A flat faced follower has a lift of 40mm. The follower rises the first 1cm at acceleration for 60^0 of cam rotation and then rises 20mm at a constant velocity for the next 60^0 of cam rotation, and finally rises the remaining 10mm at a constant retardation for another 60^0 of cam rotation. After a dwell for 45^0 of cam rotation, the follower returns with simple harmonic motion for the next 90^0 of cam rotation follower by a dwell. Determine the minimum base circle radius of the cam, and the minimum length of the follower face. 10

..2

14 a) Derive the expression for overall speed ratio in a simple gear train.
b) Two involute spur gears of module is 3mm and with 18 and 26 teeth operate at a pressure angle of 20^0. Find out the maximum addendum for the gears so that no interference occurs. Assume the addendum for the gears to be equal.

15 a) Derive the expression for ratio of belt tension in a belt drive. 3
b) A leather belt transmits 10 kW from a motor running at 600 rpm by an open-belt drive. The diameter of the driving pulley of the motors is 350mm, centre distance between the pulleys 4m and the speed of the driven pulley 180 rpm. The belt weighs 1100 kg/m^3 and the maximum allowable tension in the belt is 2.5 N/mm^2, $\mu = 0.25$. Find the width of the belt assuming the thickness to be 10 mm. neglect the belt thickness to calculate the velocities. 7

16 Sketch a peaucellier mechanism. Show that it can be used to trace a straight line. 10

17 A reverted epicyclic gear train for a hoist block is shown in fig.1. The arm E is keyed to the same shaft as the load drum and the wheel A is keyed to a second shaft which carries a chain wheel, the chain being operated by hand. The two shafts have common axis but can rotate independently. The wheels B and C are compound and rotate together on a pin carried at the end of arm E. The wheel D has internal teeth and is fixed to the outer casing of the block so that it does not rotate. The wheels A and B have 16 and 36 teeth respectively with a module of 3mm. The wheels C and D have a module of 4mm. Find : 1. the number of teeth on wheels C and D when the speed of A is ten times the speed of arm E, both rotating in the same sense, and 2 the speed of wheel D when the wheel A is fixed and the arm E rotates at 450 r.p.m. anticlockwise. 10

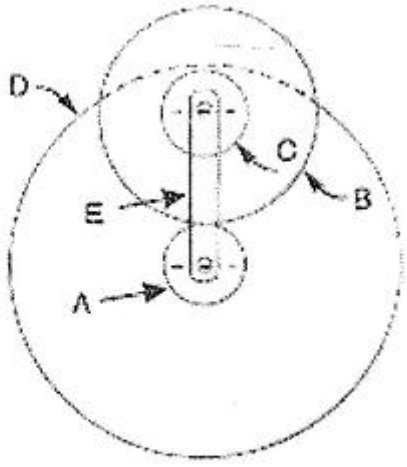

Fig. 1.

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Code No. 3102 / N

FACULTY OF ENGINEERING

B.E. 2/4 (M/P/A.E.) II – Semester (New) (Suppl.) Examination, December 2016

Subject: Kinematics of Machines

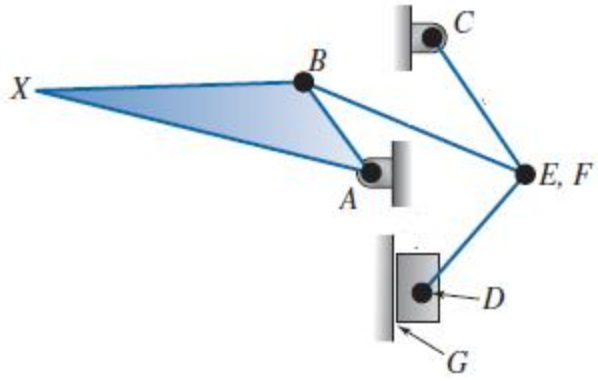
Time: 3 Hours **Max.Marks: 75**

Note: Answer all questions from Part A. Answer any five questions from Part B.

PART – A (25 Marks)

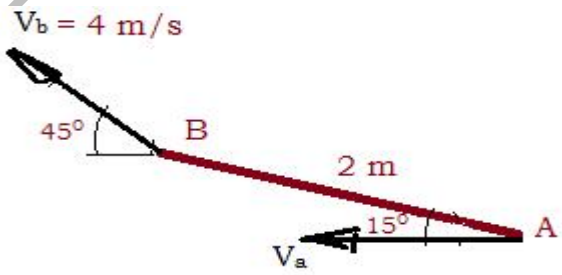
1 Differentiate self and force closed pairs. 2

2 Calculate the mobility of the linkage shown below: 2



3 Differentiate Davis and Ackermann steering gear mechanisms. 3

4 A rigid link AB of length 2 m at one of it's position is shown in figure below. The magnitude and direction of velocity of point B and the direction of velocity of point A also shown. What is magnitude of velocity of point A at that instant? 2



5 Define pressure angle in cams and discuss it's effect on performance of cam follower action. 2

6 Two rigid shafts are connected by a Hooke's joint. The driving shaft rotates at 600 rpm. Calculate the greatest allowable angle of the driven shaft for the total permissible variation in speed of the driving shaft is not to exceed 5 % of the mean speed. 3

7 State and prove the law of gearing. 3

8 Derive the expression for minimum number of teeth of pinion required in order to eliminate interference when it meshes with a rack. 3

…2.

9 The gear A having 20 teeth meshes with gear B which has 45 teeth. The gear B meshes with gear C having 24 teeth. All the gears are mounted on separate shafts. The gear A is driven by an electric motor of 2 KW power runs at 1400 rpm. Calculate the torque available at output shaft connected to gear C. 3

10 Define the slip and creep in belt drives. 2

PART – B (5x10 = 50 Marks)

11 a) Explain the Elliptical trammel mechanism and prove that the coupler curve produces an ellipse.

b) Explain the Whit worth quick return mechanism and prove that the ratio of times between forward and return strokes is more than one.

12 A slider crank mechanism is shown in Fig.1 having link dimensions: AB=120 mm, AX=70 mm, BX=60 mm, BC=400 mm, BY=250 mm and CY=220 mm. The crank AB is at 70^0. The angular velocity (μ) and angular acceleration (~) of crank are 10.2 rad/s and 200 rad/s^2 respectively. Determine:

i) Absolute linear acceleration of point C.
ii) Absolute linear acceleration of point Y.
iii) Angular acceleration of link BC.

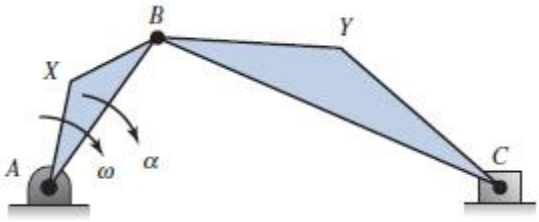


Fig.1

13 a) Explain the rope brake dynamometer with a neat sketch

b) Two parallel shafts 5m apart are connected by open flat belt drive. The diameter of the bigger pulley is 1.5m and that of the smaller pulley 0.75m. The initial tension in the belt is 2.5 kN. The mass of the belt is 1.25 kg/m length and coefficient of friction is 0.25. Taking centrifugal tension into account, find the power transmitted, when the smaller pulley rotates at 450 rpm. 6

14 A cam with 40 mm as minimum diameter is rotating clockwise at a uniform speed of 1000 rpm and has to give the following motion to a roller follower having 10 mm diameter:

- Follower to complete outward stroke of 25 mm during 120° of cam rotation with equal uniform acceleration and retardation.
- Follower to dwell for 60° of cam rotation.
- Follower to return to its initial position during 90° of cam rotation with equal SHM.

…3.

- Follower to dwell for the remaining 90° of cam rotation.

Draw the cam profile if the axis of the roller follower passes through the axis of the cam. Determine the maximum velocity of the follower during the outstroke and return stroke.

15 The number of teeth on the gear and the pinion of two spur gears in mesh are 30 and 18 respectively. Both the gears have a module of 6mm and pressure angle of 20^0. If the pinion rotates at 400rpm, what will be the sliding velocity at the moment the tip of the tooth of pinion has contact with the gear flank? Take addendum equal to one module. Also, find the maximum velocity of sliding.

16 An epi-cyclic gear train is shown in Figure 2. The number of teeth on A and B are 80 and 200. Determine the speed of the arm a.

i) If A rotates at 100rpm clockwise and B at 50 rpm counter-clockwise.
ii) If A rotates at 100 rpm clockwise and B is stationary.

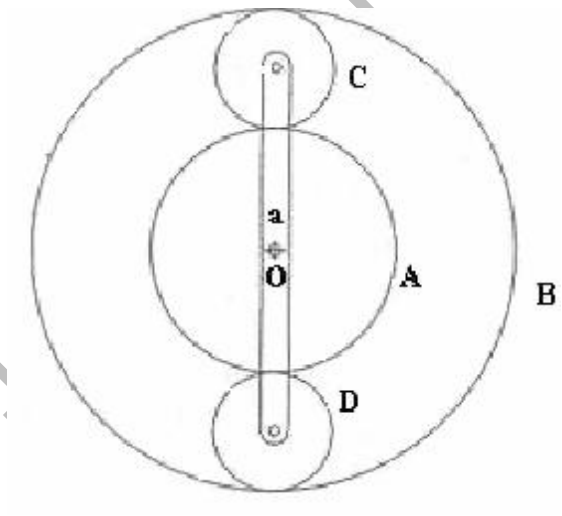


Fig-2

17 Explain the following

a) Pantograph mechanism

b) Multi plate clutch

c) Variation of Displacement, velocity,acceleration and jerk of the follower when it follows cycloidal motion.

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Code No. 3074 / O

FACULTY OF ENGINEERING

B.E. 2/4 (CSE) II – Semester (Old) Examination, December 2016

Subject: Data Communication

Time: 3 Hours **Max.Marks: 75**

Note: Answer all questions from Part A. Answer any five questions from Part B.

PART – A (25 Marks)

1	What is a Protocol Architecture?	2
2	What is delay distortion?	2
3	Convert the following digital data into digital signal by using Manchester encoding technique. 0110011011.	3
4	What is the major disadvantage of asynchronous transmission?	2
5	Define flow control.	2
6	What is the difference between in-channel and common channel signaling?	3
7	Differentiate between synchronous TDM and statistical TDM.	3
8	What is the difference between Hub and Layer2 Switch?	3
9	What is CSMA/CD?	2
10	What is the principle of frequency reuse in the context of cellular networks?	3

PART – B (5x10 = 50 Marks)

11	a)	Explain about the functions of TCP/IP Layers.	6
	b)	Define Channel capacity and different types of transmission modes.	4
12	a)	Explain in detail about CRC detection techniques with suitable example.	6
	b)	Explain about three types of stations HDLC defines.	4
13	a)	Explain about any two Collision free Protocols.	6
	b)	What are the characteristics of backend networks and storage area networks?	4
14	a)	Compare and Contrast Circuit Switching and Packet Switching?	5
	b)	What are the services provided by AAL?	5
15	a)	Explain in brief about Wireless technologies.	5
	b)	Differentiate between bridges and switches.	5
16		Explain about IEEE802.11 Architecture and services.	10
17		Give the applications and transmission characteristics of any two guided media.	10

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Code No. 3112 / N

FACULTY OF ENGINEERING

B.E. 2/4 (CSE) II – Semester (New) (Suppl.) Examination, December 2016

Subject: Principles of Programming Languages

Time: 3 Hours **Max.Marks: 75**

Note: Answer all questions from Part A. Answer any five questions from Part B.

PART – A (25 Marks)

1	In what fundamental way do operational semantics and denotational semantics differ?	3
2	Which performs faster program execution, a compiler or a pure interpreter?	2
3	Define lifetime, scope, static scope and dynamic scope.	2
4	What are advantages of named constants? Write the syntax to declare named constants in C, C++ and Java.	3
5	Write the general form (syntax) of for statement of Ada and Pyhton languages.	2
6	What is naming encapsulation? Why naming encapsulations are important for developing large programs? Does Java support naming encapsulation?	3
7	What is the difference between physical and logical concurrency?	2
8	What advantages do monitors have over semaphores?	3
9	Describe the syntax and semantics of COND and LET?	3
10	Write the syntax for instantiating an object in Python for a class named Myclass.	2

PART – B (5x10 = 50 Marks)

11 a) Consider the following grammar: 6

< assign > → < id > := < expr >
< id > →A | B | C
< expr > → < id > + < expr > | < id > * < expr > | (< expr >) | < id >

Using the grammar write a parse tree and left most derivation for each of the following statements:

i) A := A * (B + (C * A))
ii) B := C * (A * C + B)
iii) A := A * (B + (C))

b) What is the primary use of attribute grammar?What purpose do predicates serve in an attribute grammar? 4

12 a) i) Distinguish between static type binding and dynamic type binding. 2

ii) Brief about the two approaches used to define type equivalence. 3

b) What is an overloaded operator? Write a C++ program to illustrate operator overloading. 5

13 a) Explain briefly the criterion used to evaluate a programming language. 5

b) Assume the following rules of associativity and precedence for expressions: 5

Precedence: Highest *, / , not
+, -, & , mod
- (unary)
=, /=, <, <=, >=, >
and
Lowest or, xor

Associativity: Left to Right

Show the order of evaluation of the following expressions by parenthesizing all sub-expressions and placing a subscript on the right parenthesis to indicate order. For example, for the expression a+b * c + d the order of evaluation would be represented as
$((a+ (b*c)^{1})^{2} + d)^{3}$

i) a * b -1 +c
ii) a* (b - 1) / c mod d
iii) -a or c = d and e
iv) a > b x or c or d < = 17
v) (a - b) / c & (d * e / a - 3)

14 Explain in detail the different models of parameter passing. 10

15 a) Describe the shallow-access method of implementing dynamic scoping. 5

b) i) Consider the following skeletal C function: 3

```
void sub(float total, int part) {
int list[5];
float sum;
. . . }
```

Draw the activation record for function sub.

ii) Is it possible for a programmer to choose a location for loop control? If yes mention the control mechanisms supported by programming languages. If no, give reasons. 2

16 Write a detailed comparison of the exception-handling capabilities of C++ and those of Java. 10

17 a) What are the syntactic forms and usage of fact and rule statements in Prolog? 5

b) Write a Prolog program that finds the maximum of a list of numbers. 5

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Code No. 3079 / O

FACULTY OF INFORMATICS

B.E. 2/4 (I.T.) II – Semester (Old) Examination, December 2016

Subject: OOP Using JAVA

Time: 3 Hours **Max.Marks: 75**

Note: Answer all questions from Part A. Answer any five questions from Part B.

PART – A (25 Marks)

1	What is the use of Packages?	2
2	Differentiate between Method overloading and Method overriding.	2
3	What is an unchecked Exception? Give an example?	3
4	What is the difference between Collection classes and Legacy classes?	3
5	List different methods in Thread class.	2
6	Explain Delegation Event Model.	2
7	What is the advantage of using Buffered I/O Stream classes?	2
8	What is the difference between applets init () and start () method.	3
9	What is a Layout manager? Give examples?	3
10	Differentiate between Vector and ArrayList .	3

PART – B (50 Marks)

11	a)	Explain Interfaces concept .Give Examples.	5
	b)	Explain super keyword with example program	5
12	a)	What is Runnable Interface? How can you use this to create Thread?	6
	b)	How to set priorities for threads? Specify various examples.	4
13	a)	Explain various Wrapper classes used in Java.	6
	b)	Write a program to read the contents of any File.	4
14	a)	What is an Iterator? What is the use of it? Write a program to demonstrate Iterator.	2+2+2
	b)	Explain Tree set in java.	4
15	a)	Explain various AWT Components with examples.	6
	b)	Write a program to implement Choice class.	4
16	a)	Explain the Life Cycle of an Applet.	5
	b)	Write a program to demonstrate Applet.	5
17	Write short notes on:		
	a)	String Tokenizer	3
	b)	Event Listener Interfaces	3
	c)	Checked Exceptions	4

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Code No. 3117 / N

FACULTY OF INFORMATICS

B.E. 2/4 (I.T.) II – Semester (New) (Suppl.) Examination, December 2016

Subject: OOP Using JAVA

Time: 3 Hours **Max.Marks: 75**

Note: Answer all questions from Part A. Answer any five questions from Part B.

PART – A (25 Marks)

1	List down java buzzwords.	3
2	What is the difference between throw and throws keyword?	2
3	What is the difference between method overloading and overriding?	2
4	What is the difference between Applet and Application?	2
5	Explain the delegation event model.	3
6	What is the purpose of Garbage collection?	3
7	Draw the hierarchy of collection interface.	3
8	What are the uses of final keyword?	2
9	Draw a figure for exception hierarchy.	3
10	What is the difference between vector and array list.	2

PART – B (5x10 = 50 Marks)

11	a) What are the benefits of object oriented development?	8
	b) Why is Java, a strongly typed language?	2
12	What is the difference between interfaces and abstract classes? Write a program for creating and accessing packages.	10
13	Differentiate between thread and process. Specify the different methods of creating threads. Write a program for creating two threads using any method.	10
14	Write a program for accessing a collection via a list Iterator.	10
15	Illustrate differences between swing and AWT. Draw MVC architecture and explain.	10
16	What is serialization? Explain the concept of serialization with program.	10
17	Write short notes on the following:	
	a) String tokenizer class	4
	b) Dynamic method dispatch	3
	c) Adapter classes	3

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