Code No. 5121

# FACULTY OF ENGINEERING

**B.E. 3/4 (Civil) I - Semester (Main) Examination, December 2015**

**Subject : Fluid Mechanics - II**

**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 Differentiate pipe flow and channel flow. (3)

2 Explain the concept of specific energy with a neat sketch. (3)

3 Distinguish between positive and negative surges in channels. (3)

4 In a hydraulic jump on a horizontal floor, the Froude number for initial flow is $\sqrt{6}$. Compute loss of energy in terms of $Y_1$. (2)

5 Differentiate between Form drag and Friction drag. (2)

6 Why are hydraulic losses less in a Kaplan turbine than in a Francis turbine? (2)

7 Define scale effect in models. (2)

8 Explain three types of similitudes. (3)

9 What is a draft tube? What are its functions? (3)

10 Define the specific speed of turbine. (2)

## PART – B (50 Marks)

11 (a) Explain in detail with sketches the pressure and velocity distribution in an open channel.

(b) Show that the discharge formula for a Trapezoidal channel having manning's. n = 0.0126 and conveying maximum flow is given by

$$Q = 100\ y^{8/3}\left[\sqrt{1+z^2}-\frac{z}{2}\right]S_0^{1/2}$$

Where Q = discharge in cumec

y = depth of flow in m in channel of side slopes 1 Horizontal to z vertical.

$S_o$= bed slope of the channel

12 (a) Derive momentum equation for a jump in horizontal rectangular channel.

(b) Define a surge and give its classification. Derive the equation for positive surge moving u/s.

13 (a) The velocity profile in Laminar boundary layer is given as $\frac{u}{U}=\frac{3}{2}\left(\frac{y}{¢}\right)-\frac{1}{2}\left(\frac{y}{¢}\right)^2$.

Determine the thickness of the boundary layer and shear stress at 1.8m from the leading edge of plate. The size of plate is 3.0m long and 1.75 m wide and velocity of flow is 0.175 m/s, viscosity of water is 0.01 poise.

(b) Explain the methods to control Boundary layer separation with neat sketches.

14 (a) The efficiency η of a fan depends on density ρ, Viscosity of a fluid μ and angular velocity w, diameter Δ and discharge Q. Obtain its functional relationship for η in terms of dimensionless parameters.

(b) For models governed by viscous forces, obtain the scaling ratios for velocity, discharge, energy and power.

15 (a) Define a centrifugal pump. Describe the principle and working of a centrifugal pump with a neat sketch.

(b) A reaction turbine works at 450 rpm under a head of 120 m. Its diameter at inlet is 120 cm and the flow area is 0.4m$^2$. The angles made by the absolute and relative velocities at inlet are 20$^o$ and 60$^o$ respectively with the tangential velocity. Determine (i) volume flow rate (ii) hydraulic power developed and (iii) efficiency. Assume whirl at outlet to be zero.

16 (a) Explain briefly in what way a hydraulic reaction turbine differs from an impulse turbine.

(b) In a flow through a rectangular open channel for a certain discharge, the Froude numbers corresponding to the two alternate depths are $Fr_1$ and $Fr_2$. Show that

$$\left[\frac{Fr_2}{Fr_1}\right]^{2/3} = \frac{2+Fr_2^2}{2+Fr_1^2}$$

17 Write short notes on the following:

(a) Significance of Froude number

(b) Characteristics curves of Centrifugal pump

(c) Energy and Momentum correction coefficient

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**Code No. 5127**

# FACULTY OF ENGINEERING

**B.E. 3/4 (EEE) I – Semester (Main) Examination, December 2015**

**Subject: Electrical Machinery – II**

**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 Show that if two transformers have same p.v. impedances, they will share the load in proportion to their KVA capacities. 3

2 Discuss the relative merits and demerits of an auto transformer. 3

3 Draw the phaser diagram of 3¤ induction motor. 3

4 A 3¤ , 50 Hz induction motor has a full load speed of 960 rpm. Calculate the speed of rotor structure ;w.r.t. rotor structure, w.r.t. stator structure and w.r.t. stator field. 3

5 Sketch the torque-speed curves of a conventional induction motor and indicate how this will change when
   i) The rotor resistance is doubled
   ii) The applied voltage is halved. 3

6 Name the control techniques used in variable frequency drive. 2

7 What do you understand by the term “Single-phasing” of 3¤ induction motors? 3

8 Draw the torque-slip characteristics of a 3¤ induction machine when it is operating as induction generator. 2

9 Find the load current of transformer at which maximum efficiency occurs. 3

## PART – B (5x10 = 50 Marks)

10 a) Describe the method by which the separation of the core losses of a transformer is achieved. 5

   b) The efficiency of a 20 KVA, 2500/250 V, 1¤ , transformer at unity P.F. is 98% at rated load and also at half load. Determine the transformer core loss and Ohmic loss and also find the p.v. value of the equivalent resistance of the transformer. 5

11 a) A two winding 15 KVA, 440/220 V transformer is reconnected as a step-down 660/440 V auto transformer. Compare VA rating of auto transformer with that of the original two winding transformer. Find the power transferred to the load inductively and conductively. 5

   b) Two single phase furnaces are supplied at 110 V from a 3¤ , 1100 V supply by the use of a Scott connected transformer. If the total output is 500 KW at 0.8 power factor lagging, find the transformation ratio and currents in the winding of each transformer. 5

12 a) Draw the Torque-slip characteristics of 3¤ induction machine during motoring, breaking and generating modes. 4

   b) An induction motor has an efficiency of 85% when the output is 30 HP. At this load, the stator and the rotor copper losses each equals the iron losses. The friction and windge losses are 1/3 of the no load losses. Find i) Slip if the rotor frequency is 2 Hz. Ii) Mechanical power developed and speed of the motor. 6

…2.

13 a) Explain any three speed controlling techniques of induction motor. 5
b) Explain in detail about the Scherbius drive. 5

14 a) Explain how the operation of a 3¤ induction motor is effected when single phasing occurs. 5
b) Explain in detail about the “single phase load on three phase transformer”. 5

15 Draw the circle diagram of 15 HP, 230 V, 50 Hz slip ring induction motor with a star connected stator and rotor, having winding ratio unity. The stator and rotor resistances per phase are 0.35Ω and 0.25Ω respectively.

| | | | | |
|---|---|---|---|---|
| No load test | 230 V | 8A | 0.2 | Power factor |
| SC test | 100 V | 48A | 0.45 | Power factor |

Find:
i) Starting torque in synchronous watt
ii) Max, torque in synchronous watt
iii) Max. power factor
iv) Max. output.

16 Write a short note on the following:
a) Measurement of insulation resistance in transformers
b) Variable frequency control of induction motors
c) No-load tap changer.

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Code No. 5133

# FACULTY OF ENGINEERING

**B.E. 3/4 (Inst.) I – Semester Examination, December 2015**

**Subject: Signals and Systems**

**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 Define Time In variant System with an example. (3)
2 Determine the fundamental period of x (t)= cos (0.5Πt) (2)
3 Using suitable example define a complete set. (2)
4 Write the necessary & sufficient condition for existence of Fourier series. (3)
5 Prove Time shifting Property of Fourier Transform. (2)
6 State and Prove the properties of Convolution (3)
7 Define final Value & Initial Value theorem in Laplace Transform. (3)
8 Determine the laplace transform of $\cos\omega_0 t\, u(t)$. (2)
9 Determine Z transform for standard test signals. (3)
10 Define zero Order hold (2)

## PART –B (5x10 = 50 Marks)

11 a) Find the natural response of the system described by difference equation. y(n)+ 2y(n-1)+y(n-2)=x(n)+x(n-1) with initial condition y(-1)=y(-2)=1. (6)

b) State and Prove properties of LTI systems. (4)

12 List out the Properties of Fourier Transform. Derive any Five properties of Fourier Transform. (10)

13 a) Find the trigonometric Fourier series of Full wave rectified sinusoidal signal. (5)
(b) Give the detail classification of typical systems and signals. (5)

14 a) List out the properties of Laplace Transform. Lapalce transform is generalized form of Fourier transform, Justify. (4)
b) Find the Inverse Laplace Transform of $G(s)= s/(s+3)(s^2+4s+5)$. (6)

15 a) Consider a system described by differential equation y(n)–0.5y(n-1)-0.25y(n-2)=x(n) determine y(n) if x(n)=(0.5)n u(n) using Z-Transform. (6)
(b) Mention properties of ROC. (4)

16 a) Define the standard test signals. (4)
b) Determine Z-Transform of (i). $x(n)=a^n u(n)$ (ii). x(n)=nu(n) (iii) x(n)=u(-n-1) (6)

17 Write short notes on the following: (10)
a) Sampling theorem.
b) Dirichlet Condition.
c) Parseval theorem.

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Code No. 5135

# FACULTY OF ENGINEERING

## B.E. 3/4 (ECE) I - Semester (Main) Examination, December 2015

## Subject : Digital Integrated Circuits and Applications

**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 features of TTL logic family. | 3 |
| 2 | | In common wired connection why totem pole outputs are not used. Explain. | 3 |
| 3 | | Draw 2 input CMOS NOR gate and write its truth table. | 2 |
| 4 | | Compare ECL with TTL logic family. | 2 |
| 5 | | Explain correction logic required for BCD adder design with example. | 3 |
| 6 | | Implement fulladder using multiplexer. | 2 |
| 7 | | Convert J-K to D-flipflop. | 3 |
| 8 | | Write the applications of universal shift registers. | 2 |
| 9 | | A certain memory capacity as 4K x 32. What is the word size of the memory system. | 2 |
| 10 | | Classify various programmable logic devices. | 3 |

**PART – B** (50 Marks)

| | | | |
|---|---|---|---|
| 11 | a) | What is tristate logic? Draw and explain the operation of tristate inverter with enable input equals to logic 'O' and '1'. | 6 |
| | b) | List out various package styles of an IC and write the types temperature ranges for an integrated circuit. | 4 |
| 12 | a) | Draw the circuit diagram of a 2 input NAND gate using CMOS logic family and explain its operation with truth table. | 5 |
| | b) | What are characteristics of CMOS logic family and compare its electrical parameters with TTL logic family? | 5 |
| 13 | a) | Explain the operation of CMOS transmission gate and write its applications. | 4 |
| | b) | Compare various logic families and write the best features of each logic family. | 6 |
| 14 | a) | Implement the following Boolean function using 8 x 1 line multiplexer IC. $F(P, Q, R, S) = \sum m\ (0, 1, 2, 4, 5, 7, 10, 13)$ | 5 |
| | b) | Design 2 bit binary multiplier and explain its logic with example. | 5 |
| 15 | a) | Derive the two level equation for output carry $C_4$ for look ahead adder and explain how it reduces the propagation delay in parallel adders. | 5 |
| | b) | Design 2 bit digital comparator and write its applications. | 5 |
| 16 | a) | Design decade counter and explain its application in digital circuits. | 5 |
| | b) | Draw and explain the architecture of ROM and RAM. | 5 |
| 17 | | Write short notes on : | |
| | a) | BCD counters and shift registers | 4 |
| | b) | Expanding word size and capacity | 3 |
| | c) | Programmable logic devices | 3 |

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**Code No. 5140**

# FACULTY OF ENGINEERING

**B.E. 3/4 (M/P/AE) I-Semester (Main) Examination, December 2013**

**Subject: Dynamics of Machines**

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

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

**PART – A** (25 Marks)

1 What is meant by Applied torque and Reaction torque?
2 With a neat sketch explain the working principle of a centrifugal Governor.
3 How do you calculate sensitiveness of a Governor? Explain.
4 What is meant by the effort of a Governor?
5 What is the purpose of a flywheel in an engine? How is it different from a Governor?
6 Discuss what is meant by primary and secondary unbalance is Reciprocating engines?
7 Write a short note on balancing of locomotives.
8 Define the term magnification factor (MF).
9. What is meant by vibration Isolation and Transmissibility?
10 Write a short note on Dunkerley's method used to determine natural frequencies in multi rotor systems.

**PART – B** (5x10=50 Marks)

11 The turbine rotor of a sea vessel having a mass of 950kg rotates at 100 rpm clockwise while looking from the stern. The vessel pitches with an angular velocity of 1.2 rad/sec. What will be the gryroscopic couple transmitted to the hull when the bow rises? (The radius of gyration of the rotor is 300 mm.

12 The length of each arm in a porter Governor is 300 mm and pivoted on the axis of rotation. Each ball has a mass of 6kg and the sleeve weights 18 kg. The radius of rotation of the ball is 200mm when the governor begins to lift, and 250mm when the speed is maximum. Determine the maximum and minimum speeds and the range of speed of the Governor.

13 A three cylinder single acting engine has its cranks at $120^o$. The turning moment diagram for each cycle is a triangle for the power stroke with a maximum torque of 60 N.m at $60^o$ after the dead centre of the corresponding crank. There is no torque on the return stroke. The engine runs at 400 rpm. Determine.
(i) Power developed
(ii) Coefficient of fluctuation of speed if the mass of the fly wheel is 10 kg, and radius of gyration is 88 mm.
(iii) Coefficient of fluctuation of energy

14 Four masses A, B, C, D are completely balanced. Masses C and D make angle of $90^o$ and $210^o$ respectively with B in the same sense. The planes containing B and C are 300mm apart. Masses A, B, C and D can be assumed to be concentrated at radii of 360, 480, 240 and 300 mm respectively. The masses B, C and D are 15 kg, 25 kg and 20kg respectively. Determine.
(i) Mass 'A' and its angular position
(ii) Position of planes A and D



..2

15 A flywheel of mass 1 tonne (radius of gyration = 0.5m) is connected at one of the ends of a 200 mm diameter shaft (length = 1.5m). Find the frequency of torsional vibrations, if the other end of the Shaft is fixed (The modulus of rigidity for the shaft material is given as 80 GN/$m^2$.).

16 A machine mounted on springs and fitted with a dashpot has a mass of 60 kg. There are three springs, each of shiftness 12 N/mm. The amplitude of vibration reduces from 45mm to 8 mm in two complete oscillations. Assuming that the damping force varies as the velocity determine.

(i) Damping coefficient (c)

(ii) ratio of frequencies of damped and undamped vibration $\left(\frac{w_d}{w_n}\right)$

(iii) Periodic time of damped vibrations ($T_d$)

17 Write short notes on the following:

(a) Forced vibrations and Resonance

(b) Rayleigh's method for multirotor system

(c) Force analysis of 4-bar mechanism

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Code No. 5152

# FACULTY OF ENGINEERING

**B.E. 3/4 (CSE) I - Semester (Main) Examination, December 2015**

**Subject : Operating Systems**

**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 preemptive and Non-preemptive scheduling algorithms | 3 |
| 2 | Define context switching with an neat diagram. | 3 |
| 3 | Differentiate random and sequential access of a file. | 2 |
| 4 | List the methods used for free space management. | 3 |
| 5 | Site the necessary conditions required for deadlock to occur. | 3 |
| 6 | Define race condition with an example. | 3 |
| 7 | What do you understand by Rotational latency? | 2 |
| 8 | Differentiate between maskable and non-maskable interrupts and give an example for each. | 2 |
| 9 | What is the use of plug-and-play manager in WINDOWS-XP? | 2 |
| 10 | How security issues are addressed in Linux? | 2 |

**PART – B** (50 Marks)

| | | | |
|---|---|---|---|
| 11 | a) | Explain the role of schedulers with the help of process transition diagram. | 4 |
| | b) | Discuss about Multi-level and Multi-level feedback queue scheduling algorithms with an example. | 6 |
| 12 | a) | Find the number of page faults in FIFO, LRU, OPTIMAL and LFU page replacement algorithms for the following reference string. 7 0 2 1 3 4 2 1 0 2 1 4 3 2 1 0 0 1 2 1 (no. of frames = 3). | 7 |
| | b) | Describe various file allocation methods. | 3 |
| 13 | a) | Describe classical problems of synchronization. | 7 |
| | b) | List and explain the methods used for deadlock recovery. | 3 |
| 14 | a) | Explain the levels of RAID with neat diagram. | 6 |
| | b) | Describe the steps with a neat flow chart for transforming I/O request to hardware operations. | 4 |
| 15 | a) | Compare how process management is done in Linux and Windows. | 5 |
| | b) | Explain the system components in Windows NT. | 5 |
| 16 | | Explain disk scheduling algorithms for the following example. Initially the read/write head is at 125 cylinder and total number of cylinders are 5000 i.e. 0 to 4999. 86 1470 913 1774 948 1509 1022 1750 130 | 10 |
| 17 | | Write short notes on any **two** : | 5 x 2 = 10 |
| | a) | Process synchronization with hardware instructions | |
| | b) | Explain the protocols used for deadlock prevention | |
| | c) | Draw and explain the implementation of segmentation | |

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Code No. 5158

# FACULTY OF INFORMATICS

**B.E. 3/4 (IT) I - Semester (Main) Examination, December 2015**

**Subject: Database Management Systems**

**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 about the three levels of data abstraction. | 3 |
| 2 | List the types of attributes with examples. | 2 |
| 3 | What is a super-key and a candidate key? Give examples. | 3 |
| 4 | Write the basic structure of SQL queries. | 2 |
| 5 | Give any two examples of integrity constraints. | 2 |
| 6 | What is the difference between 3NF and BCNF. | 3 |
| 7 | Explain the types of ordered indices. | 3 |
| 8 | Draw the state diagram of a transaction. | 2 |
| 9 | State the two-phase locking protocol. | 2 |
| 10 | What is a phantom record? Why do they occur? | 3 |

**PART – B** (5 x 10 = 50 Marks)

| | | |
|---|---|---|
| 11 | a) Distinguish between a file processing system and a DBMS. | 5 |
| | b) What are the functions of a Database Administrator. | 5 |
| 12 | Discuss the fundamental and extended relational algebra operations with examples. | 10 |
| 13 | Explain about Embedded SQL and dynamic SQL. | 10 |
| 14 | Define Hashing. Explain the differences between closed hashing and open hashing. Discuss the relative merits of each technique in database applications. | 10 |
| 15 | Discuss the concept of serializability and how do you test whether the given non-serial schedule is serializable or not. | 10 |
| 16 | Define a time-stamp. Explain the time-stamp ordering protocol and Thoma's write rule. | 10 |
| 17 | Write short notes on the following : | |
| | a) Views | 3 |
| | b) Deadlock Recovery | 4 |
| | c) Remote backup systems | 3 |

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