Code No. 3119 / O / S

FACULTY OF ENGINEERING

B.E. 3/4 (Civil) I - Semester (Old) (Supplementary) Examination,

May / June 2017

Subject : Reinforced Cement Concrete

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

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B. IS 456-2000 is permitted in the examination.

PART – A (25 Marks)

1 Explain the role of reinforcement bars in reinforced cement concrete.
2 Sketch the idealized stress-strain curve for mild steel.
3 Why the partial safety factor for concrete is higher than for steel.
4 How do you calculate neutral axis constant in working stress method?
5 What is meant by doubly reinforced beam?
6 Calculate the anchorage length in compression for Fe415 steel rebars in concrete of grade M20.
7 What are the limits of deflection in slabs and beams?
8 What are the factors which influence crack-widths in flexural members?
9 What are the assumptions made in yield line theory of RCC slabs?
10 What is an interaction diagram for column design?

PART – B (50 Marks)

11 A rectangular beam section 230 mm width and 400 mm effective depth is reinforced with 3-16 mm diameter tension bars. Determine the stresses induced in the top compression fibre of concrete and tension steel when it is subjected to a moment of 40 KNm. Consider concrete of grade M20. Use working stress method.

12 Design a singly reinforced rectangular section for an applied factored moment of 120 KNm. Take the width of the section as 230 mm. Use M20 concrete and Fe415 steel. Sketch the reinforcement details.

13 A simply supported RC beam, 300 mm wide and 700 mm deep, carries a factored udl of 100 KN/m including self weight over a span of 6m. The beam is reinforced with 4 numbers of 25mm diameter bars of grade Fe415 on tension face. Design the shear reinforcement using vertical stirrups. Take M25 concrete effective cover is 50 mm. Sketch the reinforcement details.

14 Design a reinforced concrete slab for a room 3m x 4m clear in size. The slab is supported all around on walls of width 300mm. Assume super imposed load on the slab as 3 KN/m^2 and floor finish 1 kN/m^2. Use M20 concrete and Fe415 steel. The edges are simply supported and corners are held down. Sketch the reinforcement details.

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15 Design a dog-legged staircase for a building in a room measuring 2.8m x 5.8 clear, given the following data :
   a) Vertical distance between floors = 3.6m
   b) Riser = 150 mm, tread = 300 mm, number of treads = 11
   c) Width of flight = Landing width = 1.25m
   d) Live load = 3 kN/m^2

   Assume the stairs are supported on 230mm walls at the end of outer edges of landing slabs, parallel to the risers. Use M20 concrete and Fe415 steel. Sketch the reinforcement details.

16 Design a helically reinforced short circular column for an axial working load of 1200kN. Assume ϱ_{min} <0.05D. Use M20 concrete and Fe415 steel. Sketch the reinforcement details.

17 Design a square footing for a square of 300 mm x 300 mm subjected to a factored axial load of 1200 kN. The SBC of the soil is 150 kN/m^2. Adopt M25 concrete and Fe415 steel. Sketch the reinforcement details.

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Code No. 3398 / N / S

FACULTY OF ENGINEERING

B.E. 3/4 (Civil) I-Semester (New) (Suppl.) Examination, May / June 2017

Subject : Reinforced Cement Concrete

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 do you understand from limit state method?	3
2	Explain the properties of steel.	3
3	Explain why over reinforced sections are not preferred.	3
4	What do you understand from anchorages?	2
5	What are the IS specifications for durability aspects?	2
6	How do you identify shear deficiency in design?	2
7	What do you understand from biaxial bending?	3
8	Define isolated footing.	2
9	Differentiate one way and two way slabs.	3
10	How do you design stair case?	2

PART – B (50 Marks)

11 a) Explain the fresh and hardened properties of concrete. 5

b) Differentiate between working stress method and limit state method. 5

12 The cross-section of a rectangular beam has to resist a bending moment of 75KNm. If the beam is 250mm wide and permissible stresses in steel and concrete are 190N/mm^2 and 5N/mm^2 respectively, find the effective depth and tensile reinforcement required. Use the working stress method. 10

13 Design a rectangular beam for 4m effective span which is subjected to dead load of 15KN/m and a live load of 12KN/m. Use M20 grade concrete and fe415 grade steel use limit state method. 10

14 Design the shear stress in a 250mm x 500mm rectangular section if the shear force is 20KN and torsional moment is 10KNm at service loads. Assume M20 grade concrete and 0.75% tension reinforcement at an effective cover of 50 mm. Use limit state method. 10

15 Design a two-way slab for a room 5.5m x 4.0 m clear in size if the super imposed load is 5KN/m^2. Use M20 grade concrete and fe415 grade steel. Use limit state method. 10

16 Design a circular column to carry an axial load of 1500KN using i) lateral ties ii) helical reinforcement. Use M25 grade concrete and fe500 grade steel. 10

17 Design footing for the foundation of a brick wall 400mm thick and transmitting a load of 100 KN/m of its length. The bearing capacity of the soil is 60 KN/m^2. The unit weight of earth is 16KN/m^3. Use M20 grade concrete and fe415 grade steel and load factor is 1.5. 10

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Code No. 3125 / O / S

FACULTY OF ENGINEERING

B.E. 3/4 (EEE) I - Semester (Old) Examination, May / June 2017

Subject : Power System - 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)

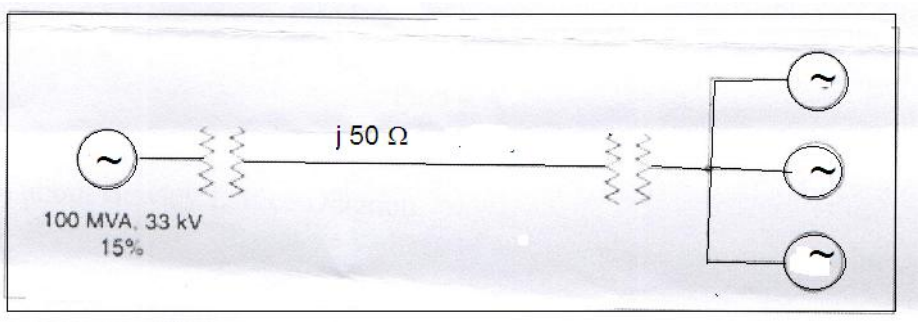
1 Explain Surge Impedance Loading of a line. (3)
2 Explain about Bewley Lattice Diagram. (3)
3 Explain about Critical Disruptive Voltage of a single phase transmission line. (3)
4 Write the advantage of Per Unit system. (3)
5 Explain the basic working principle of Thyristor Controlled Reactor. (3)
6 Draw the equivalent Positive, Negative, Zero sequence network of an un-loaded alternator. (3)
7 Write the Positive, Negative, Zero sequence current equations, when double lien to ground fault is at the terminal of the alternator. (3)
8 Explain the effect of atmospheric condition on corona loss. (2)
9 Write the relation between sequence component voltage in-terms of phase voltage, taking Phase-A as reference. (2)

PART – B (50 Marks)

10 (a) For a short transmission line, draw the equivalent circuit and phasor diagram. Find the A, B, C, D constants for short transmission line and explain it. (6)
(b) Explain corona loss and write its empirical formula. (4)

11 (a) Explain the operation of a thyristor switched capacitor with necessary diagram and waveforms. (5)
(b) Explain about the Tap changing transformers type of voltage control method. (5)

12 100 MVA, 33kV 3-phase generator has a sub-transient reactance of 16%. The generator is connected to the motors through a transmission line and transformers as shown below. The motor have rated inputs of 20 MVA, 30 MVA and 40 MVA at 30 kV with 17% subtransient reactance. The 3-phase transformers are rated at 110 MVA, 32 kV, Δ/110kV Y with leakage reactance 9%. The line has a reactance of 50 ohms. Selecting the generator rating as the base quantities in the generator circuit, determine the base quantities in other parts of the system and evaluate the corresponding p.u. values. Draw the per unit equivalent diagram. (10)



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13 (a) Derive the expression for average three phase power in-terms of symmetrical components. (4)

(b) A 25 MVA, 13.2 kV alternator with solidly grounded neutral has a sub-transient reactance of 0.25 p.u. The negative and zero sequence reactances are 0.35 p.u. and 0.1 p.u. respectively. A single line to ground fault occurs at the terminals of an un-loaded alternator. Determine the (i) Fault Current, (ii) Line-to-Line Voltages. Assume base quantities as 25 MVA and 13.2 kV). (6)

14 (a) Explain about Travelling wave phenomenon over long transmission line (loss less), considering the line with receiving end is short-circuited. Draw the necessary various current and voltage waves over the line. (6)

(b) For a line terminated through a resistance 'R' the surge impedance is 'Z'. Derive the expression for the coefficient of reflection for (i) current waves, (ii) voltage waves. (4)

15 (a) Explain about concept of short circuit capacity of a bus. (4)

(b) Consider a three phase system with earthed neutral. For a single line-to-ground fault on line phase-A of three phase system, derive the expression for (i) sequence currents of faulted phase – A (ii) sequence voltage at faulted phase-A, in terms of sequence impedance Z_0, Z_1, and Z_2. (6)

16 (a) Determine the critical disruptive voltage and corona loss for a 3 phase line operating at 100 kV which has conductor of 1.25 cm diameter arranged in 3.05 meter delta. Assume air density factor of 1.07 and dielectric strength of air to be 21kV / cm. (6)

(b) Explain Ferranti effect of long transmission line. (4)

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Code No. 3404 / N/S

FACULTY OF ENGINEERING

B.E. 3/4 (EEE) I - Semester (New)(Suppl.) Examination, May / June 2017

Subject : Power Systems - 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 For a medium length nominal T transmission line draw the circuit and the phasor diagram for lagging power factor conditions. (2)

2 What do you mean by the term regulation of a transmission line? Why its knowledge is essential? (3)

3 Explain the working of tap changing transformers. (2)

4 Show that the load voltage V_2 is not affected much due to the component of the load. (3)

5 Draw the positive, negative and zero sequence connection diagrams for Y/Y (grounded) and Delta / Delta transformers. (3)

6 The generator emf is 1 p.u and the subtransient reactance is 25%. Find the subtransient current. (2)

7 Explain the theory of symmetrical components. (3)

8 Draw the connections of sequence networks for three phase to ground fault through an impedance Z_f. (2)

9 Explain why a travelling wave suffers reflection when it reaches a discontinuity? (2)

10 Why is insulation coordination required in a large power systems? What is meant by BIL of an equipment? (3)

PART – B (50 Marks)

11 (a) Derive the expressions for voltage and currents distribution over a long line. (5)

(b) Determine the corona characteristics of a 3-phase, 50 Hz, 132 kV transmission line 100 km long running through terrain at an altitude of 600 metres, temp. of 30°C and barometric pressure 74 cm. The conductors are 1.5 cm diameter and spaced with equilateral spacing of 2.75 metres. Assume surface irregularity factor of 0.9 and mv = 0.75. (5)

12 (a) Along with its advantages and disadvantages explain in detail about Static Var compensator (draw necessary diagrams). (5)

(b) A 3-phase line having an impedance of (5 + j20) ohm per phase delivers a load of 30 MW at a p.f., of 0.8 lag and voltage 33 kV. Determine the capacity of the phase modifier required to be installed at the receiving end if the voltage at the sending end is to be maintained at 33 kV. (5)

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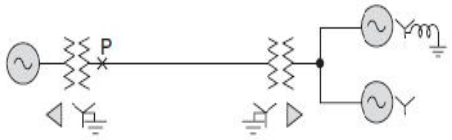
13 A single line-to-ground fault occurs on phase a at point P in the circuit whose single line diagram is shown here. Determine the subtransient current in phase a of machine 1 and in the fault at P. Neglect prefault current. Assume that machine 2 is a synchronous motor operating at rated voltage. Both machines are rated. 1.5 MVA, 600 volts with reactances of X″ = X2 = 8% and X0 = 4%. Each 3-phase transformer is rated 1.25 MVA, 660 volts delta/ 4160 volts star with leakage reactance of 5%. The reactances of transmission line are X1 = X2 = 12% and X0 = 40% on a base of 1.25 MVA, 4160 volts.

(10)

14 A 30 MVA, 13.8 kV, 3-phase alternator has a subtransient reactance of 15% and negative and zero sequence reactances of 15% and 5% respectively. The alternator supplies two motors over a transmission line having transformers at both ends as shown on the one-line diagram. The motors have rated inputs of 20 MVA and 10 MVA both 12.5 kV with 20% subtransient reactance and negative and zero sequence reactances are 20% and 5% respectively. Current limiting reactors of 2.0 ohms each are in the neutral of the alternator and the larger motor. The 3-phase transformers are both rated 35 MVA, 13.2 Δ-115Y kV with leakage reactance of 10%. Series reactance of the line is 80 ohms. The zero sequence reactance of the line is 200 ohms. Determine the fault current when (i) L-G fault takes place at point P. Assume Vf = 120 kV.



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15 (a) An overhead line with inductance and capacitance per km of 1.24 mH and 0.087 μF Respectively is connected in series with an underground cable having inductance and capacitance of 0.185 mH/km and 0.285 μF/km. Calculate the values of transmitted and reflected waves of voltage and current at the junction due to a voltage surge of 110 kV travelling to the junction (i) along the line towards the cable, and (ii) along the cable towards the line. (6)

(b) Explain in details about Beweley Lattice Diagram. (4)

16 (a) With necessary diagrams explain in detail about thyrister switched capacitors. (4)

(b) From fundamentals explain in details about all the aspects to draw the sending end Circle diagram. (6)

17 (a) From fundamentals obtain the expression for disruptive and visual critical voltages. (5)

(b) A 3-phase 50 Hz transmission line has resistance, inductance and capacitance per phase of 10 ohm, 0.1 H and 0.9 μF respectively and delivers a load of 35 MW at 132 kV and 0.8 p.f. lag. Determine the efficiency and regulation of the line using nominal-T method. (5)

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Code No. 3133 / O/S

FACULTY OF ENGINEERING

B.E. 3/4 (ECE) I - Semester (Old) Examination, May / June 2017

Subject : Linear Integrated Circuits and Applications

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 Why open loop Op-amp is not suitable for AC applications? (2)

2 An Op-amp operates as a unity gain buffer with $3V_{PP}$ square wave input. If Op-amp is ideal with slew rate 0.5 V/sec, find the maximum frequency of operation. (2)

3 What are the limitations of basic differentiator circuit? How it can be overcome? (3)

4 How the Op-amp acts as a substractor? (2)

5 Draw the circuit diagram of Non inverting Schmitt trigger. (2)

6 Design all pass filter with a phase of 45^{o} at a frequency of 2kHz. (3)

7 Draw the circuit diagram of Schmitt trigger using 555 timer. (3)

8 Draw the pin diagram of IC 566. (2)

9 Compare series regulator with shunt regulator. (3)

10 Define the following terms: (3)
(i) Settle time (ii) Conversion time (iii) Resolution

PART – B (50 Marks)

11 (a) Define input offset voltage. Explain the input offset voltage compensating circuit to minimize the input offset voltage. (4)
(b) Determine the output voltage of a differential amplifier for the input voltages of 300μv and 240μv. The differential gain of the amplifier is 500 and the value of CMRR is 100dB? (3)
(b) Define the following terms: (3)
(i) PSRR (ii) Total output voltage (iii) CMRR

12 (a) Draw the frequency response of an ideal differentiator? How it is modified when a small resistor is connected in series with the capacitor. (5)
(b) Design a practical differentiator to differentiate an i/p signal that varies in frequency from 10Hz to 10kHz. Input is a sine wave peak to peak amplitude 2v at 10 kHz. (5)

13 (a) Explain Full wave precision rectifier using Op-amp. (5)
(b) Design Analog voltage multiplier circuit using Op-amp. (5)

14 (a) Design a 4^{th} order Butterworth high-pass filter with cutoff frequency 1KHz. (5)
(b) Draw the circuit and explain the operation of wide band reject filter. (5)

15 (a) Explain the operation of Astable multivibrator using LC555. (5)
(b) Design an astable multivibrator using 555 timer with a frequency of 1KHz for the duty cycle of 40%. (5)

16 (a) Explain the working of R-2R ladder type DAC circuit. (5)
(b) A certain 5 bit DAC has V_{FS}=10V with a guarantee accuracy of ±1/2 LSB. Determine the expected output, the upper and lower limits of the possible output for the binary input.
(i) 00101 (ii) 10000 (5)

17 (a) Draw the functional diagram of IC8038 function generator and explain its operation. (5)
(b) Draw the internal functional block diagram of 565 PLL and explain the function of each block. (5)

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Code No. 3410 / N/S

FACULTY OF ENGINEERING

B.E. 3/4 (Inst.) I - Semester (New)(Suppl.) Examination, May / June 2017

Subject : Instrumentation Systems

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 What is AC Tachogenerator? (2)

2 Explain the principle of Drag Cup Tachometer? (3)

3 Write the Characteristics of elastic force transducers. (3)

4 What is peltier and seebeck effect?. (2)

5 What are the various types of flow meters? (2)

6 What do you mean by Vena – Contracta? (3)

7 Draw a schematic diagram for measurement of liquid level using Resistive Transducer. (2)

8 Match the following (3)

(a) Refractometer	(1) temperature measurement
(b) Calomel electrode	(2) measurement of flow rate
(c) Hot wire anemometer	(3) liquid level measurement
	(4) humidity measurement
	(5) measurement of P^H value

9 Mention the different types of microphones. (2)

10 Explain working principle of carbon microphone. (3)

PART - B (50 Marks)

11 Derive the general second order equation for seismic transducers, sketch the frequency response for seismic displacement, velocity and acceleration. (10)

12 (a) What is the principle of operation of torque measurement? Explain one typical type of management for the measurement. (6)

(b) Discuss the merits - demerits of the cooling techniques of thermocouples. (4)

13 Classify various flow meters. Explain with neat diagram of the head flow meter. (10)

14 (a) With help of a neat sketch explain aluminium oxide hygrometer. (5)

(b) With help of a neat sketch explain measurement of liquid level by gamma rays. (5)

15 (a) With the help of a diagram explain the arrangement of a capacitive microphone and explain its working. (5)

(b) Five machines are working in a noisy environment, if the 5 machines having individual SPL's of 62, 74, 82, 88, 94 and 98 are switched on simultaneously. Determine the resultant SPL of machines. (5)

16 (a) Discuss the merits and demerits of measurement of angular velocity by DC tachogenerator. (5)

(b) An orifice plate is situated in a water pipe of dia 50mm and has an orifice dia of 30mm for reynold's no. 1 lakh. The discharge coefficient is .61. Calculate the velocity at orifice to give flow value (value of flow 1000kg/m^2, kinematic viscosity 10^-6 m^2/sec) (5)

17 Write short notes on the following: (10)

(a) Laws of thermocouple (b) Installation of pH meter

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Code No. 3131 / O/S

FACULTY OF ENGINEERING

B.E. 3/4 (Inst.) I - Semester (Old) Examination, May / June 2017

Subject : Instrumentation Systems

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 State working principle of Piezo-Electric Transducer. (3)
2 How Strain gauges are classify. (2)
3 Mention the law of Thermocouple. (2)
4 Mention various torque and force measurement methods. (3)
5 An accelerometer has a seismic mass of 0.05 kg and a spring constant of $3x10^3$ N/m, maximum mass displacement is ± 0.02m. Calculate (a) maximum measurable acceleration and (b) natural frequency. (3)
6 The domestic water meter used for water flow measurement is based on the principle. (2)
7 Explain measurement of liquid level using Gamma Rays. (3)
8 Define Absolute Humidity. (2)
9 What are the significant characteristics of piezo-electric microphone. (3)
10 Give the classification of various microphones. (2)

PART – B (50 Marks)

11 (a) Explain the working of a DC teachogenerator with suitable diagram. (5)
(b) A seismic accelerometer sensing displacement has an under damped frequency of 20Hz and a damping ratio of 0.7. Calculate (i) its damping frequency (ii) Amplitude ratio (5)

12 (a) Explain the digital measurement of Torque using suitable diagram. (5)
(b) Explain in detail construction of Thermocouple with suitable diagram describing various productive sheaths. (5)

13 Explain various kinds of Head-type flow meter depending on the physical principle of operation and other characteristics with suitable diagrams and equations. (10)

14 (a) Explain the measurement of Liquid level with variable permeability method. (5)
(b) Explain with suitable diagram the working of Resistive and Aluminum Hygrometer. (5)

15 Explain the various microphones in detail. (10)

16 (a) A piezo-electric accelerometer has a transfer function of 61mV/g and a natural frequency of 4500Hz. In a vibration test at 110Hz, a reading of 3.6V peak is obtained. Find the vibration peak displacement. (5)
(b) A load cell consist of a solid cylinder of steel 40 mm in diameter with four starin gauges bonded to it and connected into four arms of voltage sensitive bridge. The gauges are mounted to have Poisson arrangement. If G_f=2.1, the bridge excitation voltage 6V, determine the sensitivity of the cell in V/kN, E=200GN/m^2 v = 0.29. (5)

17 (a) A venture meter is to be fitted in the horizontal section at a 0.15m pipeline. Calculate the cylindrical throat diameter, if the maximum differential pressure obtained is 0.5cm for a maximum flow rate of 5.0 Kg/s for water of 20^{o}C, Assume discharge coefficient of 0.99. (5)
(b) Write short note on pH meters. (5)

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Code No. 3412/N/S

FACULTY OF ENGINEERING

B.E. 3/4 (ECE) I - Semester (New)(Suppl.) Examination, May / June 2017

Subject : Linear Integrated Circuits and Applications

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 What is a level translator circuits? Why is it used with cascaded differential amplifiers? (2)
2 Define CMRR and explain about its importance. (2)
3 What is meant by virtual ground? (2)
4 Explain the difference between normal rectifiers and precision rectifiers. (3)
5 What are the advantages of Active filters over Passive filters? (2)
6 Explain the operation of Schmitt Trigger using OPAMP. (3)
7 Explain any one application of Astable multivibrator using 555 timer. (3)
8 Explain how VCO acts as voltage to frequency converter. (3)
9 Explain the features of fixed voltage regulators. (2)
10 What output voltage would be protected by D/A converter whose output range is 0 to 5 v and input binary is 10110011. (3)

PART – B (50 Marks)

11 (a) Define the following OPAMP electrical parameters.
(i) Input bias current (ii) Input offset voltage (iii) PSRR
(iv) Output offset voltage and also write their typical values for μA 741 IC. (5)
(b) For a given differential amplifier two sets of input signals are applied
(i) V_{S1} = 200μ V and V_{S2}=220μV (ii) V_{SF} - V_{S2} = 20μV. Obtain the output due to both set of inputs if CMRR = 80dB and A_d=100. (5)

12 (a) Explain the operation of Instrumentation Amplifier using three OPAMPs with neat diagram. (6)
(b) Design a practical integrator which operates between 1.5KHz to 15 KHz. (4)

13 (a) Draw the circuit diagram of second order high pass butterworth filter and derive the expression for its voltage gain. (5)
(b) Explain the operation of clamper circuit using precision rectifiers. (5)

14 (a) Draw the circuit diagram of Astable multivibration using 555 timer and explain its operation. Also drive the expression for frequency of oscillations. (6)
(b) Draw the block diagram of PLL and explain the function of each block. (4)

15 (a) Explain the operation of inverted R-2R ladder D/A inverter with neat diagram. (6)
(b) Explain current fold back technique in IC 723 voltage Regulator. (4)

16 (a) Explain about voltage to current converter with grounded load. (4)
(b) Explain the operation of triangular waveform generator and derive the expression for frequency of oscillations. (6)

17 Write short notes on the following:
(a) Function Generator (5)
(b) Flash type ABC (5)

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Code No. 3138 / O / S

FACULTY OF ENGINEERING

B.E. 3/4 (Mech.) I-Semester (Old) Examination, May / June 2017

Subject : Applied Thermodynamics

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

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

PART – A (10 x 2.5 = 25 Marks)

1 Write any three applications of compressed air.
2 Determine the length of the stroke of the piston, if velocity of the piston 152.5 meters/min and speed of the compressor is 100 r.p.m.
3 Compare SI and CI engine with respect to introduction of fuel load control.
4 Explain the mist lubrication in few sentences.
5 Define equivalent ratio.
6 Explain the importance of ignition delay period in C.I. engine.
7 Write any twomountings and two accessories in steam boilers.
8 How the cooling towers are classified based on the type of draught?
9 What is fluidized bed combustion? Explain briefly.
10 Define steam rate in Rankine cycle.

PART – B (5 x 10 = 50 Marks)

11 a) Define volumetric efficiency and obtain an expression for it in case of a reciprocating air compressor. 4

b) A single acting single cylinder reciprocating compressor has a cylinder diameter of 200 mm and a stroke of 300mm air enters the cylinder at 1 bar and 27^0c ; it is then compressed polytropically to 8 bar according to the law $PV^{1.3} = C$. If speed of compressor is 250 rpm calculate the mass of air compressed per min and power required in kw to drive the compressor. 6

12 The following observations were made during a trial of a single cylinder four stroke cycle gas engine having a cylinder diameter of 18cm and stroke 24cm.

Duration of trial = 30 min, Total no. of revolutions = 9000, Total no. of explosions = 4450, Mean effective pr = 5bar, Net load on brake wheel = 40kg, Effective dia of brake wheel = 1m, Total gas used at NTP = 2.4m^3, CV of gas at NTP = 19 MJ/M^3, Total air used = 36m^3 ; Pr of air = 720 mm of Hg, Temp of air = 17^0c, Density of air at NTP = 1.29 kg/m^3, Temp of exhaust gases = 350^0c,

Room Temp = 17^0c, Sp.heat of exhaust gases = 1 kj/kg^{0}c, cooling water circulated = 80kg, Rise in temp of cooling water = 30^0c.

Draw a heat balance sheet and estimate mechanical and indicated thermal efficiencies of the engine (R = 287 j/kg k). 10

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13 a) Explain in detail flame front propagation in S.I. engine? Discuss the factors influencing the flame speed. 5

b) Discuss the abnormal combustion in S.I. engine. 5

14 a) Compare jet type and surface type condensers. 5

b) Explain with neat sketch of double pass surface condenser. 5

15 a) Define the term critical pressure. Derive an expression for condition for maximum discharge. 7

b) In a convergent-divergent nozzle the steam enters at 15 bar, 300^0c and leaves it at a pressure of 2 bar. The inlet velocity to the nozzle is 150m/sec. Find the required throat and exit areas for mass flow rate of 1kg/sec. Assume, nozzle efficiency to be 90%. Assume C_p = 2.4 Kj/kg k. 3

16 a) Explain the concept of Reheat cycle with a neat sketch and its importance in the steam power plant. 4

b) A cycle steam power plant is to be designed for a steam temperature at turbine inlet of 360^0c and an exhaust pressure of 0.08 bar. After isentropic expansion of steam in the turbine, the moisture content at the turbine exhaust is not to exceed 15%. Determine the greatest allowable steam pressure at the turbine inlet and calculate the Rankine cycle efficiency for these steam conditions. Estimate also the mean temperature of heat addition. 6

17 Write short notes on the following : 10

a) Isothermal, Isentropic efficiencies in Reciprocating Air Compressors

b) Combustion phenomena in C.I. engine

c) Crank case dilusion

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Code No. 3418 / N / S

FACULTY OF ENGINEERING

B.E. 3/4 (Mech.) I-Semester (New) (Suppl.) Examination, May / June 2017

Subject : Applied Thermodynamics

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

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

PART – A (10 x 2.5 = 25 Marks)

1 Define clearance factor in a reciprocating air compressor and its significance.
2 Determine the length of the stroke of the piston, if velocity of the piston 152.5 meters / min and speed of the compressor is 100 r.p.m..
3 Write the formula of indicated power and explain each term.
4 Define brake specific fuel consumption and indicated specific fuel consumption.
5 Define equivalent ratio.
6 Write importance of compression swirl in C.I. engines.
7 Write the importance of air preheater and economiser in steam boiler.
8 Define boiler efficiency.
9 Draw the Rankine cycle on T-S diagram.
10 Write importance of cooling tower in a condenser.

PART – B (5 x 10 = 50 Marks)

11 a) Define volumetric efficiency and obtain an expression for it in case of a reciprocating air compressor.
b) Derive an expression for isothermal efficiency in case reciprocating air compressor.

12 The following observations were made during a trial of a single cylinder four stroke cycle gas engine having a cylinder diameter of 18cm and stroke 24cm.
Duration of trial = 30 min, Total no. of revolutions = 9000, Total no. of explosions = 4450, Mean effective pr = 5 bar, net load on brake wheel = 40 kg, Effective dia of brake wheel = 1m, Total gas used at NTP = 2.4m^3, CV of gas at NTP = 19 MJ/m^3, Total air used = 36m^3; Pr of air = 720mm of Hg, Temp of air = 17^{0}c, Density of air at NTP = 1.29 kg/m^3, temp of exhaust gases = 350^{0}c, Room temp = 17^{0}c, Sp.heat of exhaust gases = 1 kj/kg^{0}c, cooling water circulated = 80kg, Rise in temp of cooling water = 30^{0}c.
Draw a heat balance sheet and estimate mechanical and indicated thermal efficiencies of the engine (R = 287 k/kg k).

13 Explain the stages of combustion in S.I. engine with neat sketch using P-θ diagram.

14 Derive an expression for a boiler draught in terms water column in terms chimney height of a boiler.

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15 A regenerative system is added to a 5-MW steam power plant that operates of a simple ideal Rankine cycle. Steam enters into the inlet of the turbine at 5MPa and 673K and subsequently gets cooled to a saturated liquid at 5 kPa in the condenser. A suitable portion of the steam is withdrawn from the turbine at 3MPa, and the remaining steam is expanded to the condenser pressure level. Then, the pressure of this steam is raised to 3MPa to get mixed with extracted steam from the turbine in an open feed water heater. Determine a) quality of steam at the exit of turbine b) net work out put per unit mass, and c) thermal efficiency.

16 Define critical pressure of nozzle and derive condition for critical pressure.

17 Write short notes on the following :
   a) Multi stage compression
   b) Simple carburettor
   c) Exhaust Emissions in C.I. engine

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Code No. 3143 / O / S

FACULTY OF ENGINEERING

B.E. 3/4 (Prod.) I-Semester (Old) Examination, May / June 2017

Subject : Applied Thermodynamics and Heat Transfer

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 function of aftercooler in reciprocating air compressor?		2
2	Define isothermal efficiency as referred to reciprocating air compressor.		3
3	What are the various assumptions made in air-standard cycle analysis?		2
4	Define specific fuel consumption.		3
5	What are the various factors that influence the flame speed?		2
6	What is meant by detonation?		3
7	What is the significance of thermal diffusivity?		2
8	What is the critical radius if insulation?		3
9	State Wein's law.		2
10	What is meant by grey body?		3

PART – B (50 Marks)

11 a) Discuss how the clearance effects the performance of multistage reciprocating air compressor.

b) An air compressor takes in air at 1 bar and 20^0C and compresses it according to law $PV^{1.2}$ = constant, it is then delivered to a receiver at a constant pressure of 10 bar, R = 0.287 kJ/jg K, Determine

i) Temperature at the end of compression

ii) Workdone and heat transferred during compression per kg of air.

12 a) Describe the working principle of four-stroke cycle SI engine with the help of neat sketches.

b) A 4-cylinder four-stroke petrol engine develops 14.7 kW at 1000 rpm, the mean effective pressure is 5.5 bar, calculate the bore and stroke of the engine, if the length of the stroke is 1.5 times the bore.

13 a) Explain the working principle of thermostatic cooling system of IC engines.

b) Explain the combustion phenomenon in CI engine.

14 a) Derive the general heat conduction equation in cartesian coordinate system.

b) Derive the expression for the rate of heat transfer through slab without internal heat generation.

..2

15 A flat plate consists of two layers of materials A and B. A is 6cm thick having thermal conductivity 209 W/m-K. B is 3 cm thick having thermal conductivity 46.5 W/m-K. Plate is in contact with hot gas at a temperature of 150^0C and heat transfer coefficient equal to 14 W/m^2-K. Plate B is in contact with a cold fluid at temperature 30^0C with heat transfer coefficient equal to 23 W/m^2 K. Determine overall heat transfer coefficient and rate of heat transfer through 1m^2 surface.

16 a) Explain the difference between parallel flow and counter flow heat exchanger and show how the temperature if the two fluids vary along the path of flow.
b) What is the physical significance of Reynolds number and Grashofs number?

17 Write short notes on the following :
a) BP, IP and FP
b) Knocking
c) Isothermal Efficiency

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Code No. 3423 / N / S

FACULTY OF ENGINEERING

B.E. 3/4 (Prod.) I-Semester (New) (Suppl.) Examination, May / June 2017

Subject : Applied Thermodynamics and Heat Transfer

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	How are the air compressors classified?	3
2	Define isothermal efficiency.	2
3	What is meant by heat balance sheet of IC Engines?	3
4	Compare 4-stroke and 2-stroke cycle engine.	2
5	What is meant by abnormal combustion?	3
6	What are homogeneous and heterogeneous mixtures?	2
7	What is Newtons law of cooling?	3
8	Define critical radius of insulation.	2
9	State Stefan Boltzman law.	3
10	What is meant by black body?	2

PART – B (50 Marks)

11 a) Prove that the clearance volume does not effect the ideal work of compressing and delivering 1kg of air in reciprocating air compressor.

b) A single stage double acting air compressor is required to deliver $14m^3$/min of air measured at 1.013 bar and 15^0C. Delivery pressure is 7 bar and speed 300 rpm. Take the clearance volume as 5% of the swept volume with compression and expansion and expansion index of n as 1.3. Calculate i) Swept volume of the cylinder, ii) The delivery temperature iii) Indicated power.

12 a) What are the different performance parameters of IC engine, Explain?

b) The power output of an IC engine is measured by a rope brake bynamometer. The diameter of the brake pulley is 700mm, and the rope diameter is 25mm, the load on the light side of rope is 50kg mass and spring balance reads 50N. The engine is running at 900rpm, the engine consumes fuel of calorific value 44,000 kJ/kg, at a rate of 4 kg/h.
Calculate i) brake specific fuel consumption ii) brake thermal efficiency

13 a) What are the types of combustion chambers in CI engines?

b) Explain the working principle of Zenith carburetor.

14 a) Explain about the stages of combustion in CI engine.

b) Derive the expression for heat loss through a composite wall of layer considering convective heat transfer coefficient.

..2

15 A mild steel tank of wall thickness 12mm contains water at 95^0C. The thermal conductivity of mild steel is 50 W/m^{0}C and heat transfer coefficients for inside and outside the tank are 2850 and 10 W/m^2 ^{0}C, respectively. If the atmospheric temperature is 15^0C, Calculate i) the rate of heat loss per m^2 of the tank surface area ii) the temperature of the outside surface of tank.

16 In a counter flow double pipe heat exchanger, water is heated from 25^0C to 65^0C by an oil with a specific heat of 1.45 kJ/kg K and mass flow rate of 0.9 kg/s. The oil is cooled from 230^0C to 160^0C. If the overall heat transfer coefficient is 420 W/m^{20}C, calculate the
Following
i) The rate for heat transfer
ii) The mass flow rate of water
iii) The surface area of heat exchanger

17 Write short notes on the following :
a) After cooling in reciprocating air compressors
b) Buckingham Theorem
c) Modes of heat transfer

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Code No. 3146 / O / S

FACULTY OF ENGINEERING

B.E. 3/4 (AE) I-Semester (Old) Examination, May / June 2017

Subject : Automative Diesel Engines

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

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B. Assume suitable data if necessary for solving problems.

PART – A (2.5 x 10 = 25 Marks)

1 Why diesel engines are widely used in different fields?
2 What is meant by jerk injection system?
3 What is meant by squish motion?
4 What is the necessity of supercharging an Engine?
5 Give a brief account of emissions from CI engines.
6 How does two stroke engine differ from four stroke cycle engine?
7 Why is proper distribution of fuel essential?
8 What is the purpose of air motion in CI engine?
9 Why scavenging is important in two strike engines?
10 What is meant by performance maps?

PART – B (50 Marks)

11 Compare the combustion, operation and performance of CI engine with SI engine. 10

12 a) What is the purpose of using a governor in CI engines? 5
b) What are the functional requirements of an injection system? 5

13 Explain with neat sketches about the various types of combustion chambers used in CI engines. 10

14 a) What do you understand by the term turbo charger? 5
b) What is meant by EGR? 5

15 a) Define air fuel ratio and briefly state its effect on power output, fuel consumption and combustion pressure. 5
b) What is meant by heat balance sheet? 5

16 In an ideal diesel cycle the pressure and temperature are 1.03 bar and 27^0C respectively. The maximum pressure in cycle is 47 bar and the heat supplied during the cycle is 545 kJ/kg. Determine i) the compression ration ii) the temperature at the end of compression iii) the temperature at the end of constant pressure combustion and iv) the air standard efficiency, assume r=1.4 and Cp = 1.004 KJ/Kg.K for air. 10

17 Write short notes on the following :
a) Spray characteristics 4
b) Delay period 3
c) M type combustion chamber 3

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Code No. 3426 / N / S

FACULTY OF ENGINEERING

B.E. 3/4 (AE) I – Semester (New) (Suppl.) Examination, May / June 2017

Subject: Automotive Diesel Engines

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

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

PART – A (25 Marks)

1 Define the following terms:
   a) Ignition quality
   b) Cut-off ratio
2 What are the requirements of fuel injection system?
3 Define PTFI system pressure wave.
4 What is the importance air motion in diesel engines?
5 Define delay period and on what parameters it depends.
6 Define knocking in CI engine.
7 What are the methods used to improve the volumetric efficiency of an engine?
8 What is the purpose of exhaust gas recirculation?
9 What are the exhaust emissions from CI engines?
10 What is the need for conducting heat balance test?

PART – B (50 Marks)

11 a) Derive an expression for air standard efficiency of diesel cycle.
   b) Differentiate between actual and air standard cycles.

12 a) What are the laboratory tests conducted to determine the cetane number of given fuel explain in detail.
   b) Differentiate between diesel and dual cycles.

13 a) With a neat sketch explain the working principle of distributor type fuel injection pump.
   b) What are the different types of a governors used in diesel engine. Explain in detail.

14 a) What parameters are considered for designing a combustion chamber of a diesel engine. Give reasons for that.
   b) With a neat sketch explain M-type combustion chamber.

15 a) Compare super charging with turbo charging.

b) With a neat sketch explain charge cooling used in turbo charging.

16 a) Explain how to obtain engine performance and emission characteristics.

b) List the variables which effects the engine performance and emission.

17 Write a short note on the following:

a) Performance maps

b) Knocking

c) Fuel injection system.

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Code No. 3150 / O / S

FACULTY OF ENGINEERING

B.E. 3/4 (CSE) I-Semester (Old) Examination, May / June 2017

Subject : Database Management System

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	Explain the differences between physical and logical independence.		2
2	Explain weak entity and strong entity with example.		3
3	Express right outer join in relational algebra with example.		2
4	Discuss about embedded SQL.		3
5	Describe about integrity constraints.		3
6	Define 3 NF. Give an example.		2
7	What is the difference between primary index and secondary index?		2
8	Define ACID properties.		3
9	Explain Thoma's write rule.		3
10	What is meant by 'Database Buffering'?		2

PART – B (50 Marks)

11	a)	Discuss the architecture of DBMS.	5
	b)	Write about the decomposition using multivalue dependencies.	5
12	a)	Explain the reduction of E-R model to relational schema.	6
	b)	Differentiate between group by and order by clauses in SQL.	4
13	a)	Explain the functionality of following operations in relational algebra. i) Division ii) Select iii) Cartesian product	6
	b)	Write short notes on recursive queries with example.	4
14	a)	Explain the concept of functional depencies in normal forms with an example.	6
	b)	What are the features of good relational designs?	4
15	a)	Explain recoverable schedules and cascadeles schedules.	4
	b)	Discuss B+ tree index file with an example. Explain its importance in databases.	6
16	a)	Differentiate between 'conflict equivalence' and 'conflict serializability'.	5
	b)	What is the functionality of time-stamp based protocols?	5
17	Write short notes on the : a) Embedded SQL b) ARIES c) Recoverability		10

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Code No. 3431 N / S

FACULTY OF ENGINEERING

B.E. 3/4 (CSE) I – Semester (Suppl.) Examination, May / June 2017

Subject: Database Management Systems

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

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

PART – A (25 Marks)

1		Define Assertion? Write the Syntax?	2
2		Define weak entity set? How a weak entity set is represented in E-R Model?	2
3		What is DML? List the various types of DML statements.	3
4		Define natural Join. Explain the natural join using SQL query.	3
5		Define trigger. Write a syntax for trigger.	2
6		What is Authorization? Different types of authorization that database needs to satisfy.	2
7		What are the different states in a transaction that a process goes before committing in database?	3
8		Define Conflict Serializability? Draw the Truth table for it using Read and Write Operations?	3
9		What is Stable Storage?	2
10		Explain Cascadeless schedules?	3

PART – B (5x10 = 50 Marks)

11	a)	List the various applications of Databases.	5
	b)	Explain different architectures of database applications?	5
12	a)	Explain the Fundamental relational algebra operations?	4
	b)	Consider the following Relational Schema	6

employee (person name, street, city)

works (person name, company name, salary)

company (company name, city)

manages (person name, manager name)

the primary keys are underlined, write SQL queries.

i) Find names of employees who live in the same city and on the same street as do their managers.

ii) Find all employees who earns more than average salaries of all employees of their company.

13 a) Define function in database? Write the syntax? 4

b) Differentiate between Sparse and Dense indexing techniques? 6

14 a) Construct B+ tree index structure for the given search keys that can accommodate four (4) pointers in a node. 5

3 5 7 11 17 19 23 29 31 35 39

b) Check the following given schedule is Conflict serializable or not, for READ (X) and WRITE (X) instruction. Where 5

T= { $R_1(A);R_2(A);W_2(A);R_2(B),W_1(A),R_1(B),W_1(B);W_2(B)$} using precedence graph?

15 a) Explain Time-Stamp based locking protocol? 5

b) Explain ARIES Algorithm? 5

16 a) What is Phantom problem? Explain. 4

b) Explain Recoverability in detail. 6

17 Write short notes on the following: 10

a) Arm strong axioms

b) Bitmap Indices.

c) Dynamic SQL.

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Code No. 3157 / O / S

FACULTY OF INFORMATICS

B.E. 3/4 (IT) I – Semester (Old) Examination, May / June 2017

Subject: Database Management Systems

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

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

PART – A (25 Marks)

1 State the purpose of database model.

2 What is derived attributes in E-R diagram? Give an example.

3 List fundamental relational algebra operations with their symbolic representation.

4 What is outer join? Write about different types of it.

5 Give any two examples of integrity constraints.

6 Compare BCNF and 3NF.

7 Write about any two types of order indices.

8 Specify ACID properties.

9 Write about the types of locks in database.

10 Discuss why “stable storage not implemented”.

PART – B (50 Marks)

11 a) Discuss major advantages of a database system. 7

b) Explain the concept of generalization specification in extended E-R model. 3

12 a) Write about fundamental relation algebra operations with an example for each. 6

b) What is difference between a weak and strong entity set with an example. 4

13 a) Explain any five integrity constraints with examples. 7

b) Discuss different authorization in SQL with necessary commands to grant them. 3

14 a) Explain about decomposition using functional dependency. 5

b) Compare ordered indexing and hashing. 5

15 Show that 2 phase locking protocol ensures conflict serializability in detail and that transactions can be serialized according to their lock points. 10

16 a) Write the usage of B^+ trees. Explain with example. 5

b) Explain ARIES recovery algorithm. 5

17 Write short notes on:

1) Extended SQL 3

2) Remote Backup system 3

3) Timestamp based protocol 4

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Code No. 3438 / N / S

FACULTY OF INFORMATICS

B.E. 3/4 (IT) I – Semester (New) (Suppl.) Examination, May / June 2017

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	Define a view. What is the need for creating views?	(2)
2	What are the different levels of abstraction?	(3)
3	What is Referential integrity?	(2)
4	Distinguish between static and dynamic hashing	(3)
5	Differentiate between Primary and secondary indices	(2)
6	Draw state diagram of a transaction.	(3)
7	List the responsibilities of DBA.	(3)
8	List the two modes of locks on data items.	(2)
9	Write Armstrong's axioms.	(2)
10	What are remote backup systems?	(3)

PART – B (5x10 = 50 Marks)

11	a) Illustrate with figures database architecture.	(6)
	b) List and explain the different Data Models.	(4)
12	a) What are nested subqueries? Explain with examples.	(6)
	b) Explain different types of Joins with examples.	(4)
13	What is normalization? Explain the need for normalization. Explain different forms of normalization along with examples .	(10)
14	Construct B+-tree for the following keys when n=4 2,3,5,7,11,17,19,23,29,31	(10)
15	a) Explain 2-phase locking protocol along with its versions	(6)
	b) Explain how recovery can be done using log records.	(4)
16	Define E-R diagram. Explain extended E-R features. Give example for each.	(10)
17	Write short notes on:	
	a) Embedded SQL	(3)
	b) Types of attributes	(2)
	c) Relational algebra operations	(5)

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