

D 50211

(Pages : 3)

Name.....

Reg. No.....

**FIFTH SEMESTER (CUCBCSS—UG) DEGREE EXAMINATION
NOVEMBER 2023**

Physics/Applied Physics

PHY 5B 09/APY 5B 10—ELECTRONICS (ANALOG AND DIGITAL)

(2018 Admissions)

Time : Three Hours

Maximum : 80 Marks

Section A*Answer all questions.**1 mark each.*

1. Define a full wave rectifier.
2. The most widely used rectifier is _____.
3. The collector-base junction in a transistor is _____ biased.
4. How many pn junctions a Zener have ?
5. If biasing is not done in an amplifier circuit, it results in _____.
 - (i) Decrease in base current.
 - (ii) Unfaithful Amplification.
 - (iii) Excessive collector bias.
 - (iv) None of the above.
6. What is the use of Coupling capacitor in an amplifier ?
7. The phase difference of 180° between the signal voltage and output voltage in a common emitter amplifier is known as _____.
8. In the zero signal conditions, a transistor sees _____ load.
 - (i) d.c.
 - (ii) a.c.
 - (iii) both d.c. and a.c.
 - (iv) None of the above.
9. _____ coupling provides the maximum voltage gain.
 - (i) RC.
 - (ii) Transformer.
 - (iii) Direct.
 - (iv) Impedance.

Turn over

Section D

*Solve any **four** problems.*

4 marks each.

25. A full-wave rectifier uses two diodes, the internal resistance of each diode may be assumed constant at $20\ \Omega$. The transformer r.m.s. secondary voltage from centre tap to each end of secondary is $50\ \text{V}$ and load resistance is $980\ \Omega$. Find : (i) the mean load current ; and (ii) the r.m.s. value of load current
26. The applied input a.c. power to a half-wave rectifier is 100 watts. The d.c. output power obtained is 40 watts.(i) What is the rectification efficiency ? (ii) What happens to remaining 60 watts ?
27. In a transistor circuit, collector load is $4\ \text{k}\Omega$ whereas quiescent current (zero signal collector current) is $1\ \text{mA}$.
- (i) What is the operating point if $V_{CC} = 10\ \text{V}$?
- (ii) What will be the operating point if $R_C = 5\ \text{k}\Omega$?
28. Find the gain in db in the following cases :
- (i) Voltage gain of 30 ; and (ii) Power gain of 100
29. A three-stage amplifier has a first stage voltage gain of 100, second stage voltage gain of 200 and third stage voltage gain of 400. Find the total voltage gain in db
30. Convert octal number $(24.6)_8$ to the equivalent decimal number.
31. In a frequency modulated wave, frequency deviation constant is $75\ \text{kHz/volt}$ and the signal amplitude is $2\ \text{V}$. Find the maximum frequency deviation.

(4 × 4 = 16 marks)

Section E

*Write any **two** questions.*

10 marks each.

32. With figure explain common base transistor circuit. What are its characteristics ?
33. Explain transistor RC coupled amplifier with special reference to frequency response, advantages, disadvantages and applications With figure.
34. Explain two types of full wave rectifiers.
35. Analyse DC and AC load lines.

(2 × 10 = 20 marks)

D 30198

(Pages : 4)

Name.....

Reg. No.....

**FIFTH SEMESTER (CUCBCSS-UG) DEGREE EXAMINATION
NOVEMBER 2022**

Physics/Applied Physics

PHY 5B 09/APY 5B 10—ELECTRONICS (ANALOG AND DIGITAL)

(2017—2018 Admissions)

Time : Three Hours

Maximum : 80 Marks

Section A

Answer all questions.

1 mark each.

1. Define current amplification factor.
2. Write the relation connecting emitter, base and collector currents.
3. What is the use of C_E in an amplifier.
4. Mention Various circuit currents in an amplifier circuit
5. A CE amplifier is also called _____ circuit.

(i) Grounded emitter.	(ii) Grounded base.
(iii) Grounded collector.	(iv) None of the above.
6. What is a multistage transistor amplifier. RC coupling is used for _____ amplification.

(i) Voltage.	(ii) Current.
(iii) Power.	(iv) None of the above.
7. 1 db corresponds to _____ change in power level.

(i) 50%.	(ii) 35%.
(iii) 26%.	(iv) 22%.
8. Draw the symbol of not gate.
9. In Boolean algebra, the bar sign ($\bar{}$) indicates _____.

(i) OR operation.	(ii) AND operation.
(iii) NOT operation.	(iv) None of the above.

Turn over

10. What is binary number system ?

(10 × 1 = 10 marks)

Section B

*Answer all questions.
Write in two or three sentences.
2 marks each.*

11. Draw the figure of a full wave bridge rectifier.

12. What is the purpose of using filters in a circuit ?

13. What is a voltage multiplier ?

14. Explain operating point.

15. Describe the transistor action in detail.

16. Draw the truth table and symbol of a NAND gate.

17. State De Morgan's theorems.

(7 × 2 = 14 Marks)

Section C

*Write any five questions.
Write in one paragraph.
4 marks each.*

18. Explain different types of filter circuits.

19. With figure explain voltage halfwave doubler.

20. Derive the relation between α and β .

21. Compare various transistor circuits.

22. Mention the steps that are taken to design the transistor biasing and stabilisation circuits.

23. Explain the working of a Hartley oscillator.

24. With examples write a note on various number systems.

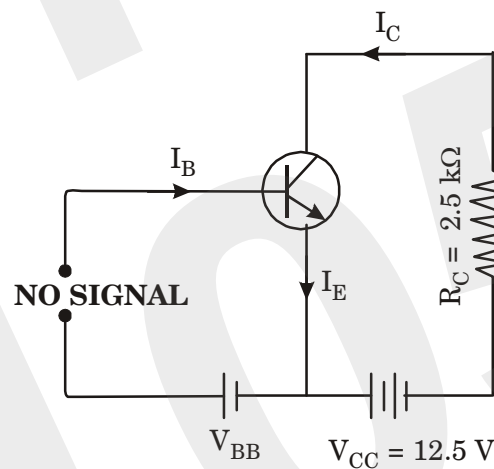
(5 × 4 = 20 marks)

Section D

Solve any **four** problems.

4 marks each.

25. Find the value of β if : (i) $\alpha = 0.9$; (ii) $\alpha = 0.98$; and (iii) $\alpha = 0.99$.
26. For the circuit shown, draw the DC load line :



27. The applied input a.c. power to a half-wave rectifier is 100 watts. The d.c. output power obtained is 40 watts : (i) What is the rectification efficiency ? ; and (ii) What happens to remaining 60 watts ?
28. In a transistor circuit, collector load is $4 \text{ k}\Omega$ whereas quiescent current (zero signal collector current) is 1 mA .
- (i) What is the operating point if $V_{CC} = 10 \text{ V}$?
- (ii) What will be the operating point if $R_C = 5 \text{ k}\Omega$?
29. Find the gain in db in the following cases :
- (i) Voltage gain of 30 (ii) Power gain of 100
30. A half-wave rectifier is used to supply 50 V d.c. to a resistive load of 800Ω . The diode has a resistance of 25Ω . Calculate a.c. voltage required.
31. In a common base connection, $I_C = 0.95 \text{ mA}$ and $I_B = 0.05 \text{ mA}$. Find the value of α .

(4 × 4 = 16 marks)

Section E

*Write any two.
10 marks each.*

32. With figure explain CE amplifier. Express the equation for gain
33. Explain with figure Biasing with Collector Feedback Resistor. Explain the advantageous and disadvantageous.
34. With figure explain two types of full wave rectifiers
35. With figure explain RC coupled amplifier.

(2 × 10 = 20 marks)

D 10246

(Pages : 3)

Name.....

Reg. No.....

FIFTH SEMESTER B.A./B.Sc. DEGREE EXAMINATION, NOVEMBER 2021

(CUCBCSS-UG)

Physics/Applied Physics

PHY 5B 09/APY 5B 10—ELECTRONICS (ANALOG AND DIGITAL)

Time : Three Hours

Maximum : 80 Marks

Section A

*Answer all questions.
1 mark each.*

1. What is the value of ripple factor of a full wave rectifier ?
2. A zener diode is used as _____.
 - (i) an amplifier.
 - (ii) a voltage regulator.
 - (iii) a rectifier.
 - (iv) a multi vibrator.
3. Draw the out put wave form of full wave rectifier.
4. In a practical biasing circuit, the value of R_E is about _____.
5. What is the use of Input capacitor C_{in} in an amplifier circuit ?
6. Write expression of zero signal collector current.
7. Define phase reversal.
8. 1 db corresponds to _____ change in voltage or current level.
9. (i) 40% ; (ii) 80% ; (iii) 20% ; (iv) 25%.
10. What is a feed back circuit ?

(10 × 1 =10 marks)

Section B

*Answer all questions.
Write in two or three sentences.*

11. Mention two disadvantages of a centre tap full wave rectifier.
12. Define ripple factor.
13. Explain Zener Diode as Voltage Stabiliser.
14. Draw the symbol of npn and pnp transistor and specify the leads.

Turn over

15. Explain Zener Diode as Voltage Stabiliser.
16. Distinguish between ordinary diode and zener diode.
17. Define bel power gain.

(7 × 2 =14 marks)

Section C

*Write any five questions.
Write in one paragraph 4 marks each.*

18. Discuss the importance of peak inverse voltage in rectifier service
19. How will you determine the input and output characteristics of CE connection experimentally ?
20. Write short notes on the following : (i) advantages of transistors (ii) operating point (iii) a.c. load line.
21. Compare different types of coupling.
22. Explain the working of a Hartley oscillator.
23. Write a note on flipflops.
24. Explain the following terms : (i) Frequency response ; (ii) Decibel gain ; (iii) Bandwidth.

(5 × 4 =20 marks)

Section D

*Solve any four problems.
4 marks each.*

25. A half-wave rectifier is used to supply 50V d.c. to a resistive load of 800 Ω. The diode has a resistance of 25 Ω. Calculate a.c. voltage required.
26. In a common base connection, $I_C = 0.95 \text{ mA}$ and $I_B = 0.05 \text{ mA}$. Find the value of α .
27. A change of 200 mV in base-emitter voltage causes a change of 100 μA in the base current. Find the input resistance of the transistor.
28. A transistor uses potential divider method of biasing. $R_1 = 50 \text{ k}\Omega$, $R_2 = 10 \text{ k}\Omega$ and $R_E = 1 \text{ k}\Omega$. If $V_{CC} = 12 \text{ V}$, find :
 - (i) the value of I_C ; given $V_{BE} = 0.1\text{V}$
 - (ii) the value of I_C ; given $V_{BE} = 0.3\text{V}$.
29. In a transistor circuit, collector load is 4 kΩ whereas quiescent current (zero signal collector current) is 1mA.
 - (i) What is the operating point if $V_{CC} = 10 \text{ V}$?
 - (ii) What will be the operating point if $R_C = 5 \text{ k}\Omega$?

30. Find the gain in db in the following cases :
- (i) Voltage gain of 30 ; (ii) Power gain of 100.
31. The applied input a.c. power to a half-wave rectifier is 100 watts. The d.c. output power obtained is 40 watts.
- (i) What is the rectification efficiency ?
 - (ii) What happens to remaining 60 watts ?

(4 × 4 = 16 marks)

Section E

*Write any two.
10 marks each.*

32. With figure explain common emitter transistor circuit. What are its characteristics ?
33. What is phase reversal.? Explain with figure.
34. Analyse DC and AC load lines.
35. With figure explain half wave and full wave rectifiers and their ripple factors. Compare.

(2 × 10 = 20 marks)

D 90246

(Pages : 4)

Name.....

Reg. No.....

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2020

(CUCBCSS—UG)

Physics/Applied Physics

PHY 5B 09/APY 5B 10—ELECTRONICS (ANALOG AND DIGITAL)

Time : Three Hours

Maximum : 80 Marks

Symbol used in this question paper have their usual meanings.

Section A

Answer all questions.

Each question carries 1 mark.

1. What is the maximum efficiency of a full wave rectifier ?
2. For a transistor, the value of α is 0.9 then the value of β is _____.
3. The most commonly used transistor arrangement is _____ configuration
4. The 8 bit binary equivalent of $(187)_{10}$ is _____.
5. The binary equivalent of the hexadecimal number EF is _____.

Questions 6 to 10 : Write True or False :

6. If the doping level of a crystal diode is increased, the breakdown voltage decreases.
7. The phase difference between the Input and output signal of a common emitter transistor configuration is 180° .
8. Positive feedback amplifier works as an oscillator.
9. For an Op-amp inverting amplifier when the input resistance and feedback resistance are equal then the numerical value voltage gain is unity.
10. In the case of an OR gate, when any *one* of the inputs is high the output is zero.

(10 × 1 = 10 marks)

Turn over

Section B

Answer at least six questions.

Each question carries 2 marks.

All questions can be attended.

Overall ceiling 12.

11. Define peak inverse voltage.
12. Draw the ac equivalent circuit of a single stage transistor amplifier circuit.
13. Write any *two* advantages of negative feed back.
14. What is meant by Demodulation.
15. Sketch the output characteristic of a JFET and define pinch of voltage.
16. State and explain De Morgan's theorem.
17. Draw the block diagram of a half adder and write down its truth table.

(6 × 2 = 12 marks)

Section C

Answer at least four questions.

Each question carries 5 marks.

All questions can be attended.

Overall ceiling 20.

18. What are filters ? With the help of neat diagrams explain the working of shunt capacitor and LC filter circuit.
19. Explain how voltage stabilisation is ensured in a zener diode voltage regulator.
20. What is an Op-amp ? Draw the circuit diagram and explain the working of Op-amp as a summing amplifier.
21. With a neat diagram explain the working of a tuned collector oscillator.
22. Sketch the output characteristic of a common emitter configuration and discuss all the regions in the characteristic curve.
23. Derive an expression for the fraction of total power carried by the side band in amplitude modulation.
24. With the help of diagrams explain the working of RS flip-flop.

(4 × 5 = 20 marks)

Section D

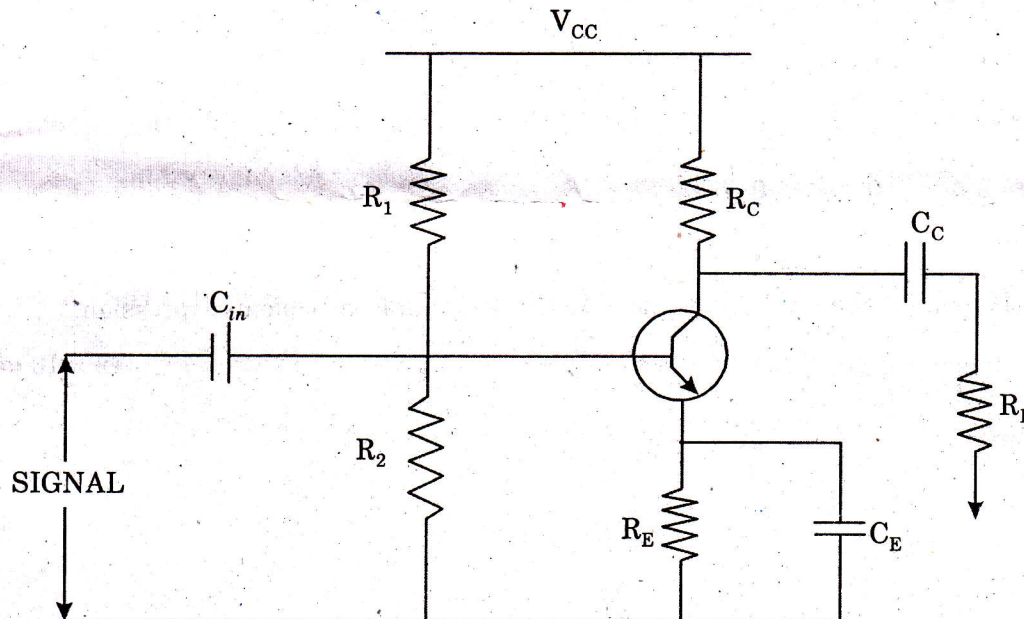
Answer at least three questions.

Each question carries 6 marks.

All questions can be attended.

Overall ceiling 18.

25. A transistor is connected in CE configuration. The voltage drop across $5\text{ k}\Omega$ resistance which is connected in the collector circuit is 5volts. Find the base current. Given $\alpha = 0.98$.
26. An amplifier has an open loop gain of 800 and a feedback fraction of 0.05. If the open loop gain changes by 20% due to temperature, find the percentage of change in closed loop gain
27. A phase shift oscillator uses 5 pF capacitors. Find the value of R to produce a frequency of 800 kHz
28. For a transistor amplifier shown in the figure given below, $V_{CC} = 15\text{ V}$, $R_1 = 10\text{ K}\Omega$, $R_2 = 5\text{ K}\Omega$, $R_C = 1\text{ K}\Omega$, $R_E = 2\text{ K}\Omega$ and $R_L = 1\text{ K}\Omega$. Draw the D.C. load line and hence find the operating point.



29. A carrier wave of 500 watts is subjected to 100% amplitude modulation. Determine :
- (i) Power in side bands ; and ii) Power of modulated wave.
30. In a transistor amplifier, the signal changes by 0.02 V , the base current changes by $10\text{ }\mu\text{A}$, and collector current by 1 mA . If the collector load $R_c = 5\text{ K}\Omega$ and $R_L = 10\text{ K}\Omega$. Find (i) Current gain ; (ii) Input impedance ; (iii) a.c. load ; and (iv) Voltage gain.
31. Convert 1011.101012 in to equivalent decimal number. Also convert 28.625_{10} in to binary number

(3 × 6 = 18 marks)

Turn over

Section E (Essays)

Answer any two questions.

Each question carries 10 marks.

32. Discuss the two biasing circuits used in CE amplifier configuration. Also explain how stabilization of operating point is achieved in each case and discuss the advantages and disadvantages of each circuit.
33. Draw the circuit diagram of a single stage CE amplifier. Describe its working with necessary theory and explain frequency response curve.
34. Explain the principle, working and V-I characteristic of UJT. Discuss one practical application of UJT in detail.
35. A Three input digital circuit gives a high output for the following input logic :

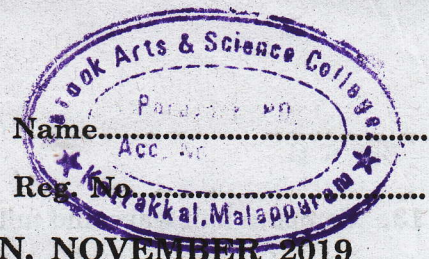
A	B	C
0	0	0
0	0	1
0	1	0
1	0	0
1	1	1

Draw a K-map for the truth table and obtained a minimised Boolean expression.

(2 × 10 = 20 marks)

D 70336

(Pages : 3)



FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2019

(CUCBCSS—UG)

Physics/Applied Physics

PHY 5B 09/APY 5B 10—ELECTRONICS (ANALOG AND DIGITAL)

Time : Three Hours

Maximum : 80 Marks

Section A (One Word)

Answer all questions.

Each question carries 1 mark.

1. What is current amplification factor ?
2. What is ripple factor ?
3. Explain voltage gain.
4. Find $A + A \cdot B = \text{—————}$.
5. Which is called universal gate ?

Write True or False :

6. The only function of NOT gate is to invert input signal
7. RC coupling is used for current amplification.
8. The best frequency response is of direct coupling.
9. Oscillators employ positive feedback.
10. The value of α of a transistor is less than one.

(10 × 1 = 10 marks)

Section B(Short Answer Type)

Answer all questions.

Each question carries 2 marks.

11. Draw the input and output characteristics of CB connection. What do you infer from these characteristics ?
12. Write a short note on operating point.

Turn over

13. Compare half wave and full wave rectifier.
14. Mention the essentials of a biasing circuit.
15. What do you understand by single stage transistor amplifiers ?
16. Explain frequency response.
17. Simplify the expression $Y = A \cdot B \cdot C + B \cdot C$.

(7 × 2 = 14 marks)

Section C (Paragraph Type)

*Answer any five questions.
Each question carries 4 marks.*

18. Explain AND function with a 2- input AND gate.
19. What are upper and lower side frequencies in AM.
20. How will you get frequency response comparable to RC coupling in a transformer coupling ?
21. Briefly explain the working of a Hartley Oscillator.
22. Explain the operation of transistor as an amplifier.
23. How will you draw d.c. load line on the output characteristics of a transistor ? What is its importance ?
24. Why are transistor amplifiers always operated above knee voltage region ?

(5 × 4 = 20 marks)

Section D (Problems)

*Answer any four questions.
Each question carries 4 marks.*

25. A CE-connected transistor has $\beta = 50$ and $I_B = 20\mu\text{A}$. Compute the values of I_C and I_E .
26. A transistor has the following ratings : $I_{c(\text{max})} = 500 \text{ mA}$ and $\beta_{\text{max}} = 300$. Determine the maximum allowable value of I_B for the device.
27. An amplifier has a voltage gain of 132 and $\beta = 100$. Determine the power gain and output power of the amplifier if the input power is $50\mu\text{W}$.
28. A certain amplifier has voltage gain of 15 dB. If the input signal voltage is 0.8V. What is the output voltage ?

29. A single stage amplifier has a voltage gain of 60. The collector load $R_c = 500\Omega$ and the input impedance is $1k\Omega$. Calculate the overall gain when two stages are cascaded through R-C coupling.
30. Convert $(B2F)_{16}$ to octal.
31. Convert decimal number 378 to a 16-bit number by first converting to hexadecimal.

(4 × 4 = 16 marks)

Section E (Essays)

Answer any two questions.

Each question carries 10 marks.

32. What is modulation ? Discuss about frequency modulation and amplitude modulation.
33. What is the importance of De Morgan's theorems in Boolean Algebra and what are the advantages of Boolean theorems ?
34. Describe the various methods used for transistor biasing ? State their advantages and disadvantages.
35. Give a brief account on feedback in amplifier. Also discuss about principle of negative feedback and their advantages.

(2 × 10 = 20 marks)

D 50609

(Pages : 4)

Name.....

Reg. No.....

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2018

(CUCBCSS—UG)

Physics/Applied Physics

PHY 5B 09/APY 5B 10—ELECTRONICS (ANALOG AND DIGITAL)

Time : Three Hours

Maximum : 80 Marks

Symbol used in this question paper have their usual meanings.

Section A (Answer in a word or phrase)

Answer all questions.

Each question carries 1 mark.

1. What is the ripple factor of a full wave rectifier ?
2. The point of intersection of DC and AC load line is _____.
3. A JFET is a _____ driven device.
4. If $A_{DM} = 3500$ and $A_{CM} = 0.35$, the CMMR of an Op-amp is _____.
5. The binary equivalent of a hexadecimal number EF is _____.

Questions 6 to 10 : Write True or False.

6. Intrinsic semiconductor is the pure form of semiconductor.
7. Positive feedback amplifier works as an oscillator.
8. The inputs to an XOR gate are 1, 0, 1. Then the output will be one.
9. The binary equivalent of decimal number 23 is 11010.
10. Two's complement of 10111 is 01000.

(10 × 1 = 10 marks)

Section B (Answer in Two or Three Sentences)

Answer all questions.

Each question carries 2 marks.

11. Define α of a transistor and show that it is always less than unity.
12. Define the operating point of a transistor.

Turn over

13. What is the importance of modulation factor in communication system ?
14. What is positional number system ?
15. Draw the circuit diagram of a RC coupled amplifier.
16. Draw the block diagram of a full adder and write down its truth table.
17. Draw the block diagram and truth table of Exclusive OR gate.

(7 × 2 = 14 marks)

Section C

Answer in a paragraph of about half a page to one page.

Answer any five questions.

Each question carries 4 marks.

18. With a neat diagram, explain the working of a Colpitt's collector oscillator and derive the expression for frequency.
19. Distinguish between positive and negative feedback amplifiers.
20. Briefly discuss the Characteristic of a FET.
21. Draw the circuit diagram and explain the working of differentiator using Op-amp.
22. Write any four limitations of amplitude modulation.
23. With the help of diagrams explain the working of RS flip-flop.
24. Draw the circuit diagram and explain the working of a voltage multiplier circuit.

(5 × 4 = 20 marks)

Section D

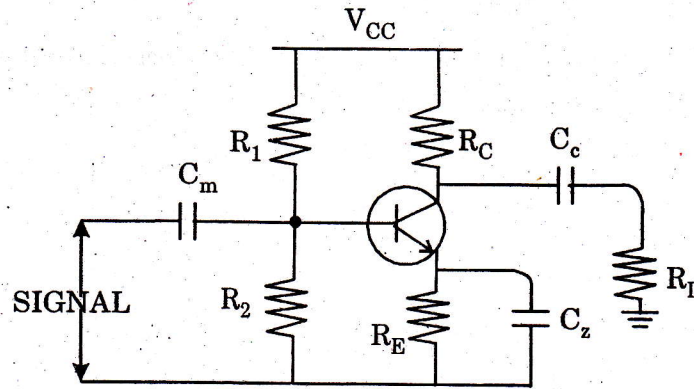
(Problems Write all relevant formulas. All important steps carry separate marks)

Answer any four questions.

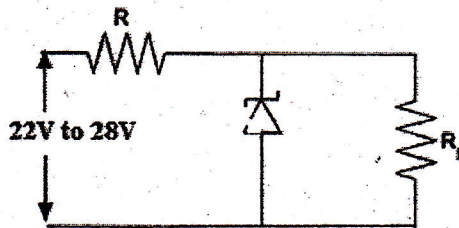
Each question carries 4 marks.

25. In an FM modulator, when the modulating frequency is 600 Hz, the modulating voltage is 2.4 V and the modulation index is 1.5. What is the modulation index when the frequency is reduced to 400 Hz and modulating voltage is simultaneously increased to 3.2 V
26. In a negative feedback amplifier, $A = 100$, $B = 0.04$ and $V_i = 50$ mv. Find (a) Gain with feedback ; (b) Output voltage ; (c) Feedback factor ; (d) Feedback voltage.
27. A diode with $V_F = 0.7$ V is connected to as a halfwave rectifier. The load resistance is 500Ω and the (r.m.s.) as input is 22 V. Determine the peak output voltage, the peak load current and the diode peak inverse voltage.

28. For a transistor amplifier shown in figure, $V_{CC} = 15V$, $R_1 = 10 K\Omega$, $R_2 = 5 K\Omega$, $R_C = 1 K\Omega$, $R_E = 2 K\Omega$ and $R_L = 1 K\Omega$. Draw the DC load line and hence find the operating point



29. A JFET has a drain current of 5 mA. If $I_{DSS} = 32 \text{ mA}$; $V_{GS}(\text{off}) = -6 \text{ V}$; find the value of :
 (i) V_{GS} ; and (ii) V_p .
30. A three-stage amplifier has a first stage of voltage gain of 100, second stage of voltage gain of 200 and the third stage voltage gain of 400. Find the total voltage gain in db.
31. The Zener diode shown in the figure has $V_Z = 18 \text{ V}$ as long as I_Z is maintained between 200 mA and 2 A. Find the value of series resistance R so that E_0 remains 18 V while input voltage E_i is free to vary between 22 V to 28 V.



(4 × 4 = 16 marks)

Section E

(Essays-Answer in about two pages)

Answer any two questions.
 Each question carries 10 marks.

32. Draw the Circuit diagram and explain the working of a full wave bridge rectifier. Also derive an expression for I_{dc} , I_{rms} , Peak inverse voltage, ripple factor and efficiency.

Turn over

33. Explain negative feedback. Derive an expression for gain in a negative voltage feedback amplifier. What are the advantages of negative feedback ?
34. Draw the circuit diagram and derive the expression for voltage gain of an Inverting and non-inverting configuration using Op-amp.
35. Draw the circuit diagram of a single stage CE amplifier. Describe its working with necessary theory and explain frequency response curve.

(2 × 10 = 20 marks)

C30315

(Pages : 4)

Name.....

Reg. No.....

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2017

(CUCBCSS—UG)

Physics/Applied Physics

PHY 5B 09/APY 5B 10—ELECTRONICS (ANALOG AND DIGITAL)

Time : Three Hours

Maximum : 80 Marks

Symbol used in the question paper have their usual meanings.

Section A

(Answer in a word or phrase)

Answer all questions.

Each question carries 1 mark

1. For a transistor the value of $\beta = 50$, then the value of $\alpha =$ _____.
2. The constant region of a JFET lies between _____.
3. Output of an OR gate is zero only when the inputs are _____.
4. The 8 bit binary equivalent of $(187)_{10}$ is _____.
5. NAND gate is known as _____ gate.

Questions 6 to 10 : Write True or False.

6. Peak inverse voltage of a half wave rectifier is V_m .
7. CE transistor amplifier circuit have greater performance then CB transistor circuit
8. The decimal equivalent of octal number 76 is 336
9. For an Op-amp inverting amplifier with equal input resistance and feedback resistance has infinite voltage gain.
10. Two's complement of 10111 is 01010.

(10 × 1 = 10 marks)

Section B

(Answer in Two or three sentences).

Answer all questions.

Each question carries 2 marks.

11. What do you mean by open loop gain.
12. What is Barkhausen criterion for sustained oscillation.
13. Derive the relationship between current amplification factors α and β .
14. What is De-morgans theorem ?
15. Define common mode rejection ratio of an Op-amp.

Turn over

16. Draw the truth table and block diagram of an exclusive OR Gate.
17. Write any two advantages of UJT.

(7 × 2 = 14 marks)

Section C

(Answer in a paragraph of about half a page to one page).

Answer any five questions.

Each question carries 4 marks.

18. Discuss the role of coupling and bypass capacitors in a single stage CE transistor amplifier. Draw the frequency response curve and define bandwidth.
19. Distinguish between FM and AM and their detection ?
20. With a neat diagram explain the working of a phase shift oscillator
21. Draw the circuit diagram of an Op-amp Integrator and explain its working
22. With a neat diagram explain the base resistor method of transistor biasing.
23. Explain how voltage stabilisation is ensured in a zener diode voltage regulator
24. With a neat diagram explain the working of a direct coupled amplifier

(5 × 4 = 20 marks)

Section D

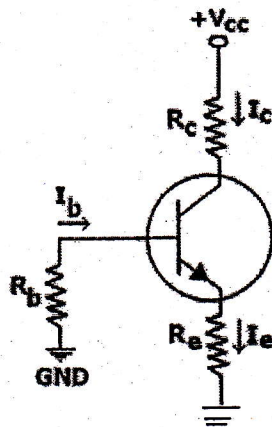
(Problems-write all relevant formulas. All important steps carry separate marks).

Answer any four questions.

Each question carries 4 marks.

25. Voltage gain of an amplifier without feedback is 3,000. Calculate the closed loop gain with negative feedback of feedback fraction 0.01. Also find the closed loop gain when the open loop gain increases to 50 %.
26. A transistor uses potential divider method of biasing. $R_1 = 50 \text{ K}\Omega$, $R_2 = 10 \text{ K}\Omega$ and $R_E = 1 \text{ K}\Omega$. If $V_{CC} = 12$, find :
 - (a) The value of I_C ; given $V_{BE} = 0.1 \text{ V}$.
 - (b) The value of I_C ; given $V_{BE} = 0.3 \text{ V}$. Comment on the result.

27. The four diode used in a bridge rectifier circuit have forward resistances which may be considered constant at 1Ω and infinite reverse resistance. The alternating supply voltage is 240 V r.m.s. and load resistance is 480Ω . Calculate (i) Mean load current ; and (ii) Power dissipated in each diode.
28. Determine the Q point of the transistor circuit shown in figure. Also draw the d.c. load line. Given $R_C = 1 \text{ K}\Omega$, $R_B = 47 \text{ K}\Omega$, $R_E = 4.7 \text{ K}\Omega$, $V_{CC} = 10 \text{ V}$ $\beta = 100$ and $V_{BE} = 0.7 \text{ V}$



29. Convert 111011.101_2 in to equivalent decimal number. Also convert 48.25_{10} in to binary number.
30. An amplifier has an open circuit voltage gain of 70 db and output resistance of $1.5 \text{ k}\Omega$. Determine the minimum value of load resistance so that voltage gain is not more than 67 db .
31. A carrier wave of 500 watts is subjected to 100% amplitude modulation. Determine :
- Power in sidebands.
 - Power of modulated wave.

(4 × 4 = 16 marks)

Section E

(Essays-Answer in about two pages).

Answer any two questions.

Each question carries 10 marks.

32. Draw the Circuit diagram and explain the working of a full wave Bridge rectifier. Also derive an expression for I_{dc} , I_{rms} , Peak inverse voltage, ripple factor and efficiency.

Turn over

33. What do you mean by feedback ? Explain the principle of feedback in amplifiers. Mention the advantages of negative feedback
34. With the help of diagrams explain the working of RS and JK flip-flops.
35. Explain the principle, working and characteristic of FET. Discuss one practical application of FET in detail.

(2 × 10 = 20 marks)

D 11562

(Pages : 4)

Name.....

Reg. No.....

**FIFTH SEMESTER B.Sc. DEGREE (SUPPLEMENTARY/IMPROVEMENT)
EXAMINATION, NOVEMBER 2016**

(UG—CCSS)

Physics

PH 5B 12—ELECTRONICS (ANALOG AND DIGITAL)

(2013 Admissions)

Time : Three Hours

Maximum : 30 Weightage

Section A (Objective Type Questions)

Answer all twelve questions.

I. Choose the correct answer :

1 Open-loop gain of an amplifier is given by :

- (a) A. (b) $A\beta$.
(c) β . (d) None of these.

2 Maximum rectifying efficiency of a full wave rectifier is :

- (a) 40.6 %. (b) 81.2 %.
(c) 0.48 %. (d) 1.21 %.

3 In a Darlington pair :

- (a) The two transistors are connected in parallel.
(b) The emitter of the first transistor feeds the base of the second.
(c) The collector of the first transistor feeds the base of the second.
(d) None of the above.

4 JFET is a :

- (a) Is a current-controlled device. (b) Has a low input resistance.
(c) Is a voltage-controlled device. (d) Is always forward-biased.

5 If $I_C = 2 \text{ mA}$ and $I_B = 50 \mu\text{A}$, the current gain for a BJT equals :

- (a) 20. (b) 25.
(c) 30. (d) 40.

Turn over

- 6 In a negative feedback, series mixing :
- (a) Tends to increase the input resistance.
 - (b) Tends to decrease the input resistance.
 - (c) Does not alter the input resistance.
 - (d) None of these.
- 7 The best frequency response is of _____ coupling.
- (a) RC.
 - (b) Transformer.
 - (c) Direct.
 - (d) Indirect.
- 8 Half adder is a logic circuit that performs binary addition of :
- (a) 3 bits.
 - (b) 2 bits.
 - (c) 4 bits.
 - (d) 8 bits.

II. Fill in the blanks with appropriate word or numerical value :

- 9 If three stage amplifier has individual stage gains of 10db, 5db and 12db, then total gain is _____.
- 10 Input impedance of an ideal op-amp equals _____.
- 11 $1100_2 + 101_2 =$ _____.
- 12 Binary equivalent of 26_8 is _____.

($12 \times \frac{1}{4} = 3$ weightage)

Section B (Short Answer Type Questions)

Answer all nine questions.

Each question carries 1 weightage.

- 13 Why are filter circuits used in power supplies ?
- 14 What is the advantage of a bridge rectifier over a full wave rectifier ?
- 15 Obtain the output of a voltage doubler, if the input r.m.s voltage is 2 V ?
- 16 What is meant by the Alpha cut off frequency ?
- 17 What are the essentials of a feedback LC oscillator ?
- 18 Why are junction transistors called bipolar devices ?
- 19 What is meant by half-power frequencies of an amplifier ?
- 20 Which are Universal gates and why are they called so ?
- 21 What do the letters R and S stand for, in the term 'RS latch'. Explain with the help of a truth table.

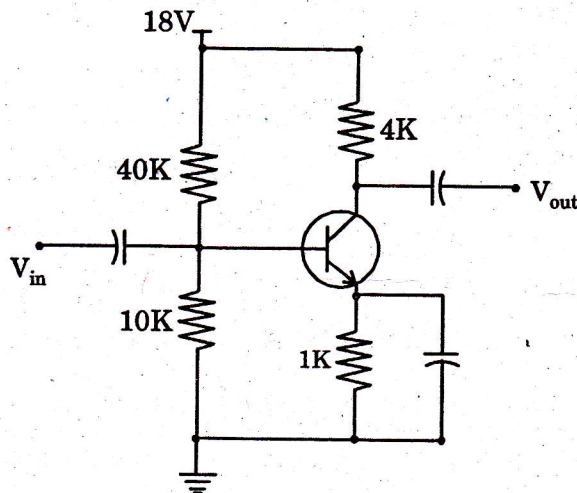
($9 \times 1 = 9$ weightage)

Section C (Short Essay or Paragraph Questions)

Answer any five questions from seven.

Each question carries 2 weightage.

- 22 What do you understand by class A amplifier ?
- 23 An amplifier has a voltage gain of -100 . The feedback ratio is -0.04 . Find (i) The voltage gain with feedback ; (ii) The amount of feedback in dB ; (iii) The output voltage of the feedback amplifier for an input voltage of 40 mV ; (iv) The feedback factor ; and (v) The feedback voltage.
- 24 An inverting amplifier has $R_f = 3 \text{ K}\Omega$ and $R = 1 \text{ K}\Omega$. Determine the output voltage, the input resistance and the input current for an input voltage of 2 V .
- 25 Give the schematic symbol of N-channel and P-channel FET.
- 26 An FM transistor sends out a 100 MHz carrier wave frequency modulated by a 15 KHz sinusoidal audio signal. The maximum frequency deviation is 30 KHz . Find (i) The modulation index ; (ii) The three significant pairs of side frequencies ; and (iii) Channel width required for these three side frequency pairs.
- 27 For a Zener regulator circuit, $V_Z = 6 \text{ V}$, $R_S = 2 \text{ K}\Omega$, $R_L = 3 \text{ K}\Omega$ and the input voltage varies from 20 V to 40 V . Find the maximum and minimum values of the Zener current.
- 28 Find the values of V_{CE} and A_v for the transistor amplifier circuit shown below :



(5 × 2 = 10 weightage)

Turn over

Section D (Essay Questions)

Answer any two questions from three.

Each question carries 4 weightage.

29. Discuss the circuit details and operation of a transformer coupled two stage amplifier. What are the advantages of transformer coupling ?
30. Explain the principle and working of an RC phase shift oscillator with a neat circuit diagram. Also give the expression for frequency.
31. What is amplitude modulation ? Describe the mathematical analysis of AM wave. Explain upper and lower side frequencies.

(2 × 4 = 8 weightage)

D 11555

(Pages : 4)

Name.....

Reg. No.....

**FIFTH SEMESTER B.Sc. DEGREE (SUPPLEMENTARY/IMPROVEMENT)
EXAMINATION, NOVEMBER 2016**

(UG—CCSS)

Physics

PH 5B 12—ELECTRONICS (ANALOG AND DIGITAL)

(2009—2012 Admissions)

Time : Three Hours

Maximum : 30 Weightage

Part A

Answer all questions.

Each question carries $\frac{1}{4}$ weightage.

1. With a full wave rectified voltage across the load resistor, load current flows for what parts of a cycle ?
 - (a) 45 degree.
 - (b) 90 degree.
 - (c) 180 degree.
 - (d) 360 degree.
2. The diodes in a bridge rectifier have a maximum d.c. current rating of 2 A. This means the d.c. load current can have a maximum value of :
 - (a) 1 A.
 - (b) 2 A.
 - (c) 4 A.
 - (d) 8 A.
3. If the load resistance increases in a zener regulator, the zener current :
 - (a) Increases.
 - (b) Decreases.
 - (c) Remains the same.
 - (d) Becomes zero.
4. In a transistor the collector diode has to be :
 - (a) Forward biased.
 - (b) Reverse biased.
 - (c) Non-conducting.
 - (d) None of these.
5. A circuit with a fixed emitter current is called :
 - (a) Base bias.
 - (b) Emitter bias.
 - (c) Collector bias.
 - (d) Reverse bias.

Turn over

6. Three different Q points are shown on a load line. The upper Q point given the :
- (a) Minimum current gain.
 - (b) Intermediate current gain.
 - (c) Maximum current gain.
 - (d) Cut off point.
7. The a.c. equivalent circuit is derived from the original circuit by shorting all :
- (a) Resistors.
 - (b) Inductors.
 - (c) Transistors.
 - (d) Capacitors.
8. The input impedance of a JFET :
- (a) Approaches zero.
 - (b) Approaches one.
 - (c) Approaches infinity.
 - (d) Impossible to predict.
9. Amplitude modulation is used for broadcasting because :
- (a) It is more noise immune.
 - (b) It requires less transmitting power.
 - (c) Its use avoids receiver complexity.
 - (d) It gives large bandwidth for high fidelity.
10. Each 4-bit binary group is called :
- (a) Bit.
 - (b) Nibble.
 - (c) Byte.
 - (d) Word.
11. A combinational circuit can be designed using only :
- (a) AND gates.
 - (b) OR gates.
 - (c) OR and X-NOR gates.
 - (d) NOR gates.
12. An AND gate can be imagined as :
- (a) Switches connected in series.
 - (b) Switches connected in parallel.
 - (c) Transistors connected in series.
 - (d) Transistors connected in parallel.

(12 × ¼ = 3 weightage)

Part B

Answer all questions.

Each question carries 1 weightage.

13. What is a voltage multiplier. Give *one* use.
14. What is ripple factor ? On what factors does it depend ?
15. What is decibel ? How is the gain of an amplifier expressed in decibels ?
16. What is negative feedback ? What are its important characteristics ?
17. What is FET ? In what ways is it different from a transistor ?
18. What is slew rate ? On what factors does it depend ?
19. What is pulse code modulation ? Where is it used ?
20. Why is the binary number used in digital systems ?
21. Distinguish between positive logic system and negative logic system.

(9 × 1 = 9 weightage)

Part C

Answer any five questions.

Each question carries 2 weightage.

22. Explain how voltage stabilization is done using a zener diode. A zener regulator has an input voltage ranging from 15 V to 20 V and a load current ranging from 5mA to 20 mA. If the zener voltage is 6.8v, what is the maximum series resistance ?
23. Draw and explain the common emitter characteristics of an NPN transistor. Draw the load line and define quiescent point.
24. Explain the construction and working of a RC phase shift oscillator.
25. What is frequency modulation ? Where is it used ? Compare it with AM.
26. What is a UJT ? Give its working and characteristics. Mention *one* application.
27. Distinguish between Inverting and Non-inverting amplifiers using figures.
28. With the help of circuit diagrams, explain the working of (a) OR gate ; and (b) NAND gate. Give the truth table and logic symbols also.
29. State and prove Demorgans theorem.

(5 × 2 = 10 weightage)

Turn over

Part D

*Answer any two questions.
Each question carries 4 weightage.*

30. Explain the working of a full wave rectifier. What is a filter circuit? Explain any *one* type of a filter circuit. How does a filter circuit affect the ripple factor?
31. Describe the working of RC coupled amplifier. Using the a.c. equivalent circuit obtain an expression for the amplification. Draw the frequency response and define band width.
32. Explain the working of an op-amp as (a) Differentiator ; and (b) Integrator.
33. (a) What is the necessity to reduce Boolean expression. Give the procedure to reduce Boolean expression ; and (b) What are universal gates? Explain the working of NAND and NOR gates as universal gates.

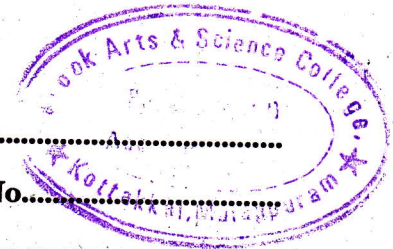
(2 × 4 = 8 weightage)

D 11171

(Pages : 3)

Name.....

Reg. No.....



FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2016

(CUCBCSS-UG)

Physics/Applied Physics

PHY 5B 04/APY 5B 10—ELECTRONICS (ANALOG/DIGITAL)

Time : Three Hours

Maximum : 80 Marks

Section A

Answer all questions in a word or a phrase.

Each question carries 1 mark.

1. How much is the percentage of regulation in an ideal rectifier ?
2. Give the Barkhausen condition for oscillations. $M_V A_V = 1$
3. How much is the gain of a buffer amplifier ?
4. In FM, when frequency deviation is doubled how does it affect the modulation ?
5. Binary equivalent of the Hexadecimal number $A5B_{16}$. $(1010\ 001\ 1011)$

Write True or False :

6. CE configuration of transistor amplifier has the highest voltage gain. ✓
7. Field effect transistor is a current-controlled device. ✓
8. The output impedance of an amplifier decreases when current-shunt negative feedback is used.
9. The closed loop gain of an amplifier is always greater than the open loop gain.
10. Oscillators employ positive feedback. ✓

(10 × 1 = 10 marks)

Section B

Answer all questions in two or three sentences.

Each question carries 2 marks.

11. What is the difference between active and passive filters ?
12. Define Q point of a transistor.
13. What is the advantage of a bridge rectifier over a full wave rectifier ?
14. Give the schematic symbol of N-channel and P-channel FET.
15. Define the bandwidth of an amplifier.
16. What do you understand by the inverting and noninverting terminals of an Op-Amp ?
17. In a code of base 7, the digits are 0, 1, 2, 3, 4, 5, 6. The number 468 is in decimal code. What is the equivalent in a code of base 7 ?

(7 × 2 = 14 marks)

Turn over

Section C

*Answer any five questions.
Each question carries 4 marks.*

18. Discuss the input and output characteristics of CB transistor configuration.
19. What is direct coupling in amplifiers? What are the advantages of the same?
20. Draw the circuit diagram of a phase shift oscillator with labels on the components. Give the expression for its frequency.
21. What are upper and lower side frequencies in AM?
22. How does a light emitting diode get its colour?
23. Explain 1's complement method of binary subtraction with example.
24. Why NAND and NOR are called universal gates?

(5 × 4 = 20 marks)

Section D

*Answer any four questions.
Each question carries 4 marks.*

Problems—write all relevant formulas, all important steps carry separate marks.

25. The turns ratio of a transformer used in half wave rectifier is $n_1 : n_2 = 10 : 1$. The primary is connected to the power mains; 220 V, 50 Hz. Neglecting the diode resistance in forward bias, calculate the d.c. voltage across the load. What is the PIV of the diode?
26. An RC coupled amplifier has a voltage gain of 120 in the frequency range of 500 to 30 kHz. On either side of these frequencies, the gain falls so that it reduced by 3 dB at 100 Hz and 50 kHz. Calculate the gain in dB at cut-off frequencies and also plot the frequency response curve.
27. A transistor has $\alpha = 0.96$ and a collector leakage current I_{CO} of 1 μ A. Calculate the collector and base currents, when $I_E = 2$ mA.
28. For a single stage transistor amplifier, the collector load is 3 k Ω and the input resistance is 1 k Ω . If the current gain is 100, calculate the voltage gain of the amplifier.
29. A water pump is required to turn on automatically whenever the water level in any two or more of three tanks A, B and C falls below a pre-set level. Each water tank is provided with a level detector that generates a high voltage whenever the water level in the tank is low. (a) Write down the Boolean expression for the working of water pump whenever a high voltage turn on. (b) Implement the Boolean expression using AND, OR and NOT gates. (c) Reduce the Boolean expression to minimum number of literals and (d) Obtain a much simpler circuit.
30. Obtain the output of an Op-Amp adder with the following data. Inputs are $V_1 = 0.1$ V, $V_2 = 0.3$ V and $V_3 = 0.5$ V. Input resistors are $R_1 = 2$ k Ω , $R_2 = 3$ k Ω and $R_3 = 4$ k Ω and the feedback resistor $R = 12$ k Ω .
31. A computer is transmitting the following groups of bytes to an output device. Give the equivalent octal and hexadecimal listings, 10110110, 01111011, 10010101, 00101110.

(4 × 4 = 16 marks)

Section E

*Answer any two questions.
Each question carries 10 marks.*

32. Discuss the need of biasing in transistor amplifiers. Describe the different methods of biasing.
33. Describe the term feedback in amplifiers. Explain the principle of negative feedback and discuss the advantages of negative feedback.
34. What is modulation ? Discuss frequency modulation and explain the term carrier swing.
35. Briefly describe the Karnaugh map method and its applications. Obtain the simplified SOP and POS forms of the function $F(A, B, C, D) = \Sigma(0, 1, 2, 5, 8, 9, 10)$ using K map.

(2 × 10 = 20 marks)

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2015

(U.G.—CCSS)

Core Course—Physics

PH 5B 12—ELECTRONICS (ANALOG AND DIGITAL)

(2013 Admissions)

Time : Three Hours

Maximum : 30 Weightage

Section A (Objective type questions)

Answer all twelve questions.

I. Choose the correct answer :

1 Maximum efficiency of a half wave rectifier is :

- (a) 40.6 %.
- (b) 81.2 %.
- (c) 50 %.
- (d) 1.21 %.

2 The gain of a cascaded amplifier is equal to the :

- (a) Product of individual gains.
- (b) Sum of individual gains.
- (c) Ratio of stage gains.
- (d) None of these.

3 Transistor is a _____ operated device.

- (a) Current.
- (b) Voltage.
- (c) Both voltage and current.
- (d) None of these.

4 In an AM wave with 100 percent modulation, each side band carries _____ of the total transmitted power.

- (a) One third.
- (b) Two third.
- (c) One sixth.
- (d) One half.

II. Fill in the blanks with appropriate word or numerical value :

5 The condition $A\beta = 1$ for oscillations is known as the _____ criterion.

6 The percentage of regulation in an ideal rectifier is _____.

7 Binary equivalent of $A3D_{16}$ is _____.

8 In a Karnaugh map, four adjacent 1s are called _____.

Turn over

III. State whether the following statements are true or false :

- 9 The higher the frequency of the wave, the longer the length of the antenna.
- 10 The closed loop gain of an amplifier is always greater than the open loop gain.
- 11 A field effect transistor is basically a voltage controlled resistor.
- 12 Class C operation is most efficient because it hardly operates during the input cycles.

(12 × ¼ = 3 weightage)

Section B (Short Answer type questions)

Answer all nine questions.

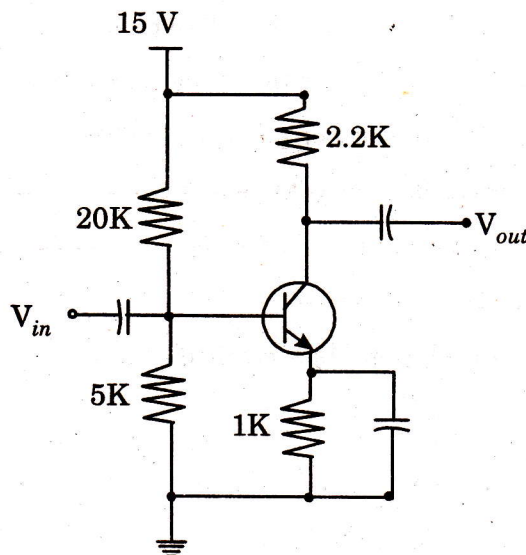
- 13 Define the unit decibel for expressing : (i) voltage ; (ii) current ; and (iii) power.
- 14 What is meant by the Beta cut off frequency ?
- 15 Explain the term PIV in connection with a half wave rectifier.
- 16 Why a capacitor filter is better than the inductor filter ?
- 17 What is a Darlington pair ?
- 18 Distinguish between oscillators and amplifiers.
- 19 What is regulated power supply ?
- 20 Implement the logic expression $Y = (A + B)(A' + B')$ in a logic diagram. Construct the truth table and hence show that the logic diagram is equivalent to an XOR gate.
- 21 Discuss the operation of a Half adder.

(9 × 1 = 9 weightage)

Section C (Short Essay or Paragraph questions)

Answer any five questions from seven.

- 22 Why R-C coupling is the widely used coupling between the two stages of cascaded amplifier ?
- 23 Find the values of V_{CE} and A_V for the transistor amplifier circuit shown below :



- 24 Draw the circuit diagram of a voltage tripler.
- 25 For a Zener regulator circuit, $V_Z = 12 \text{ V}$, $R_S = 4 \text{ K}\Omega$, $R_L = 6 \text{ K}\Omega$ and the input voltage varies from 30 V to 50 V . Find the maximum and minimum values of the Zener current.
- 26 Find the operating frequency of a Hartley oscillator if $L_1 = 100 \mu\text{H}$, $L_2 = 1 \text{ mH}$, mutual inductance between the coils $M = 20 \mu\text{H}$ and $C = 20 \text{ pF}$.
- 27 The peak-to-peak value of an AM voltage has a maximum value of 8V and a minimum value of 2V . What is the percentage modulation and the amplitude of the unmodulated carrier ?
- 28 Discuss the functioning of a JK Flip Flop with the help of a logic circuit.

(5 × 2 = 10 weightage)

Section D (Essay questions)

Answer any two questions from three.

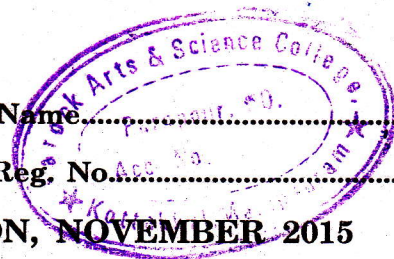
- 29 Describe the term feedback in amplifiers. Explain the principle of negative feedback and discuss the advantages of negative feedback.
- 30 What is modulation ? Discuss frequency modulation. Explain the term carrier swing.
- 31 What is an Op-Amp ? State the characteristics of an ideal Op-Amp. Describe the use of Op-Amp as an adder.

(2 × 4 = 8 weightage)

D 90915

(Pages : 4)

Name.....
Reg. No.....



FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2015

(UG—CCSS)

Core Course—Physics

PH 5B 12—ELECTRONICS (ANALOG AND DIGITAL)

(2009—2012 Admissions)

Time : Three Hours

Maximum : 30 Weightage

Part A

Answer all questions.

Each question carries ¼ weightage.

1. The diodes in a bridge rectifier have a maximum d.c. current rating of 2A. This means the d.c. load current can have a maximum value of :
 - (a) 1A.
 - (b) 2A.
 - (c) 4A.
 - (d) 8A.
2. A Zener diode :
 - (a) Is a battery.
 - (b) Is a rectifier diode.
 - (c) Has a constant voltage in the breakdown region.
 - (d) Is forward biased.
3. In a transistor the collector diode has to be :
 - (a) Forward biased.
 - (b) Reverse biased.
 - (c) Non-conducting.
 - (d) None of these.
4. The base-emitter voltage of an ideal transistor is :
 - (a) 0.3V.
 - (b) 0.7V.
 - (c) 0V.
 - (d) High voltage.
5. Three different Q points are shown on a load line. The upper Q point given the :
 - (a) Minimum current gain.
 - (b) Intermediate current gain.
 - (c) Maximum current gain.
 - (d) Cut-off point.

Turn over

6. Voltage divider bias needs :
- (a) Only three resistors.
 - (b) Only one supply.
 - (c) Precision resistors.
 - (d) Active devices.
7. The input impedance of a JFET :
- (a) Approaches zero.
 - (b) Approaches one.
 - (c) Approaches infinity.
 - (d) Impossible to predict.
8. The coupling circuit in an oscillator is :
- (a) Lag circuit.
 - (b) Lead circuit.
 - (c) Lead-lag circuit.
 - (d) Resonant circuit.
9. Each 4 bit binary group is called :
- (a) Bit.
 - (b) Nibble.
 - (c) Byte.
 - (d) Word.
10. In a digital computer binary subtraction is performed using :
- (a) Using 2'S complement method.
 - (b) Using 9'S complement method.
 - (c) Using 10'S complement method.
 - (d) None of these.
11. An AND gate can be imagined as :
- (a) Switches connected in series.
 - (b) Switches connected in parallel.
 - (c) Transistors connected in series.
 - (d) Transistors connected in parallel.
12. K-map is used :
- (a) To minimize the number of flip flops in a digital circuit.
 - (b) To minimize the number of gates only in a digital circuit.
 - (c) To minimize the number of gates and the fan in requirements.
 - (d) To design gates.

(12 × ¼ = 3 weightage)

Part B

*Answer all questions.
Each question carries 1 weightage.*

13. What is ripple factor ? On what factors does it depend.
14. What property of the transistor is used in the process of amplification ? Explain.

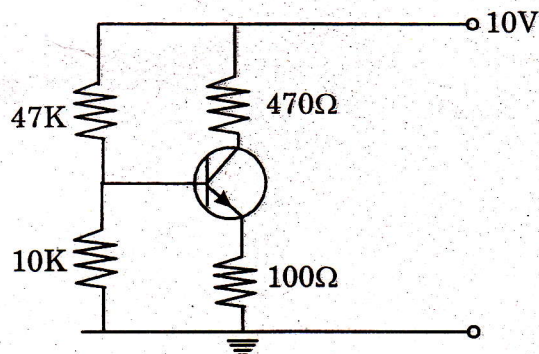
15. What is negative feedback ? What are its important characteristics ?
16. What is amplitude modulation ? Where is it used ?
17. What is slew rate ? On what factors does it depend ?
18. Distinguish between LC and RC oscillators.
19. Why is the binary number used in digital systems ?
20. Explain the sign magnitude representation of numbers.
21. Explain how voltage stabilization is done using a Zener diode.

(9 × 1 = 9 weightage)

Part C

*Answer any five questions.
Each question carries 2 weightage.*

22. Draw and explain the common emitter characteristics of an NPN transistor. Draw the load line and define quiescent point.
23. Explain voltage- divider bias. For the circuit given below calculate I_C , I_E , V_{CE} and Q point.



24. What is frequency modulation ? Where is it used? Compare it with AM.
25. What is demodulation ? How is demodulation achieved using a straight receiver.
26. Distinguish between Inverting and Non-inverting amplifiers using figures.
27. Discuss 1's and 2's complement methods of subtraction.
28. State and prove Demorgans theorem.

(5 × 2 = 10 weightage)

Turn over

Part D

*Answer any two questions.
Each question carries 4 weightage.*

29. Describe the working of RC coupled amplifier. Using the a.c. equivalent circuit obtain an expression for the amplification. Draw the frequency response and define band width.
30. Describe the construction and working of an RC phase-shift oscillator. Obtain the expression for frequency. Design a phase-shift oscillator to have a frequency of 1 kHz.
31. (a) What is the necessity to reduce Boolean expression. Give the procedure to reduce Boolean expression.
(b) What are universal gates ? Explain the working of NAND and NOR gates as universal gates.
32. Explain the working of a fullwave rectifier. What are filter circuits ? Explain its how it affects the output of rectifier circuits.

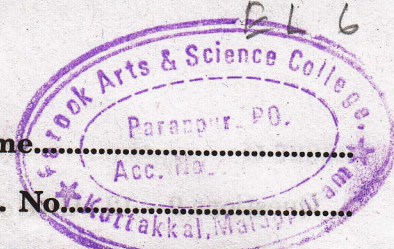
(2 × 4 = 8 weightage)

D 70950

(Pages : 3)

Name.....

Reg. No.....



FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2014

Core Course—Physics

PH 5B 12—ELECTRONICS (ANALOG AND DIGITAL)

Time : Three Hours

Maximum : 30 Weightage

Section I

I. Answer all *twelve* questions :

Questions 1 – 4 : Choose correct alternative.

1 The efficiency of a half-wave rectifier is :

- (a) 81.2%.
- (b) 40.6%.
- (c) 100%.
- (d) 50%.

2 Which of the following is wrong ?

- (a) Collector is made physically larger than emitter.
- (b) Collector is moderately doped.
- (c) Collector and emitter are of same type semiconductor.
- (d) Collector and emitter can be interchanged.

3 The condition for sustained oscillation in the case of a feedback amplifier is :

- (a) $A_{vf} < A_v$.
- (b) $A_{vf} > A_v$.
- (c) $A_{vf} = \infty$.
- (d) $A_{vf} = 0$.

4 $(101)_2 = (\text{---})_{10}$:

- (a) 6.
- (b) 5.
- (c) 8.
- (d) 10.

Questions 5 – 8 : Fill in the blanks.

5 Zener diodes are commonly used as _____.

6 An amplifier in _____ configuration has the highest output impedance.

7 A JFET has the disadvantage of _____.

8 A full adder has _____ inputs and *two* outputs.

Turn over

Questions 9 – 12 : Give *one* word answers.

- 9 How the amplitude and intensity of a sound wave are related ?
- 10 To invert a given signal which logic gate is used.
- 11 Write the expression for gain of the amplifier, if negative feedback is applied.
- 12 Write the decimal equivalent of $(1101101)_2$.

($12 \times \frac{1}{4} = 3$ weightage)

Section II

II. Answer all *nine* questions :

- 13 What are voltage multipliers ?
- 14 Draw the circuit diagram of a choke-input filter circuit.
- 15 Write the expression for voltage gain of a CE amplifier.
- 16 Write the relation between γ and α of a common-collector transistor configuration.
- 17 Draw the input and output waveforms of a class A amplifier.
- 18 Draw the circuit diagram of an Op-amp differentiator.
- 19 What is a MOSFET ?
- 20 What is a Flip-flop ?
- 21 Write the Boolean expression for Exclusive – OR gate.

($9 \times 1 = 9$ weightage)

Section III

III. Answer any *five* questions :

- 22 A diode having an internal forward resistance $r_f = 30 \Omega$ is used for a HW rectifier. The input a.c. voltage is $V_i = 5.3 \sin wt$ volt and the load resistance is 500Ω . Find the a.c. input power and rectifier efficiency.
- 23 In a common base connection, current gain is 0.9. If the emitter current is 1 mA, calculate the base current.
- 24 In a transistor CE amplifier $V_{cc} = 12.5$ V, collector load $R_c = 2.5$ k Ω . Draw the d.c. load line.
- 25 Explain the potential divider biasing method and discuss its advantages.
- 26 A class A power amplifier has zero signal collector current of 50 mA. If the collector supply voltage is 5V, find (i) the maximum a.c. power output ; (ii) the maximum collector efficiency.
- 27 In the phase shift oscillator, $R_1 = R_2 = R_3 = 1$ M Ω and $C_1 = C_2 = C_3 = 68$ pF. At what frequency does the circuit oscillate ?

28 Simplify the Boolean expressions :

(i) $AB\bar{C} + A\bar{B}\bar{C} + \bar{A}BC + ABC + A\bar{B}C$

(ii) $(AB + C)(AB + D)$.

(5 × 2 = 10 weightage)

Section IV

IV. Answer any *two* questions :

29 (a) Explain the principle of a full wave bridge Rectifier.

(b) Derive the expression for efficiency.

30 (a) With a circuit diagram, explain the working of a transformer coupled class A amplifier.

(b) Discuss its advantages.

31 Explain RC oscillation. With the help of a circuit diagram, describe the working of a phase shift oscillator. What are its merits and demerits ?

(2 × 4 = 8 weightage)

EL 8

D 50732

(Pages : 2)

Name.....

Reg. No.....

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2013
(UG-CCSS)

Physics—Core Course

PH5 B12—ELECTRONICS (ANALOG AND DIGITAL)

Time : Three Hours

Maximum : 30 Weightage

I. Answer all questions :

- 1 The efficiency of a half-wave rectifier is :

(a) 81.2 %.	(b) 40.6 %.
(c) 100 %.	(d) 50 %.
- 2 Which of the following configuration is used for impedance matching ?

(a) CB.	(b) CE.
(c) CC.	(d) All.
- 3 The condition for sustained oscillation in the case of a feedback amplifier is :

(a) $A_{vf} < A_v$.	(b) $A_{vf} > A_v$.
(c) $A_{vf} = \infty$.	(d) $A_{vf} = 0$.
- 4 $(1011.1101)_2 = \underline{\hspace{2cm}}$.

(a) 11.8125_{10} .	(b) 11.6825_{10} .
(c) 13.8125_{10} .	(d) 13.8825_{10} .

Fill in the blanks :

- 5 The maximum efficiency of a full-wave rectifier is _____.
- 6 A JFET has the disadvantages of _____.
- 7 A full adder has _____ inputs and two outputs.
- 8 The _____ gate is also called "Any or All gate".

Give one word answers :

- 9 Write the name of any one of the universal gates
- 10 How the amplitude and intensity of a sound wave are related ?
- 11 Write the decimal equivalent of $(1101101)_2$.
- 12 How negative feedback in amplifier circuits affect noise ?

(12 × ¼ = 3 weightage)

Turn over

II. Answer *all* questions :

- 13 What are voltage multipliers ?
- 14 Draw the circuit diagram of a choke-input filter circuit.
- 15 What is meant by d.c. loadline ?
- 16 Write De Morgan's theorem.
- 17 Write the relation between α and γ of a common-collector transistor configuration.
- 18 Draw the circuit diagram of an *op-amp* differentiator.
- 19 How negative numbers are represented in binary system ?
- 20 Explain the principle of light emitting diode.
- 21 Write the Boolean expression for X-OR gate.

(9 × 1 = 9 weightage)

III. Answer any *five* questions :

- 22 In a common-base transistor configuration, current gain is 0.9. If the emitter current is 1 mA, calculate the base current.
- 23 A half-wave rectifier uses a diode with $r_p = 300 \Omega$. If the input ac is 200 V (rms) and load is a resistance of 1200Ω , calculate I_{dc} , I_{rms} and rectification efficiency.
- 24 Discuss the method of biasing a transistor with feedback resistor. Explain its advantages.
- 25 Simplify the Boolean expression :
 - (i) $ABC + \overline{ABC} + \overline{ABC} + ABC + \overline{ABC}$.
 - (ii) $(AB + C)(AB + D)$.
- 26 In a transistor CE amplifier, $V_{CC} = 12.5 \text{ V}$, collector load $R_c = 2.5 \text{ k}\Omega$. Draw the DC load line.
- 27 (a) What is meant by amplitude modulation ?
 (b) An audio signal of 1 kHz is used to modulate a carrier of 500 kHz. Determine the sideband frequencies.
- 28 (a) Define decibel gain. What are the advantages of using decibel units ?
 (b) Find the gain in dB for a voltage gain of 3D.

(5 × 2 = 10 weightage)

IV. Answer any *two* questions :

- 29 (a) Explain the principle of a Full wave bridge rectifier.
 (b) Derive the expression for efficiency of the Fullwave Bridge rectifier.
- 30 (a) With a neat circuit diagram, explain the working of a transformer coupled class a amplifier.
 (b) Discuss its advantages and disadvantages.
- 31 (a) With the help of the truth table, explain the functions of full-adder.
 (b) Using examples, illustrate the addition of 3-bits by full-adder.

(2 × 4 = 8 weightage)