

University of Mumbai

Examination 2020

Examinations Commencing from 7th January 2021 to 20th January 2021

Program: Electronics and Telecommunication Engineering

Curriculum Scheme: Rev2019

Examination: SE Semester III

Course Code: ECC302 and Course Name: Electronic Devices and Circuits

Time: 2 hour

Max. Marks: 80

Q1:

Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	B
Q2.	A
Q3.	C
Q4	B
Q5	D
Q6	C
Q7	A
Q8.	C
Q9.	B
Q10.	D
Q11.	A
Q12.	C
Q13.	A
Q14.	C
Q15.	B
Q16.	A
Q17.	D
Q18.	B
Q19.	D
Q20.	C

Important steps and final answer for the questions involving numerical example

Q2(B)(i): Given

$$\beta = 100, R_e = 30 \Omega, A_V = 1$$

a. Calculation of lower cut off frequency due to C_{in} and C_{out} capacitors:

$$f_{L1} = \frac{1}{2\pi C_{in} R_{in}} = 70.2 \text{ Hz where}$$

$$C_{in} = 0.1 \mu F \text{ \& } R_{in} = 1 K\Omega + Z_i (21.7 K\Omega)$$

$$f_{L2} = \frac{1}{2\pi C_{out} R_o} = 193.4 \text{ Hz where}$$

$$C_o = 0.1 \mu F \text{ \& } R_o = 8.2 K\Omega + Z_o (29.8 K\Omega)$$

Hence lowest cutoff freq. will be 193.4 Hz

b. Calculation of higher cut off frequency due to parasitic input & output capacitors

Due to Miller effect,

$$C_{Mi} = C_{be} [1 + A_V] = 54.5 \text{ pF}$$

$$\text{\& } C_{Mo} = C_{be} = 30 \text{ pF}$$

Higher freq. input & output capacitance is

$$C_i = C_{Wi} + C_{bc} + C_{Mi} = 87.48 \text{ pF \&}$$

$$C_o = C_{Wo} + C_{ce} + C_{Mo} = 82.52 \text{ pF}$$

Higher Cutoff freq. calculation:

$$f_{H1} = \frac{1}{2\pi C_i R_i} = 1.902 \text{ MHz where}$$

$$C_i = 87.48 \text{ pF \& } R_{in} = 1 K\Omega // 21.7 K\Omega$$

$$f_{H2} = \frac{1}{2\pi C_{out} R_o} = 65 \text{ MHz where}$$

$$C_o = 82.52 \text{ pF \& } R_o = R_L // R_o$$

Hence highest cutoff freq. will be 1.9 MHz

Total BW of amplifier is

$$f_H - f_L = (1.902 \text{ MHz} - 193.4 \text{ Hz}) = 1.901 \text{ MHz}$$